HAZARD RANKING SYSTEM DOCUMENTATION PACKAGE
SAN QERMAN GROUNDWATER CONTAMINATION
SAN GERMAN, PUERTO RICO

CERCLIS ID NO.: PRN000205957

VOLUME 2 of 2*

Contract No. EP-W-05-048
Work Assignment No. 052
Document Control No. SAT2.20113.052.284

October 2006

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Prepared by:
Region 2 Site Assessment Team 2
Weston Solutions, Inc.
Edison, NJ 08837

*(Original document was one volume. In order to fit this duplicate in binders it needed to be separated into two volumes.)

202862

REFERENCE 16

SAMPLING TRIP REPORT

SITE NAME: Acorn Cleaners
DCN NO.: SAT2.20113.055.334
W.O. NO.: 20113.011.001.005.00
CASE NO.: 36112 5

EPA I.D. NO.: PRN000205926

SAMPLING DATES: January 26, 2007

1. Site Location: Refer to Figure 1

2. Sample Locations: Refer to Figure 2

3. Sample Descriptions: Refer to Table 1

4. Laboratories Receiving Samples:

Analysis	Name and Address of Laboratory
Target Compound List (TCL) Volatile Organic Compounds (VOCs), Percent Moisture	Liberty Analytical Corporation 501 Madison Avenue Cary, NC 27513

5. Sample Dispatch Data:

Six aqueous samples and eleven soil samples for TCL volatile organic compound (VOC) analysis (low-medium concentration) were shipped to Liberty Analytical Corporation, Cary NC on 1/26/2007 at 1630 hours via Federal Express (Airbill No. 8392 8685 3763).

6. On-Site Personnel:

Name	Company	Duties on Site
Dennis Foerter	Weston	Project Manager, Site Health and Safety Officer (SHSO), Sampler
Scott Snyder	Weston	Sample Management Officer (SMO)
Thomas Brownell	Weston	Site Geologist, Geoprobe oversight, Sampler
Julissa Morales	Weston	Sampler, Global Positioning System (GPS) Data Collection
William Rodriguez	GeoEnvirotech, Inc.	Geoprobe™ Operator
Abraham Nunez	GeoEnvirotech, Inc.	Geoprobe™ Assistant

7. Additional Comments:

On January 26, 2007, Weston Solutions, Inc. (Weston®) Region 2 Site Assessment Team 2 (SAT 2) personnel conducted a sampling event at the Acorn Cleaners (ACPR) site. SAT 2 collected surface soil, subsurface soil, and groundwater samples to determine the priority for further action for this site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Five surface soil, six subsurface soil (including one duplicate), and five groundwater samples were collected throughout the site. Surface and subsurface soil samples were collected from soil borings advanced using Geoprobe™ direct-push technology. Surface soil samples were collected from the 0- to 2-foot interval below ground surface (bgs). Soil borings were screened every 2 feet using a photoionization detector (PID). Subsurface soil sampling depths were determined based upon PID readings, visual observation, and Geoprobe™ refusal. If there were no elevated organic vapor concentrations, visual signs of contamination, or Geoprobe™ refusal, subsurface soil samples were collected at the interval immediately above groundwater.

Soil samples were collected using dedicated En Core™ sampling devices, disposable plastic scoops, and aluminum trays. One rinsate blank (plastic scoop, aluminum tray, and a decontaminated Geoprobe™ cutting shoe) was collected. One trip blank sample was collected in conjunction with groundwater samples. An environmental duplicate for the aqueous matrix was not collected due to the fact that groundwater was not established in the last boring (Location 2) advanced for the sampling event.

All samples collected by Weston® were designated for analysis of TCL volatile organic compounds (VOCs) through the EPA Contract Laboratory Program (CLP). All sample locations were recorded electronically using GPS technology in accordance with the EPA Region 2 Standard Operating Procedure (SOP). All samples were collected as part of the Preliminary Assessment / Site Inspection (PA/SI) evaluation conducted on site. The Organic Traffic Report is presented in Attachment 1.

8. Report Prepared by: _____ Date: 2/2/07
Dennis J. Foerter, CHMM

9. Report Approved by: _____ Date: 2/2/07
for W. S. Butterfield, CHMM

TABLE 1
SAMPLE DESCRIPTIONS
ACORN CLEANERS
SAN GERMAN, PUERTO RICO

S01	B3RZ4	1/26/07	0645	Surface soil sample from parking lot west of the Antongiorgie building. Soil consisted of well-compacted silty sand with asphalt; depth: 0.5-1 foot (ft.) below ground surface (bgs); Matrix Spike/Matrix Spike Duplicate (MS/MSD) for Quality Assurance/Quality Control (QA/QC) purposes.
SS01	B3RZ5	1/26/07	0725	Subsurface soil sample from parking lot west of the Antongiorgie building. Soil consisted of a light-grayish-brown gravelly silt; depth: 14-15 feet (ft.) bgs.
S02	B3RZ7	1/26/07	1240	Surface soil sample adjacent to south parking lot of the San German Government Building, located north of the Acorn Cleaners site. Soil consisted of loose gravelly coarse sand; depth: 0.5-1 ft. bgs.
SS02	B3RZ8	1/26/07	1240	Subsurface soil sample adjacent to south parking lot of the San German Government Building, located north of the Acorn Cleaners site. Soil consisted of light-brown hard well compacted clay; depth: 13-14 ft. bgs.
SS02A	B3RZ9	1/26/07	1245	Duplicate of subsurface soil sample AGS-SS02 for QA/QC purposes.
S03	B3S02	1/26/07	0800	Surface soil sample from parking lot west of the Antongiorgie building. Soil consisted of fine sand mixed with concrete chips; depth: 0.5-1 ft. bgs.
SS03	B3S03	1/26/07	0820	Subsurface soil sample from parking lot west of the Antongiorgie building. Soil consisted of brownish-red loose sandy gravel; depth: 6.5-7 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
ACORN CLEANERS
SAN GERMAN, PUERTO RICO

S04	B3S05	1/26/07	0845	Surface soil sample from parking lot directly west of Acorn Cleaners facility and north of Acorn's cooling tower. Soil consisted of light-brown coarse sand with concrete chippings and asphalt; depth: 0.5-1 ft. bgs.
SS04	B3S06	1/26/07	0910	Subsurface soil sample from parking lot directly west of Acorn Cleaners facility and north of Acorn's cooling tower. Soil consisted of light-gray loose medium to fine sand; depth: 12-13.5 ft. bgs.
S05	B3S08	1/26/07	0930	Background surface soil sample south of the Acorn Cleaners facility; collected from an area not believed to have been impacted by previous site activities. Soil consisted of loose fine to medium sand and concrete chippings; depth: 0.5-1 ft. bgs.
SS05	B3S09	1/26/07	1006	Background subsurface soil sample south of the Acorn Cleaners facility; collected from an area not believed to have been impacted by previous site activities. Soil consisted of light-gray silty sand; depth: 15-16 ft. bgs.
GW01	B3RZ6	1/26/07	0735	Groundwater sample from parking lot west of the Antongiorgie building; depth: 15 ft. bgs; MS/MSD for QA/QC purposes.
GW03	B3S04	1/26/07	0815	Groundwater sample from parking lot west of the Antongiorgie building; depth: 7 ft. bgs.
GW04	B3S07	1/26/07	1000	Groundwater sample from parking lot directly west of Acorn Cleaners facility and north of Acorn's cooling tower; depth: 15 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
ACORN CLEANERS
SAN GERMAN, PUERTO RICO

GW05	B3S10	1/26/07	1025	Background groundwater sample south of the Acorn Cleaners facility; collected from an area not believed to have been impacted by previous site activities; depth: 16 ft. bgs.
RIN01	B3S11	1/26/07	0805	Rinsate Blank (Geoprobe™ cutting shoe, disposable plastic scoop, and aluminum tray) for QA/QC purposes.
TB01	B3S12	1/26/07	0705	Trip Blank collected for QA/QC purposes.

SITE LOCATION AND SAMPLE LOCATION MAPS

LEGEND

Approximate Site Location

SOURCE

7.5 Minute Series Topographic Quadrangle: San German, PR.

PROJECT

Acorn Cleaners

CLIENT NAME

EPA

TITLE

Acorn Cleaners
San German Sites
San German, PR

7

WESTON

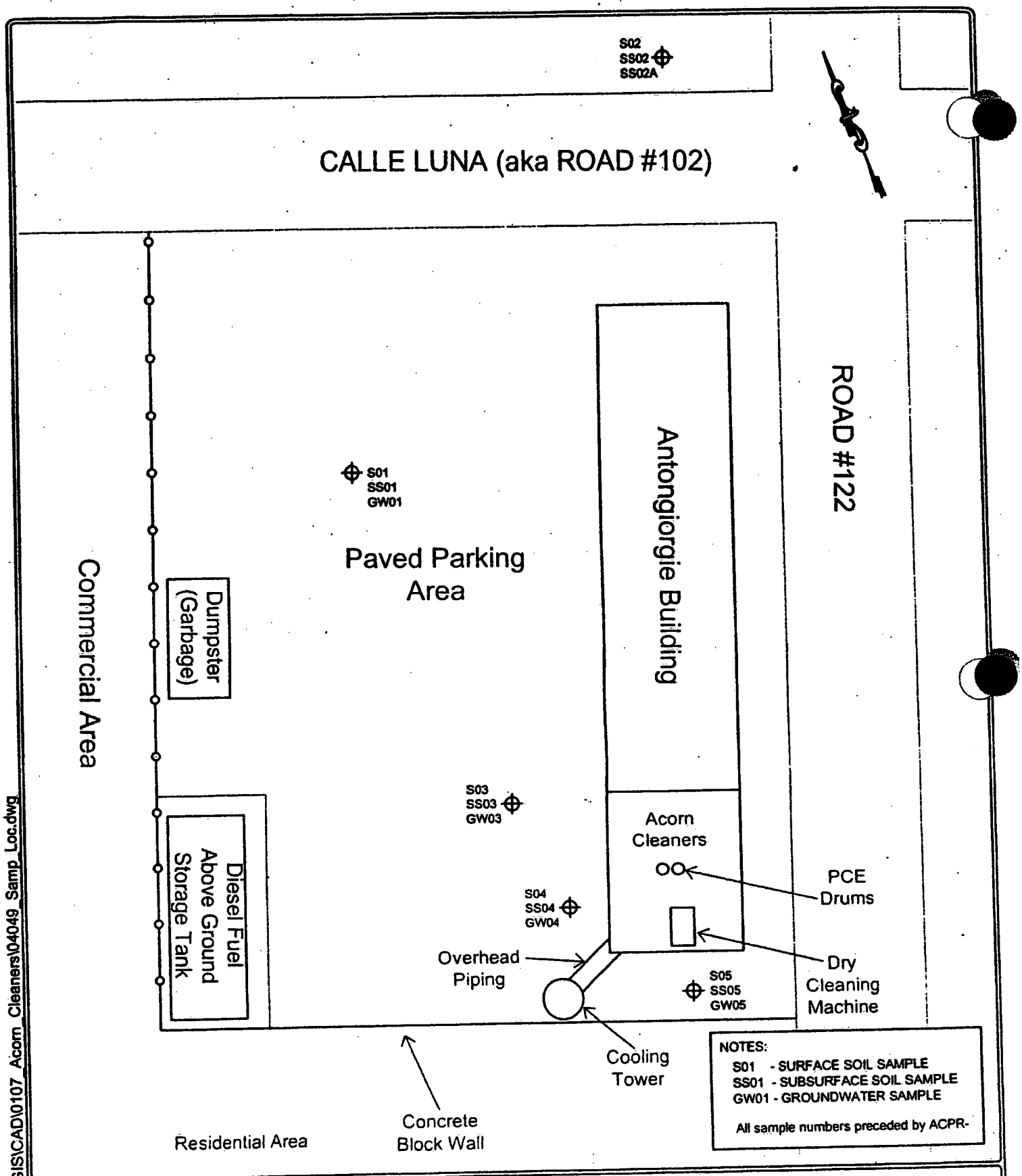
DATE

12/04/2006

FIGURE #

1

P:\SAT2\Acorn...rs\GIS\MXD\03848_AC_Site.mxd



LEGEND:
Not to scale
⊕ - BORING LOCATION

TITLE:
SAMPLE LOCATION MAP

8

PROJECT: Acorn Cleaners
San German, Puerto Rico

CLIENT NAME: EPA

WESTON

DATE: Feb 02 2007

FIGURE #: 2

P:\EPA\San_German\GIS\CAD\0107_Acorn_Cleaners\04049_Samp_Loc.dwg

ATTACHMENT 1

**TRAFFIC REPORTS/CHAIN OF CUSTODY RECORDS/
FEDEX AIRBILLS**

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36112
DAS No:
R

Region: 2	Date Shipped: 1/26/2007	Chain of Custody Record	Sampler Signature:
Project Code:	Carrier Name: FedEx	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:	Airbill: 8392 8685 3763	1 RP 1/26/07 1630	FedEx 1/26/07 1630
CERCLIS ID:	Shipped to: Liberty Analytical Corporation 501 Madison Avenue Cary NC 27513 (919) 379-4080	2	
Spill ID:		3	
Site Name/State: Acorn Cleaners/PR		4	
Project Leader: Dennis Foerter			
Action: Preliminary Assessment/Site Inspection (PA/SI)			
Sampling Co: Weston - SAT 2			

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RZ4	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-S01	S: 1/26/2007 6:45		–
B3RZ5	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS01	S: 1/26/2007 7:25		–
B3RZ6	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-GW01	S: 1/26/2007 7:35		–
B3RZ7	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-S02	S: 1/26/2007 12:40		–
B3RZ8	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS02	S: 1/26/2007 12:40		–
B3RZ9	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS02A	S: 1/26/2007 12:45		Field Duplicate
B3S02	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-S03	S: 1/26/2007 8:00		–
B3S03	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS03	S: 1/26/2007 8:20		–
B3S04	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-GW03	S: 1/26/2007 8:15		–
B3S05	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-S04	S: 1/26/2007 8:45		–
B3S06	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS04	S: 1/26/2007 9:10		–

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: B3RZ4, B3RZ6	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012607-0001

REGION COPY

PR provides pre[illegible]y results. Requests for preliminary results will increase analytical costs.
Send Copy to: S[illegible]e Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., C[illegible]y, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36112
DAS No:
R

Region:	2	Date Shipped:	1/26/2007
Project Code:		Carrier Name:	FedEx
Account Code:		Airbill:	8392 8685 3763
CERCLIS ID:		Shipped to:	Liberty Analytical Corporation, 501 Madison Avenue, Cary NC 27513, (919) 379-4080
Spill ID:			
Site Name/State:	Acorn Cleaners/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature:

Relinquished By	(Date / Time)	Received By	(Date / Time)
1	1/26/07 1630	Fed Ex	1/26/07 1630
2			
3			
4			

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3S07	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-GW04	S: 1/26/2007 10:00		–
B3S08	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-S05	S: 1/26/2007 9:30		–
B3S09	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	ACPR-SS05	S: 1/26/2007 10:06		–
B3S10	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-GW05	S: 1/26/2007 10:25		–
B3S11	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-RIN01	S: 1/26/2007 8:05		Rinsate
B3S12	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	ACPR-TB01	S: 1/26/2007 7:05		Trip Blank

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: B3RZ4, B3RZ6	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012607-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

REGION COPY

FedEx Express — *International Air Waybill*
For FedEx services worldwide

Sender's Copy

1 From *Please print and press hard.*

Date 01/26/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732) 406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State/Province PR

Country Puerto Rico ZIP/Postal Code 00680

2 To

Recipient's Name Alice Evans Phone (919) 379-4080

Company Liberty Analytical

Address 501 Madison Ave Dept./Floor

Address

City Cary State/Province NC

Country USA ZIP/Postal Code 27513

Recipient's Tax I.D. number for Customs purposes
e.g., GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 58 lbs. ☐ kg ☐ DIM 24 / 14 / 16 in. ☐ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500

For U.S. Export Only: Check One
☐ No SED required per Exemption
☐ No SED required, value $2500 or less per Schedule B Commodity number
Total Declared Value for Carriage 500
Total Value for Customs (Specify Currency) 500 USD
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

4 Express Package Service *Packages up to 150 lbs./68 kg. For packages over 150 lbs./68 kg., use the FedEx Expanded Service Intl. Air Waybill.* Not all services and options are available to all destinations.

☒ FedEx Intl. Priority ☐ FedEx Intl. First (Available to select locations. Higher rates apply.)
☐ ☐ FedEx Intl. Economy (FedEx Envelope and FedEx Pak rate not available)

5 Packaging (These values insure boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.)

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☒ SATURDAY Delivery (Available to select locations. Available for FedEx Intl. Priority only.)

7a Payment *Bill transportation charges to:* (Enter FedEx Acct. No. or Credit Card No. below.)

☐ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash/Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☐ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☒ Third Party (Enter FedEx Acct. No. below.)

FedEx Acct. No. 1080-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.01[illegible].0055.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 1/26/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 3763 Form I.D. No. 0402

464

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12

REFERENCE 17

RECORD OF COMMUNICATION
REGIONAL SAMPLE CONTROL CENTER

DATE: 2/7/2007
SUBJECT: CLP Data Package for Quality Assurance Review TDF # 06-0398
FROM: Hazardous Waste Support Section (HWSS)/RSCC
TO: HWSS ESAT-TOPO

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: Acom Cleaners **CASE #:** 36112

SDG#: B3RZ6, B3RZ4 **SAMPLER:** W-SAT

PROJ. CODE: QB **SITE SPILL #:** ZZ

LAB: LIBRTY **OPERABLE UNIT:** 00

TURN-AROUND-TIME: 7 day

CERCLIS ID #: PRN000205926

#SAMPLES	MATRIX
6	Water
11	Soil

FRACTION: VOA

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By Signature	Date/Time	Received By Signature	Date/Time
[signature]	2/12/07 9:50 Am	[signature]	2-12-07 9:50 Am
[signature]	All SDG's 2/12/07	[signature]	All SDG's 2/12/07
[signature]	All SDG's 2/14/07	[signature]	2/14/07
[signature]	2/14/07 11:02 am	[signature]	2/14/07 11:02 am
[signature]	2/15/07 9:10 AM	[signature]	2/15/07 9:10 A
[signature]	2/15/07 1:48 PM	[signature]	2/15/07 1:48 pm
[signature]	2/15/07 2:02 pm	[signature]	2/15/07 2:00 PM
[signature]	2/15/07	[signature]	2/15/07

Functional Guidelines for Evaluating Organic Analysis

CASE No.:	36112	SDG No.: B3RZ6
LABORATORY:	LIBERTY	SITE: ACORN CLEANERS
SAMPLER:	W-SAT	ANALYSIS: 06 WATER VOA

DATA ASSESSMENT

The current SOP HW-33A/VOA (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Charlene M. Alaimo — Date: February / 14 /2007

Peer Reviewer's Signature: C. Stamo — Date: 2 / 14 /2007

Verified By: D. Karras — Date: 02 / 15 /2007

SDG#B3RZ6

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. DMC's

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have DMC/SMC recoveries below the lower limit of the criteria window, but greater than 20%.
Hits are qualified "J" and non-detects are qualified "UJ".

B3S07
1,1-Dichloroethene-d2: cis-1, 2-Dichloroethene, trans-1, 2-Dichloroethene

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not Applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) **Method blank contamination:**

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated method blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Toluene
B3RZ6, B3S04

B) Field or rinse blank contamination:

See Trip blank criteria.

C) Trip blank contamination for VOA aqueous samples:

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated trip blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Cyclohexane
B3RZ6, B3S04, B3S07, B3S10

D) Storage Blank associated with VOA samples only

DC-x The following volatile samples have analyte concentrations reported above the CRQL and less than or equal to two times (2X) the associated storage blank concentration.
Hits are qualified "U" and non-detects are not flagged.

Acetone
B3S07

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated storage blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Acetone
B3S04

Methylene Chloride
B3RZ6, B3S04, B3S07, B3S10

E) Tics "R" rejected:

No problems found for this qualification.

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

DC-x The following volatile samples are associated with an initial average relative response factor (RRF) outside expanded criteria.
Hits are qualified "J" and non-detects are flagged "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RZ6, B3S04, B3S07, B3S10, B3S11, B3S12, VBLKRC, VHBLKYL

DC-x The following volatile samples are associated with an opening and/or closing continuing calibration verification (CCV) response factor (RF50) outside expanded criteria.
Hits are qualified "J" and non-detects are qualified "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RZ6, B3S04, B3S07, B3S10, B3S11, B3S12, VBLKRC, VHBLKYL

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

The following analytes in the sample shown were qualified for %RSD and %D:

DC-x The following volatile samples are associated with an opening and/or closing continuing calibration verification (CCV) percent difference (%D) outside primary criteria.
Hits are qualified "J" and non-detects are qualified "UJ".

1,2,4-Trichlorobenzene, 1,2,3-Trichlorobenzene
B3RZ6, B3S04, B3S07, B3S10, B3S11, B3S12, VBLKRC, VHBLKYL

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

All samples had 1,4-Dioxane and 1,4-Dioxane-d8 average RRF and RRF50 values less than 0.01.

11. FIELD DOCUMENTATION:

No problems found for this qualification.

12. OTHER PROBLEMS

No problems found for this qualification.

13. **This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) is identified NOT to be used.**

No problems found for this qualification.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 36112 LAB: Liberty

SITE NAME: Acorn Cleaners SDG No(s).: B3RZ4 & B3RZ6

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [✓] ___ ___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples? [✓] ___ ___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ [✓] ___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package? [✓] ___ ___

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report? ___ [✓] ___

YES NO N/A

. . . . . .

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

3.1 Is the SDG Narrative or Cover Letter Present? [✓] ___ ___

3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken? [✓] ___ ___

3.3 Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights. [✓] ___ ___

3.4 Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations? [✓] ___ ___

3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative? [✓] ___ ___

3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)? [✓] ___ ___

3.7 Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)? [✓] ___ ___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary

YES NO N/A

resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

a. Is the package paginated in ascending order starting from the SDG narrative? [✓] ___ ___

b. Are all forms and copies legible? [✓] ___ ___

c. Assembled in the order set forth in the SOW? [✓] ___ ___

Low/Med Concentration Volatiles Data present? [✓] ___

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [✓] ___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

YES NO N/A

. . . . . .

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with $NaHSO_4$.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

	YES	NO	N/A
3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)			
3.1 Are the Volatile SMC Recovery Summaries (Form II present?	[✓]	___	___
ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.			
3.2 Were outliers marked correctly with an asterisk?	[✓]	___	___
ACTION: Circle all outliers in red.			
3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?	___	[✓]	___
If yes, were samples re-analyzed?	[ ]	___	✓
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5	1,2-Dichloropropane-d6	1,2-Dichlorobenzene-d4
Dichlorodifluoromethane Chloromethane Bromomethane Chloroethane Carbon Disulfide	Cyclohexane Methylcyclohexane 1,2-Dichloropropane Bromodichloromethane	Chlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene

1,4-Dioxane-d8 1,4-Dioxane	trans-1,3-Dichloropropene-d4 cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	Chloroform-d 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
2-Butanone-d5 Acetone 2-butanone	1,1-dichloroethene-d2 trans-1,2-Dichloroethene cis-1,2-Dichloroethene	2-Hexanone-d5 4-Methyl-2-pentanone 2-Hexanone
Vinyl Chloride-d3 Vinyl Chloride	Benzene-d6 Benzene	1,1,2,2-Tetrachloroethane-d2 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
1,2-Dichloroethane-d4 Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	Toluene-d8 Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

YES NO N/A

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.

YES NO N/A

b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

a. Qualify "J" all positive associated target compounds.
b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 <u>Matrix Spike/Matrix Spike Duplicate Recovery (Form III)</u>

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present? [ ] ___ ___ /

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ___ ___ /

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data <u>alone.</u> However, using professional judgement, the validator may use the MS and MSD results in conjunction with other

YES NO N/A

QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV)

5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of Low/Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used? [✓] ___ ___

5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)? [✓] ___ ___

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed? [✓] ___ ___

YES NO N/A

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low/Med VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [✓] ___ ___

Exception: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs? ✓ [ ] ___

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs? ✓ [ ] ___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA. ("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)? ✓ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank.

Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument **	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report blank concentration for sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

YES NO N/A

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.
Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? [✓] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [✓] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

			YES	NO	N/A
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.			

7.4 Have the ion abundances been normalized to m/z 95 [✓] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ? [✓] ___ ___

	YES	NO	N/A
ACTION: If large errors exist, take action as specified in section 3.1 above.			
7.8 Is the spectrum of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 Target Compound List (TCL) Analytes (Form I)			
8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	✓		
b. Regional Control/MS/MSD samples?			✓
c. Blanks (method, trip, etc)?	✓		
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	✓		
b. Regional Control/MS/MSD samples?			✓
c. Blanks (method, trip, etc)?	✓		
ACTION: If any data are missing, take action specified in 3.1 above.			
8.3 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other: _____?			✓
ACTION: Use professional judgement to determine the acceptability of the data.			
8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	✓		

	YES	NO	N/A

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? [✓] ___ ___

8.7 Do sample and standard relative ion intensities agree to within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 <u>Tentatively Identified Compounds (TIC)</u>

9.1 Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier? [✓] ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [✓] ___ ___

b. Blanks? [✓] ___ ___

b. Are Alkanes listed in/or part of the Case Narrative? [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

YES NO N/A

. . . . . .

ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.

9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.) ___ [✓] ___

ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum? [✓] ___ ___

9.5 Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.) ___ [✓] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the

YES NO N/A

higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [✓] ___ ___

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1250, 2000, and 4000 ug/L for 1,4-dioxane. [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [ ] ___ [✓]

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ ☐ ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in

	YES	NO	N/A
the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.)		✓	

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

	YES	NO	N/A
13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	✓		
13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument?	✓		

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

	YES	NO	N/A
13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 25% for the remaining compounds?	✓		

ACTION: Circle all outliers in red.

	YES	NO	N/A
13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers?	✓		

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

YES NO N/A

. . . . . .

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 Internal Standard (Form VIII)

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response in the most recent opening CCV standard [✓] ___ ___

If no, were affected sample reanalyzed? [ ] ___ ___

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ±30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data:

INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM VOLATILES

Criteria	ACTION	
	Detected Associated Compounds *	Non-detected Associated Compounds *
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R**	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

* For volatile compounds associated to each internal standard, see Table 3-Low/Medium Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

. . . . . .

Http://www.epa.gov/superfund/programs/clp/som1.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? ☑ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

CompuChem

a division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

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FEB 01 2007
HAZ. WASTE SUPPORT SEC.

SDG NARRATIVE

CASE # 36112
SDG # B3RZ6
CONTRACT # EPW05028

SAMPLE IDENTIFICATIONS: B3RZ6, B3S04, B3S07, BES10, B3S11, and B3S12

The water samples listed above were received intact, properly refrigerated at a temperature of 5.6°C, in sealed shipping containers, on January 27, 2007, with proper documentation, except the exceptions noted in the email located behind the traffic report. These samples were scheduled for the requested analyses of the volatile fraction. The samples were prepared and analyzed following the current EPA Contract Laboratory Program (CLP) Multi-Media, Multi-Concentration Statement of Work (SOW), Document SOM1.1. All pertinent Quality Assurance Notices are included in the narrative section and all pertinent Laboratory Notices for this case are included in the sample data section.

Volatiles

Analysis holding time requirements were met for all of these samples. There were volatile Target Compound List (TCL) analytes identified above the Contract Required Quantitation Limit (CRQL) in most of these samples. Manual quantitations were performed on one or more of the process files associated with this SDG. The reasons have been coded with explanations provided in the notice included in the narrative section of the SDG.

Tentatively Identified Compounds (TICs) were found in some of these samples. In a response to a Statement of Work Interpretation, the Organic Contract Laboratory Program Office stated that if the mass spectral interpretation specialist determines a TIC to be a laboratory artifact (including artifacts from the DMC solution), there is no need to report it. However, all TICs not reported due to a mass spectral interpretation specialist's assessment should be noted in the SDG Narrative. There are laboratory artifacts (including artifacts from the DMC solution) not reported on the Form I LCFs. Their approximate retention times and origins are as follows:

4.970 min.	Laboratory artifact
10.998 min.	Laboratory artifact
13.772 min.	Laboratory artifact
13.857 min.	Laboratory artifact
14.136 min.	Laboratory artifact

These peaks are present in the standards, blanks, and samples.

All bromofluorobenzene (BFB) abundance criteria were met for tunes associated to this SDG. Overall, QC criteria were met for all initial and continuing calibration standards associated to this SDG. Most of the deuterated monitoring compounds (DMCs) met recovery criteria in the analyses of these samples. All of the internal standards met response and retention time criteria in the analyses of these samples. The associated method blanks met all quality control criteria.

As per the SOW, an example calculation is attached. The example given is for Vinyl chloride-d3 in VBLKRC.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Ron Fertile
GC/MS Lab Manager
January 31, 2007

CompuChem
a division of Liberty Analytical Corp.

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HAZ. WASTE SUPPORT SEC.

ORIGINAL

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3RZ6
VOA WATER ONLY

Laboratory Name CompuChem
Laboratory Code LIBRTY

Contract No. EPW05028
Case No. 36112

Analysis Price NA
SDG Turnaround 7

EPA Sample Numbers in SDG (Listed in Numerical Order)

1)	B3RZ6	7)		13)		19)	
2)	B3S04	8)		14)		20)	
3)	B3S07	9)		15)		21)	
4)	B3S10	10)		16)		22)	
5)	B3S11	11)		17)		23)	
6)	B3S12	12)		18)		24)	

B3RZ6
First Sample in SDG

B3S12
Last Sample in SDG

1/27/2007
First Sample Receipt Date

1/27/2007
Last Sample Receipt Date

Note: There are a maximum of 20 **field** samples (excluding PE samples in an SDG. Attach TRs to this form in alphanumeric order (the order listed above on this form).

Signature Alice Evans
Date 01/27/07

K6

Alice Evans

From: Rudolph, Elizabeth [erudolph@fedcsc.com]
Sent: Monday, January 29, 2007 12:55 PM
To: Alice Evans (E-mail)
Cc: Adly Michael; Jennifer Feranda
Subject: Region 02 | Case 36112 | Lab LIBRTY | Issue Non-sampler issues | FINAL

Alice,

Summary Start
Issue: No sample tags received for this Case.
Resolution: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples. Region 2 does not require sample tags.
Summary End

Please let me know if you have any questions.
Thanks,
Beth

-----Original Message-----
From: aevans@compuchemlabs.com [mailto:aevans@compuchemlabs.com]
Sent: Monday, January 29, 2007 12:50 PM
To: erudolph@fedcsc.com
Subject: FW: REGION 2|C#36112|ISSUE

Issue 1: We did not receive tags with this case.

Thanks,
Alice

Alice Evans
Project Manager
CompuChem/Liberty Analytical
aevans@compuchemlabs.com
919-379-4080

> -----Original Message-----
> From: Joan Purdie
> Sent: Saturday, January 27, 2007 11:13 AM
> To: 'erudolph@fedcsc.com'
> Cc: Alice Evans
> Subject: REGION 2|C#36112|ISSUE
>
> Beth,
> No return cooler information sent.
> We received 11 soils and 6 waters with TR/COC marked complete.
>
> Thank you,
> Joan Purdie
> Contract Co-ordinator
> CompuChem/Liberty
> 919-379-4081
> jpurdie@compuchemlabs.com
>
>
>
> **********NOTICE**********
> This is a PRIVATE e-mail message and the sender does not waive any related
rights and obligations. Kindly notify the sender immediately by e-mail if

> you have received this in error or by mistake. You are notified that
> disclosing,copying,distributing or taking any acton in reliance on the
> contents of this information is strictly prohibited.
>

GW01

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ6

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220701

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220701B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	21	
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0 ~~1.0~~	~~J~~ U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	10	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0 ~~0.87~~	~~J~~ U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	5.0	U
		100	~~U~~ R

GW01

EPA SAMPLE NO.

B3RZ6

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220701

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220701B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0 ~~0.27~~	~~JB~~ U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

6w01

EPA SAMPLE NO.

B3RZ6

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220701

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220701B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	115-07-1	Propene	3.83	17	NJ
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

GW03

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S04

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220702

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220702B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10 ~~8.7~~	~~J~~ U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0 ~~0.76~~	~~JB~~ U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0 ~~0.50~~	~~J~~ U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	~~U~~ R

6W03

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S04

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220702

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220702B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0 ~~0.33~~	~~JB~~ U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

GW03

EPA SAMPLE NO.

B3S04

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220702

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220702B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

SOM01.1 (5/2005)

GW04

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S07

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3R26

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220703

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220703B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0 ~~0.90~~	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0 ~~0.50~~	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	R

41

GW04

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S07

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220703

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220703B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U J
87-61-6	1,2,3-Trichlorobenzene	5.0	U J

6W04

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S07

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220703

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220703B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown	3.83	5.6	J
02		Substituted Benzene	16.82	6.6	J
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

GW05

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S10

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220704

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220704B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	14	
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0 ~~0.06~~	~~JB~~ U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0 ~~0.26~~	~~J~~ U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	~~J~~ R

6W05

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S10

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220704

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220704B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

GW05

EPA SAMPLE NO.

B3S10

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220704

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220704B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/27/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

SOM01.1 (5/2005)

Rinol

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S11 RB

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220705

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220705B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	6.5	J
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	0.90	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	2.0	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	0.61	J
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	U

R\N 01

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S11 RB

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220705

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220705B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	0.75	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

R1w01

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3S11 RB

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220705

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220705B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

T801

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S12 TB

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220706

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220706B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	2.7	J
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	0.74	J
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	100	~~U~~ R
123-91-1	1,4-Dioxane		

TB01

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S12 TB

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220706

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220706B73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	0.58	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

TB01

EPA SAMPLE NO.

B3S12 TB

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ6

Matrix (SOIL/SED/WATER): Water Lab Sample ID: 1220706

Sample wt/vol: 5.00 (g/mL) mL Lab File ID: 1220706B73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. _____ Date Analyzed: 01/28/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 5.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

Functional Guidelines for Evaluating Organic Analysis

CASE No.:	36112	SDG No.: B3RZ4
LABORATORY:	LIBERTY	SITE: ACORN CLEANERS
SAMPLER:	W-SAT	ANALYSIS: 11 SOIL VOA

DATA ASSESSMENT

The current SOP HW-33A/VOA (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Charlene M Alaimo
Charlene M. Alaimo

Date: February / 14 /2007

Peer Reviewer's Signature: C. Stamo

Date: 2 / 14 /2007

Verified By: J. Karras

Date: 02 / 15 /2007

SDG#B3RZ4

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. DMC's

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have DMC/SMC recoveries below the lower limit of the criteria window, but greater than 20%.
Hits are qualified "J" and non-detects are qualified "UJ".

B3S02
Trans -1,3-Dichloropropene: 1,1,2-Trichloroethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene
1,2-Dichlorobenzene-d4: Chlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorbenzene, 1,2,4-Trichlorobenzene, 1,2,3-Trichlorobenzene

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not Applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) **Method blank contamination:**

DC-x The following volatile samples have analyte concentrations reported above the CRQL and less

than or equal to two times (2X) the associated method blank concentration.
Hits are qualified "U" and non-detects are not flagged.

Acetone
B3RZ4

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated method blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Methylene Chloride
B3S03, B3S05

Toluene
B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02

B) Field or rinse blank contamination:

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated rinse blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Methylene Chloride
B3RZ4, B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02, B3S06, B3S09

Toluene
B3S05

C) Trip blank contamination for VOA aqueous samples:

Not applicable.

D) Storage Blank associated with VOA samples only

DC-x The following volatile samples have analyte concentrations reported above the CRQL and less than or equal to two times (2X) the associated storage blank concentration.
Hits are qualified "U" and non-detects are not flagged.

Acetone
B3S05, B3S06, B3S08

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to two times (2X) the associated storage blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Acetone
B3S03, B3S09

E) Tics "R" rejected:

No problems found for this qualification.

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are

not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

DC-x The following volatile samples are associated with an initial average relative response factor (RRF) outside expanded criteria.
Hits are qualified "J" and non-detects are flagged "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RZ4, B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02, B3S03, B3S05, B3S06, B3S08, B3S09, VBLKFW, VBLKFY, VBLKAA, VHBLKYK

DC-x The following volatile samples are associated with an opening and/or closing continuing calibration verification (CCV) response factor (RF50) outside expanded criteria.
Hits are qualified "J" and non-detects are qualified "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RZ4, B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02, B3S03, B3S05, B3S06, B3S08, B3S09, VBLKFW, VBLKFY, VBLKAA, VHBLKYK

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

The following analytes in the sample shown were qualified for %RSD and %D:

DC-x The following volatile samples are associated with an initial calibration Percent Relative Standard Deviation (%RSD) outside primary criteria.
Hits are qualified "J" and non-detects are not qualified.

1,1-Dichloroethene
B3RZ4, B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02, B3S03, B3S05, B3S06, B3S08, B3S09, VBLKFW, VBLKFY, VBLKAA, VHBLKYK

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

All samples had 1,4-Dioxane and 1,4-Dioxane-d8 average RRF and RRF50 values less than 0.01.

11. FIELD DOCUMENTATION:

No problems found for this qualification.

12. OTHER PROBLEMS

No problems found for this qualification.

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) is identified NOT to be used.

No problems found for this qualification.

CompuChem

a division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE

CASE # 36112
SDG # B3RZ4
CONTRACT # EPW05028

SAMPLE IDENTIFICATIONS: B3RZ4, B3RZ5, B3RZ7, B3RZ8, B3RZ9, B3S02, B3S03, B3S05, B3S06, B3S08, and B3S09

The soil samples listed above were received intact, properly refrigerated at a temperature of 5.6°C, in sealed shipping containers, on January 27, 2007, with proper documentation, except the exceptions noted in the email located behind the traffic report. These samples were scheduled for the requested analyses of the volatile fraction(s). The samples were prepared and analyzed following the current EPA Contract Laboratory Program (CLP) Multi-Media, Multi-Concentration Statement of Work (SOW), Document SOM1.1. All pertinent Quality Assurance Notices are included in the narrative section and all pertinent Laboratory Notices for this case are included in the sample data section.

Volatiles

Analysis holding time requirements were met for all of these samples. There were volatile Target Compound List (TCL) analytes identified above the Contract Required Quantitation Limit (CRQL) in most of these samples. Manual quantitations were performed on one or more of the process files associated with this SDG. The reasons have been coded with explanations provided in the notice included in the narrative section of the SDG.

Tentatively Identified Compounds (TICs) were found in both of these samples. In a response to a Statement of Work Interpretation, the Organic Contract Laboratory Program Office stated that if the mass spectral interpretation specialist determines a TIC to be a laboratory artifact (including artifacts from the DMC solution), there is no need to report it. However, all TICs not reported due to a mass spectral interpretation specialist's assessment should be noted in the SDG Narrative. There are laboratory artifacts (including artifacts from the DMC solution) not reported on the Form I LCFs. Their approximate retention times and origins are as follows:

4.941 min.	laboratory artifact
10.979 min.	laboratory artifact
13.773 min.	laboratory artifact
13.862 min.	laboratory artifact
14.118 min.	laboratory artifact

These peaks are present in the standards, blanks, and samples.

All bromofluorobenzene (BFB) abundance criteria were met for tunes associated to this SDG. Overall, QC criteria were met for all initial and continuing calibration standards associated to this SDG. Most of the deuterated monitoring compounds (DMCs) met recovery criteria in the analyses of these samples. All of the internal standards met response and retention time criteria in the analyses of these samples. The associated method blanks met all quality control criteria.

As per the SOW, an example calculation is attached. The example given is for Vinyl chloride-d3 in sample VBLKFW.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Ron Fertile
GC/MS Lab Manager
February 1, 2007

3

CompuChem
a division of Liberty Analytical Corp.

Sample Delivery Group (SDG)
Cover Sheet

ORIGINAL

SDG Number B3RZ4
VOA SOIL ONLY

Laboratory Name CompuChem Laboratory Code LIBRTY

Contract No. EPW05028 Case No. 36112

Analysis Price NA SDG Turnaround 7

EPA Sample Numbers in SDG (Listed in Numerical Order)

1)	B3RZ4	7)	B3S03	13)		19)	
2)	B3RZ5	8)	B3S05	14)		20)	
3)	B3RZ7	9)	B3S06	15)		21)	
4)	B3RZ8	10)	B3S08	16)		22)	
5)	B3RZ9	11)	B3S09	17)		23)	
6)	B3S02	12)		18)		24)	

B3RZ4
First Sample in SDG

B3S09
Last Sample in SDG

1/27/2007
First Sample Receipt Date

1/27/2007
Last Sample Receipt Date

Note: There are a maximum of 20 **field** samples (excluding PE samples in an SDG. Attach TRs to this form in alphanumeric order (the order listed above on this form).

Signature Alice Evans Date 01/27/07

Alice Evans

From: Rudolph, Elizabeth [erudolph@fedcsc.com]
Sent: Monday, January 29, 2007 12:55 PM
To: Alice Evans (E-mail)
Cc: Adly Michael; Jennifer Feranda
Subject: Region 02 | Case 36112 | Lab LIBRTY | Issue Non-sampler issues | FINAL

Alice,

Summary Start
Issue: No sample tags received for this Case.
Resolution: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples. Region 2 does not require sample tags.
Summary End

Please let me know if you have any questions.
Thanks,
Beth

-----Original Message-----
From: aevans@compuchemlabs.com [mailto:aevans@compuchemlabs.com]
Sent: Monday, January 29, 2007 12:50 PM
To: erudolph@fedcsc.com
Subject: FW: REGION 2|C#36112|ISSUE

Issue 1: We did not receive tags with this case.

Thanks,
Alice

Alice Evans
Project Manager
CompuChem/Liberty Analytical
aevans@compuchemlabs.com
919-379-4080

> -----Original Message-----
> From: Joan Purdie
> Sent: Saturday, January 27, 2007 11:13 AM
> To: 'erudolph@fedcsc.com'
> Cc: Alice Evans
> Subject: REGION 2|C#36112|ISSUE
>
> Beth,
> No return cooler information sent.
> We received 11 soils and 6 waters with TR/COC marked complete.
>
> Thank you,
> Joan Purdie
> Contract Co-ordinator
> CompuChem/Liberty
> 919-379-4081
> jpurdie@compuchemlabs.com
>
>
>
> ********NOTICE********
> This is a PRIVATE e-mail message and the sender does not waive any related
> rights and obligations. Kindly notify the sender immediately by e-mail if

> you have received this in error or by mistake. You are notified that
> disclosing,copying,distributing or taking any acton in reliance on the
> contents of this information is strictly prohibited.
>

6L

Sol

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ4

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220601

Sample wt/vol: 4.41 (g/mL) g Lab File ID: 1220601A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	6.8	U
74-87-3	Chloromethane	6.8	U
75-01-4	Vinyl chloride	6.8	U
74-83-9	Bromomethane	6.8	U
75-00-3	Chloroethane	6.8	U
75-69-4	Trichlorofluoromethane	6.8	U
75-35-4	1,1-Dichloroethene	6.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.8	U
67-64-1	Acetone	15	~~B~~ U
75-15-0	Carbon disulfide	6.8	U
79-20-9	Methyl acetate	6.8	U
75-09-2	Methylene chloride	6.8 ~~1.8~~	~~B~~ U
156-60-5	trans-1,2-Dichloroethene	6.8	U
1634-04-4	Methyl tert-butyl ether	6.8	U
75-34-3	1,1-Dichloroethane	6.8	U
156-59-2	cis-1,2-Dichloroethene	6.8	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.8	U
67-66-3	Chloroform	6.8	U
71-55-6	1,1,1-Trichloroethane	6.8	U
110-82-7	Cyclohexane	6.8	U
56-23-5	Carbon tetrachloride	6.8	U
71-43-2	Benzene	6.8	U
107-06-2	1,2-Dichloroethane	6.8	U
123-91-1	1,4-Dioxane	140	~~U~~ R

S01

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3R24

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3R24

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220601

Sample wt/vol: 4.41 (g/mL) g Lab File ID: 1220601A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	6.8	U
108-87-2	Methylcyclohexane	6.8	U
78-87-5	1,2-Dichloropropane	6.8	U
75-27-4	Bromodichloromethane	6.8	U
10061-01-5	cis-1,3-Dichloropropene	6.8	U
108-10-1	4-Methyl-2-pentanone	14	U
108-88-3	Toluene	6.8	U
10061-02-6	trans-1,3-Dichloropropene	6.8	U
79-00-5	1,1,2-Trichloroethane	6.8	U
127-18-4	Tetrachloroethene	6.8	U
591-78-6	2-Hexanone	14	U
124-48-1	Dibromochloromethane	6.8	U
106-93-4	1,2-Dibromoethane	6.8	U
108-90-7	Chlorobenzene	6.8	U
100-41-4	Ethylbenzene	6.8	U
95-47-6	o-Xylene	6.8	U
179601-23-1	m,p-Xylene	6.8	U
100-42-5	Styrene	6.8	U
75-25-2	Bromoform	6.8	U
98-82-8	Isopropylbenzene	6.8	U
79-34-5	1,1,2,2-Tetrachloroethane	6.8	U
541-73-1	1,3-Dichlorobenzene	6.8	U
106-46-7	1,4-Dichlorobenzene	6.8	U
95-50-1	1,2-Dichlorobenzene	6.8	U
96-12-8	1,2-Dibromo-3-chloropropane	6.8	U
120-82-1	1,2,4-Trichlorobenzene	6.8	U
87-61-6	1,2,3-Trichlorobenzene	6.8	U

S01

EPA SAMPLE NO.

B3RZ4

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220601

Sample wt/vol: 4.41 (g/mL) g Lab File ID: 1220601A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

SS01

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ5

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220602

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220602A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	5.8	U
74-87-3	Chloromethane	5.8	U
75-01-4	Vinyl chloride	5.8	U
74-83-9	Bromomethane	5.8	U
75-00-3	Chloroethane	5.8	U
75-69-4	Trichlorofluoromethane	5.8	U
75-35-4	1,1-Dichloroethene	5.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.8	U
67-64-1	Acetone	5.8	U
75-15-0	Carbon disulfide	12	U
79-20-9	Methyl acetate	5.8	U
75-09-2	Methylene chloride	5.8	U
156-60-5	trans-1,2-Dichloroethene	5.8 ~~1.8~~	U
1634-04-4	Methyl tert-butyl ether	5.8	U
75-34-3	1,1-Dichloroethane	5.8	U
156-59-2	cis-1,2-Dichloroethene	5.8	U
78-93-3	2-Butanone	5.8	U
74-97-5	Bromochloromethane	12	U
67-66-3	Chloroform	5.8	U
71-55-6	1,1,1-Trichloroethane	5.8	U
110-82-7	Cyclohexane	5.8	U
56-23-5	Carbon tetrachloride	5.8	U
71-43-2	Benzene	5.8	U
107-06-2	1,2-Dichloroethane	5.8	U
123-91-1	1,4-Dioxane	5.8	U
		120	R

65

S501

EPA SAMPLE NO.

B3RZ5

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220602

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220602A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	5.8	U
108-87-2	Methylcyclohexane	5.8	U
78-87-5	1,2-Dichloropropane	5.8	U
75-27-4	Bromodichloromethane	5.8	U
10061-01-5	cis-1,3-Dichloropropene	5.8	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	5.8 ~~1.8~~	~~J~~B U
10061-02-6	trans-1,3-Dichloropropene	5.8	U
79-00-5	1,1,2-Trichloroethane	5.8	U
127-18-4	Tetrachloroethene	5.8	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	5.8	U
106-93-4	1,2-Dibromoethane	5.8	U
108-90-7	Chlorobenzene	5.8	U
100-41-4	Ethylbenzene	5.8	U
95-47-6	o-Xylene	5.8	U
179601-23-1	m,p-Xylene	5.8	U
100-42-5	Styrene	5.8	U
75-25-2	Bromoform	5.8	U
98-82-8	Isopropylbenzene	5.8	U
79-34-5	1,1,2,2-Tetrachloroethane	5.8	U
541-73-1	1,3-Dichlorobenzene	5.8	U
106-46-7	1,4-Dichlorobenzene	5.8	U
95-50-1	1,2-Dichlorobenzene	5.8	U
96-12-8	1,2-Dibromo-3-chloropropane	5.8	U
120-82-1	1,2,4-Trichlorobenzene	5.8	U
87-61-6	1,2,3-Trichlorobenzene	5.8	U

SS01

EPA SAMPLE NO.

B3RZ5

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220602

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220602A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

S02

EPA SAMPLE NO.

B3RZ7

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220603

Sample wt/vol: 4.93 (g/mL) g Lab File ID: 1220603A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 11 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	5.7	U
74-87-3	Chloromethane	5.7	U
75-01-4	Vinyl chloride	5.7	U
74-83-9	Bromomethane	5.7	U
75-00-3	Chloroethane	5.7	U
75-69-4	Trichlorofluoromethane	5.7	U
75-35-4	1,1-Dichloroethene	5.7	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.7	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.7	U
79-20-9	Methyl acetate	5.7	U
75-09-2	Methylene chloride	5.7 ~~1.7~~	~~J~~ U
156-60-5	trans-1,2-Dichloroethene	5.7	U
1634-04-4	Methyl tert-butyl ether	5.7	U
75-34-3	1,1-Dichloroethane	5.7	U
156-59-2	cis-1,2-Dichloroethene	5.7	U
78-93-3	2-Butanone	11	U
74-97-5	Bromochloromethane	5.7	U
67-66-3	Chloroform	5.7	U
71-55-6	1,1,1-Trichloroethane	5.7	U
110-82-7	Cyclohexane	5.7	U
56-23-5	Carbon tetrachloride	5.7	U
71-43-2	Benzene	5.7	U
107-06-2	1,2-Dichloroethane	5.7	U
123-91-1	1,4-Dioxane	110	~~U~~ R

S02

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ7

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220603

Sample wt/vol: 4.93 (g/mL) g Lab File ID: 1220603A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 11 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	5.7	U
108-87-2	Methylcyclohexane	5.7	U
78-87-5	1,2-Dichloropropane	5.7	U
75-27-4	Bromodichloromethane	5.7	U
10061-01-5	cis-1,3-Dichloropropene	5.7	U
108-10-1	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	5.9 ~~0.86~~	~~J~~ U
10061-02-6	trans-1,3-Dichloropropene	5.7	U
79-00-5	1,1,2-Trichloroethane	5.7	U
127-18-4	Tetrachloroethene	5.7	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	5.7	U
106-93-4	1,2-Dibromoethane	5.7	U
108-90-7	Chlorobenzene	5.7	U
100-41-4	Ethylbenzene	5.7	U
95-47-6	o-Xylene	5.7	U
179601-23-1	m,p-Xylene	5.7	U
100-42-5	Styrene	5.7	U
75-25-2	Bromoform	5.7	U
98-82-8	Isopropylbenzene	5.7	U
79-34-5	1,1,2,2-Tetrachloroethane	5.7	U
541-73-1	1,3-Dichlorobenzene	5.7	U
106-46-7	1,4-Dichlorobenzene	5.7	U
95-50-1	1,2-Dichlorobenzene	5.7	U
96-12-8	1,2-Dibromo-3-chloropropane	5.7	U
120-82-1	1,2,4-Trichlorobenzene	5.7	U
87-61-6	1,2,3-Trichlorobenzene	5.7	U

S02

EPA SAMPLE NO.

B3RZ7

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220603

Sample wt/vol: 4.93 (g/mL) g Lab File ID: 1220603A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 11 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

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SS02

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ8

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220604

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220604A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 20 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	5.7	U
74-87-3	Chloromethane	5.7	U
75-01-4	Vinyl chloride	5.7	U
74-83-9	Bromomethane	5.7	U
75-00-3	Chloroethane	5.7	U
75-69-4	Trichlorofluoromethane	5.7	U
75-35-4	1,1-Dichloroethene	5.7	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.7	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.7	U
79-20-9	Methyl acetate	5.7	U
75-09-2	Methylene chloride	5.7 ~~17~~	~~J~~ U
156-60-5	trans-1,2-Dichloroethene	5.7	U
1634-04-4	Methyl tert-butyl ether	5.7	U
75-34-3	1,1-Dichloroethane	5.7	U
156-59-2	cis-1,2-Dichloroethene	5.7	U
78-93-3	2-Butanone	11	U
74-97-5	Bromochloromethane	5.7	U
67-66-3	Chloroform	5.7	U
71-55-6	1,1,1-Trichloroethane	5.7	U
110-82-7	Cyclohexane	5.7	U
56-23-5	Carbon tetrachloride	5.7	U
71-43-2	Benzene	5.7	U
107-06-2	1,2-Dichloroethane	5.7	U
123-91-1	1,4-Dioxane	110	~~U~~ R

5502

EPA SAMPLE NO.

B3RZ8

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220604

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220604A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 20 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	5.7	U
108-87-2	Methylcyclohexane	5.7	U
78-87-5	1,2-Dichloropropane	5.7	U
75-27-4	Bromodichloromethane	5.7	U
10061-01-5	cis-1,3-Dichloropropene	5.7	U
108-10-1	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	5.7 ~~1~~	~~J~~ U
10061-02-6	trans-1,3-Dichloropropene	5.7	U
79-00-5	1,1,2-Trichloroethane	5.7	U
127-18-4	Tetrachloroethene	5.7	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	5.7	U
106-93-4	1,2-Dibromoethane	5.7	U
108-90-7	Chlorobenzene	5.7	U
100-41-4	Ethylbenzene	5.7	U
95-47-6	o-Xylene	5.7	U
179601-23-1	m,p-Xylene	5.7	U
100-42-5	Styrene	5.7	U
75-25-2	Bromoform	5.7	U
98-82-8	Isopropylbenzene	5.7	U
79-34-5	1,1,2,2-Tetrachloroethane	5.7	U
541-73-1	1,3-Dichlorobenzene	5.7	U
106-46-7	1,4-Dichlorobenzene	5.7	U
95-50-1	1,2-Dichlorobenzene	5.7	U
96-12-8	1,2-Dibromo-3-chloropropane	5.7	U
120-82-1	1,2,4-Trichlorobenzene	5.7	U
87-61-6	1,2,3-Trichlorobenzene	5.7	U

5502

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RZ8

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220604

Sample wt/vol: 5.51 (g/mL) g Lab File ID: 1220604A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 20 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

SOM01.1 (5/2005)

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SS02A

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ9

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220605

Sample wt/vol: 5.56 (g/mL) g Lab File ID: 1220605A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	5.6	U
74-87-3	Chloromethane	5.6	U
75-01-4	Vinyl chloride	5.6	U
74-83-9	Bromomethane	5.6	U
75-00-3	Chloroethane	5.6	U
75-69-4	Trichlorofluoromethane	5.6	U
75-35-4	1,1-Dichloroethene	5.6	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.6	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.6	U
79-20-9	Methyl acetate	5.6	U
75-09-2	Methylene chloride	5.6 ~~1~~	~~B~~ U
156-60-5	trans-1,2-Dichloroethene	5.6	U
1634-04-4	Methyl tert-butyl ether	5.6	U
75-34-3	1,1-Dichloroethane	5.6	U
156-59-2	cis-1,2-Dichloroethene	5.6	U
78-93-3	2-Butanone	11	U
74-97-5	Bromochloromethane	5.6	U
67-66-3	Chloroform	5.6	U
71-55-6	1,1,1-Trichloroethane	5.6	U
110-82-7	Cyclohexane	5.6	U
56-23-5	Carbon tetrachloride	5.6	U
71-43-2	Benzene	5.6	U
107-06-2	1,2-Dichloroethane	5.6	U
123-91-1	1,4-Dioxane	110	~~U~~ R

74

SS02A

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RZ9

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220605

Sample wt/vol: 5.56 (g/mL) g Lab File ID: 1220605A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	5.6	U
108-87-2	Methylcyclohexane	5.6	U
78-87-5	1,2-Dichloropropane	5.6	U
75-27-4	Bromodichloromethane	5.6	U
10061-01-5	cis-1,3-Dichloropropene	5.6	U
108-10-1	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	5.6 ~~1~~	~~2~~ U
10061-02-6	trans-1,3-Dichloropropene	5.6	U
79-00-5	1,1,2-Trichloroethane	5.6	U
127-18-4	Tetrachloroethene	5.6	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	5.6	U
106-93-4	1,2-Dibromoethane	5.6	U
108-90-7	Chlorobenzene	5.6	U
100-41-4	Ethylbenzene	5.6	U
95-47-6	o-Xylene	5.6	U
179601-23-1	m,p-Xylene	5.6	U
100-42-5	Styrene	5.6	U
75-25-2	Bromoform	5.6	U
98-82-8	Isopropylbenzene	5.6	U
79-34-5	1,1,2,2-Tetrachloroethane	5.6	U
541-73-1	1,3-Dichlorobenzene	5.6	U
106-46-7	1,4-Dichlorobenzene	5.6	U
95-50-1	1,2-Dichlorobenzene	5.6	U
96-12-8	1,2-Dibromo-3-chloropropane	5.6	U
120-82-1	1,2,4-Trichlorobenzene	5.6	U
87-61-6	1,2,3-Trichlorobenzene	5.6	U

S502A

EPA SAMPLE NO.

B3RZ9

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220605

Sample wt/vol: 5.56 (g/mL) g Lab File ID: 1220605A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

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SOM01.1 (5/2005)

5503

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S02

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220606

Sample wt/vol: 4.53 (g/mL) g Lab File ID: 1220606A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 23 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	7.2	U
74-87-3	Chloromethane	7.2	U
75-01-4	Vinyl chloride	7.2	U
74-83-9	Bromomethane	7.2	U
75-00-3	Chloroethane	7.2	U
75-69-4	Trichlorofluoromethane	7.2	U
75-35-4	1,1-Dichloroethene	7.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.2	U
67-64-1	Acetone	7.2	U
75-15-0	Carbon disulfide	28	
79-20-9	Methyl acetate	7.2	U
75-09-2	Methylene chloride	7.2	U
156-60-5	trans-1,2-Dichloroethene	7.9 ~~2~~	~~J~~ U
1634-04-4	Methyl tert-butyl ether	7.2	U
75-34-3	1,1-Dichloroethane	7.2	U
156-59-2	cis-1,2-Dichloroethene	7.2	U
78-93-3	2-Butanone	7.2	U
74-97-5	Bromochloromethane	14	U
67-66-3	Chloroform	7.2	U
71-55-6	1,1,1-Trichloroethane	7.2	U
110-82-7	Cyclohexane	7.2	U
56-23-5	Carbon tetrachloride	7.2	U
71-43-2	Benzene	7.2	U
107-06-2	1,2-Dichloroethane	7.2	U
123-91-1	1,4-Dioxane	7.2	U
		140	R

5503

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S02

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3R24

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220606

Sample wt/vol: 4.53 (g/mL) g Lab File ID: 1220606A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 23 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	7.2	U
108-87-2	Methylcyclohexane	7.2	U
78-87-5	1,2-Dichloropropane	7.2	U
75-27-4	Bromodichloromethane	7.2	U
10061-01-5	cis-1,3-Dichloropropene	7.2	U J
108-10-1	4-Methyl-2-pentanone	14	U
108-88-3	Toluene	7.2 ~~2.1~~	U
10061-02-6	trans-1,3-Dichloropropene	7.2	U J
79-00-5	1,1,2-Trichloroethane	7.2	U J
127-18-4	Tetrachloroethene	7.2	U
591-78-6	2-Hexanone	14	U
124-48-1	Dibromochloromethane	7.2	U
106-93-4	1,2-Dibromoethane	7.2	U
108-90-7	Chlorobenzene	7.2	U J
100-41-4	Ethylbenzene	7.2	U
95-47-6	o-Xylene	7.2	U
179601-23-1	m,p-Xylene	7.2	U
100-42-5	Styrene	7.2	U
75-25-2	Bromoform	7.2	U
98-82-8	Isopropylbenzene	7.2	U
79-34-5	1,1,2,2-Tetrachloroethane	7.2	U
541-73-1	1,3-Dichlorobenzene	7.2	U J
106-46-7	1,4-Dichlorobenzene	7.2	U J
95-50-1	1,2-Dichlorobenzene	7.2	U J
96-12-8	1,2-Dibromo-3-chloropropane	7.2	U
120-82-1	1,2,4-Trichlorobenzene	7.2	U J
87-61-6	1,2,3-Trichlorobenzene	7.2	U J

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S02

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220606

Sample wt/vol: 4.53 (g/mL) g Lab File ID: 1220606A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 23 Date Analyzed: 01/29/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

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SS03

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S03

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220607

Sample wt/vol: 6.01 (g/mL) g Lab File ID: 1220607A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	5.1	U
74-87-3	Chloromethane	5.1	U
75-01-4	Vinyl chloride	5.1	U
74-83-9	Bromomethane	5.1	U
75-00-3	Chloroethane	5.1	U
75-69-4	Trichlorofluoromethane	5.1	U
75-35-4	1,1-Dichloroethene	5.1	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.1	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.1	U
79-20-9	Methyl acetate	5.1	U
75-09-2	Methylene chloride	5.1 ~~10~~	U
156-60-5	trans-1,2-Dichloroethene	5.1	U
1634-04-4	Methyl tert-butyl ether	5.1	U
75-34-3	1,1-Dichloroethane	5.1	U
156-59-2	cis-1,2-Dichloroethene	5.1	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.1	U
67-66-3	Chloroform	5.1	U
71-55-6	1,1,1-Trichloroethane	5.1	U
110-82-7	Cyclohexane	5.1	U
56-23-5	Carbon tetrachloride	5.1	U
71-43-2	Benzene	5.1	U
107-06-2	1,2-Dichloroethane	5.1	U
123-91-1	1,4-Dioxane	100	R

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5503

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S03

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220607

Sample wt/vol: 6.01 (g/mL) g Lab File ID: 1220607A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	5.1	U
108-87-2	Methylcyclohexane	5.1	U
78-87-5	1,2-Dichloropropane	5.1	U
75-27-4	Bromodichloromethane	5.1	U
10061-01-5	cis-1,3-Dichloropropene	5.1	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.1	U
10061-02-6	trans-1,3-Dichloropropene	5.1	U
79-00-5	1,1,2-Trichloroethane	5.1	U
127-18-4	Tetrachloroethene	5.1	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.1	U
106-93-4	1,2-Dibromoethane	5.1	U
108-90-7	Chlorobenzene	5.1	U
100-41-4	Ethylbenzene	5.1	U
95-47-6	o-Xylene	5.1	U
179601-23-1	m,p-Xylene	5.1	U
100-42-5	Styrene	5.1	U
75-25-2	Bromoform	5.1	U
98-82-8	Isopropylbenzene	5.1	U
79-34-5	1,1,2,2-Tetrachloroethane	5.1	U
541-73-1	1,3-Dichlorobenzene	5.1	U
106-46-7	1,4-Dichlorobenzene	5.1	U
95-50-1	1,2-Dichlorobenzene	5.1	U
96-12-8	1,2-Dibromo-3-chloropropane	5.1	U
120-82-1	1,2,4-Trichlorobenzene	5.1	U
87-61-6	1,2,3-Trichlorobenzene	5.1	U

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EPA SAMPLE NO.

B3S03

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220607

Sample wt/vol: 6.01 (g/mL) g Lab File ID: 1220607A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 19 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown	6.27	6.7	J
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

S04

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S05

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220608

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220608A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	6.2	U
74-87-3	Chloromethane	6.2	U
75-01-4	Vinyl chloride	6.2	U
74-83-9	Bromomethane	6.2	U
75-00-3	Chloroethane	6.2	U
75-69-4	Trichlorofluoromethane	6.2	U
75-35-4	1,1-Dichloroethene	6.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.2	U
67-64-1	Acetone	19	~~B~~ U
75-15-0	Carbon disulfide	6.2	U
79-20-9	Methyl acetate	6.2	U
75-09-2	Methylene chloride	6.2 ~~2.0~~	~~B~~ U
156-60-5	trans-1,2-Dichloroethene	6.2	U
1634-04-4	Methyl tert-butyl ether	6.2	U
75-34-3	1,1-Dichloroethane	6.2	U
156-59-2	cis-1,2-Dichloroethene	6.2	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	6.2	U
67-66-3	Chloroform	6.2	U
71-55-6	1,1,1-Trichloroethane	6.2	U
110-82-7	Cyclohexane	6.2	U
56-23-5	Carbon tetrachloride	6.2	U
71-43-2	Benzene	6.2	U
107-06-2	1,2-Dichloroethane	6.2	U
123-91-1	1,4-Dioxane	130	~~U~~ R

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S04

EPA SAMPLE NO.

B3S05

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220608

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220608A73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	6.2	U
108-87-2	Methylcyclohexane	6.2	U
78-87-5	1,2-Dichloropropane	6.2	U
75-27-4	Bromodichloromethane	6.2	U
10061-01-5	cis-1,3-Dichloropropene	6.2	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	6.2 ~~1.2~~	U
10061-02-6	trans-1,3-Dichloropropene	6.2	U
79-00-5	1,1,2-Trichloroethane	6.2	U
127-18-4	Tetrachloroethene	6.2	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	6.2	U
106-93-4	1,2-Dibromoethane	6.2	U
108-90-7	Chlorobenzene	6.2	U
100-41-4	Ethylbenzene	6.2	U
95-47-6	o-Xylene	6.2	U
179601-23-1	m,p-Xylene	6.2	U
100-42-5	Styrene	6.2	U
75-25-2	Bromoform	6.2	U
98-82-8	Isopropylbenzene	6.2	U
79-34-5	1,1,2,2-Tetrachloroethane	6.2	U
541-73-1	1,3-Dichlorobenzene	6.2	U
106-46-7	1,4-Dichlorobenzene	6.2	U
95-50-1	1,2-Dichlorobenzene	6.2	U
96-12-8	1,2-Dibromo-3-chloropropane	6.2	U
120-82-1	1,2,4-Trichlorobenzene	6.2	U
87-61-6	1,2,3-Trichlorobenzene	6.2	U

S04

EPA SAMPLE NO.

B3S05

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220608

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220608A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown	19.98	160	J
02		Unknown	20.23	170	J
03		Unknown	20.38	150	J
04		Unknown	20.46	160	J
05	575-41-7	Naphthalene, 1,3-dimethyl-	20.76	170	NJ
06	2199-69-1	Benzene-1,2,3,4-d4-, 5,6-dichlor	14.18	270	NJ
07	3386-33-2	Octadecane, 1-chloro-	14.30	120	NJ
08		Substituted Benzene	14.88	140	J
09		Unknown	14.97	160	J
10		Substituted Benzene	15.69	120	J
11		Substituted Benzene	16.09	140	J
12	17059-48-2	1H-Indene, 2,3-dihydro-1,6-dimet	16.29	210	NJ
13		Substituted Benzene	16.44	140	J
14		Unknown	16.67	220	J
15		Unknown	16.80	270	J
16		Unknown	17.10	120	J
17		Unknown	17.27	120	J
18		Unknown	17.33	220	J
19		Unknown	17.40	160	J
20		Unknown	17.55	230	J
21	1680-51-9	Naphthalene, 1,2,3,4-tetrahydro-	17.89	150	NJ
22	13065-07-1	Naphthalene, 1,2,3,4-tetrahydro-	18.10	300	NJ
23	5557-93-7	Benzene, 1-(1-methylethenyl)-2-(	18.24	160	NJ
24		Unknown	18.30	170	J
25		Unknown	18.61	130	J
26		Unknown	18.69	180	J
27		Unknown	18.78	160	J
28	4175-54-6	Naphthalene, 1,2,3,4-tetrahydro-	18.88	130	NJ
29		Unknown	19.29	140	J
30	20027-77-4	Naphthalene, 1,2,3,4-tetrahydro-	19.51	200	NJ
31					
32					
33					
34					
35					
36					

SOM01.1 (5/2005)

S04

EPA SAMPLE NO.

B3S05

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220608

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220608A73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24	E966796 [1]	Total Alkanes	N/A	2900	J

[1] EPA-designated Registry Number.

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SOM01.1 (5/2005)

SS04

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S06

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220609

Sample wt/vol: 4.75 (g/mL) g Lab File ID: 1220609RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 18 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	6.4	U
75-15-0	Carbon disulfide	14	U
79-20-9	Methyl acetate	6.4	U
75-09-2	Methylene chloride	6.4	U
156-60-5	trans-1,2-Dichloroethene	6.4 ~~0.64~~	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	6.4	U
74-97-5	Bromochloromethane	13	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	6.4	U
		130	R

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SS04

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S06

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220609

Sample wt/vol: 4.75 (g/mL) g Lab File ID: 1220609RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 18 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	6.4	U
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.4	U
10061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	6.4	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
95-47-6	o-Xylene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	U
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

88

SS04

EPA SAMPLE NO.

B3S06

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220609

Sample wt/vol: 4.75 (g/mL) g Lab File ID: 1220609RB73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 18 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

89 AMENDED DATA 1-07

SOM01.1 (5/2005)

101

S05

EPA SAMPLE NO.

B3S08

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220610

Sample wt/vol: 4.91 (g/mL) g Lab File ID: 1220610RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 21 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.4	U
79-20-9	Methyl acetate	6.4	U
75-09-2	Methylene chloride	6.4	U
156-60-5	trans-1,2-Dichloroethene	6.4	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.4	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	130	R

90 AMENDED DATA 2-6-07

19A

S05

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S08

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220610

Sample wt/vol: 4.91 (g/mL) g Lab File ID: 1220610RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 21 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	6.4	U
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.4	U
10061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	3.1	J
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
95-47-6	o-Xylene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	U
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

S05

EPA SAMPLE NO.

B3S08

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220610

Sample wt/vol: 4.91 (g/mL) g Lab File ID: 1220610RB73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 21 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
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23					
24					
25					
26					
27					
28					
29					
30	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

SOM01.1 (5/2005)

SS05

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S09

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220611

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220611RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
75-71-8	Dichlorodifluoromethane	6.2	U
74-87-3	Chloromethane	6.2	U
75-01-4	Vinyl chloride	6.2	U
74-83-9	Bromomethane	6.2	U
75-00-3	Chloroethane	6.2	U
75-69-4	Trichlorofluoromethane	6.2	U
75-35-4	1,1-Dichloroethene	6.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.2	U
67-64-1	Acetone	6.2	U
75-15-0	Carbon disulfide	12 ~~1~~	U
79-20-9	Methyl acetate	6.2	U
75-09-2	Methylene chloride	6.2	U
156-60-5	trans-1,2-Dichloroethene	6.2 ~~1~~	U
1634-04-4	Methyl tert-butyl ether	6.2	U
75-34-3	1,1-Dichloroethane	6.2	U
156-59-2	cis-1,2-Dichloroethene	6.2	U
78-93-3	2-Butanone	6.2	U
74-97-5	Bromochloromethane	12	U
67-66-3	Chloroform	6.2	U
71-55-6	1,1,1-Trichloroethane	6.2	U
110-82-7	Cyclohexane	6.2	U
56-23-5	Carbon tetrachloride	6.2	U
71-43-2	Benzene	6.2	U
107-06-2	1,2-Dichloroethane	6.2	U
123-91-1	1,4-Dioxane	6.2	U
		130	R

5505

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S09

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220611

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220611RB73

Level: (TRACE/LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
79-01-6	Trichloroethene	6.2	U
108-87-2	Methylcyclohexane	6.2	U
78-87-5	1,2-Dichloropropane	6.2	U
75-27-4	Bromodichloromethane	6.2	U
10061-01-5	cis-1,3-Dichloropropene	6.2	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	6.2	U
10061-02-6	trans-1,3-Dichloropropene	6.2	U
79-00-5	1,1,2-Trichloroethane	6.2	U
127-18-4	Tetrachloroethene	6.2	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	6.2	U
106-93-4	1,2-Dibromoethane	6.2	U
108-90-7	Chlorobenzene	6.2	U
100-41-4	Ethylbenzene	6.2	U
95-47-6	o-Xylene	6.2	U
179601-23-1	m,p-Xylene	6.2	U
100-42-5	Styrene	6.2	U
75-25-2	Bromoform	6.2	U
98-82-8	Isopropylbenzene	6.2	U
79-34-5	1,1,2,2-Tetrachloroethane	6.2	U
541-73-1	1,3-Dichlorobenzene	6.2	U
106-46-7	1,4-Dichlorobenzene	6.2	U
95-50-1	1,2-Dichlorobenzene	6.2	U
96-12-8	1,2-Dibromo-3-chloropropane	6.2	U
120-82-1	1,2,4-Trichlorobenzene	6.2	U
87-61-6	1,2,3-Trichlorobenzene	6.2	U

94

SS05

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S09

Lab Name: COMPUCHEM Contract: EPW05028

Lab Code: LIBRTY Case No.: 36112 Mod. Ref No.: _____ SDG No.: B3RZ4

Matrix (SOIL/SED/WATER): Soil Lab Sample ID: 1220611

Sample wt/vol: 4.82 (g/mL) g Lab File ID: 1220611RB73

Level: (TRACE or LOW/MED) LOW Date Received: 01/27/2007

% Moisture: not dec. 17 Date Analyzed: 01/30/2007

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796 [1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

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REFERENCE 18

SAMPLING TRIP REPORT

SITE NAME: Abandoned Gulf Station
DCN NO.: SAT2.20113.054.333
W.O. NO.: 20113.011.001.0054.00
CASE NO.: 36111

EPA I.D. NO.: PRN000205925

SAMPLING DATES: January 25, 2007

1. Site Location: Refer to Figure 1

2. Sample Locations: Refer to Figure 2

3. Sample Descriptions: Refer to Table 1

4. Laboratories Receiving Samples:

Analysis	Name and Address of Laboratory
Target Compound List (TCL) Volatile Organic Compounds (VOCs), Percent Moisture	Mitkem Corporation 175 Metro Center Boulevard Warwick, RI 02886
Target Analyte List (TAL) Inorganics (including mercury)	ChemTech Consulting Group 284 Sheffield Street Mountainside, NJ 07092

5. Sample Dispatch Data:

Eight aqueous samples and eleven soil samples for TCL VOC analysis (low-medium concentration) were shipped to Mitkem Corporation, Warwick, RI on 1/25/2007 at 1830 hours via Federal Express (Airbill No. 8392 8685 4200).

Seven aqueous samples and eleven soil samples for TAL Inorganic (including mercury) analysis (low-medium concentration) were shipped to ChemTech Consulting Group, Mountainside, NJ on 1/25/2007 at 1830 hours via Federal Express (Airbill No. 8392 8685 4211).

6. On-Site Personnel:

Name	Company	Duties on Site
Dennis Foerter	Weston	Project Manager, Site Health and Safety Officer (SHSO), Sampler
Scott Snyder	Weston	Sample Management Officer (SMO)
Thomas Brownell	Weston	Site Geologist, Geoprobe oversight, Sampler
Julissa Morales	Weston	Sampler, Global Positioning System (GPS) Data Collection
William Rodriguez	GeoEnvirotech, Inc.	Geoprobe™ Operator
Abraham Nunez	GeoEnvirotech, Inc.	Geoprobe™ Assistant

7. Additional Comments:

On January 25, 2007, Weston Solutions, Inc. (Weston®) Region 2 Site Assessment Team 2 (SAT 2) personnel conducted a sampling event at the Abandoned Gulf Station (AGS) site. SAT 2 collected surface soil, and subsurface soil, and groundwater samples to determine the priority for further action for this site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Five surface soil, six subsurface soil (including one duplicate), and six groundwater (including one duplicate) samples were collected throughout the site. Surface and subsurface soil samples were collected from soil borings advanced using Geoprobe™ direct-push technology. Surface soil samples were collected from the 0- to 2-foot interval below ground surface (bgs). Soil borings were screened every 2 feet using a photoionization detector (PID). Subsurface soil sampling depths were determined based upon PID readings, visual observation, and Geoprobe™ refusal. If there were no elevated organic vapor concentrations, visual signs of contamination, or Geoprobe™ refusal, subsurface soil samples were collected at the interval immediately above groundwater.

Soil samples were collected using dedicated En Core™ sampling devices, disposable plastic scoops, and aluminum trays. One rinsate blank (plastic scoop, aluminum tray, and a decontaminated Geoprobe™ cutting shoe) was collected on each day of sampling. Trip blank samples were collected in conjunction with groundwater samples.

All samples collected by Weston® were designated for analysis of TCL volatile organic compounds (VOCs) and TAL inorganics (including mercury), through the EPA Contract Laboratory Program (CLP). All sample locations were recorded electronically using GPS technology in accordance with the EPA Region 2 Standard Operating Procedure (SOP). All samples were collected as part of the Preliminary Assessment / Site Inspection (PA/SI) evaluation conducted on site. Organic and Inorganic Traffic Reports are presented in Attachment 1

8. Report Prepared by: Dennis J. Foerter, CHMM Date: 2/2/07

9. Report Approved by: for W. S. Butterfield, CHMM Date: 2/2/07

TABLE 1
SAMPLE DESCRIPTIONS
ABANDONED GULF STATION
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC LAB NO.	INORGANIC LAB NO.	DATE	TIME	COMMENTS
AGS-S01	B3S24	MB3S24	1/25/07	0810	Surface soil sample south of the existing site building. Soil consisted of light brown medium sand mixed with loose concrete; depth: 0.5-1 foot (ft.) below ground surface (bgs); Matrix Spike/Matrix Spike Duplicate (MS/MSD) for Quality Assurance/Quality Control (QA/QC) purposes.
AGS-SS01	B3S25	MB3S25	1/25/07	0840	Subsurface soil sample south of the existing site building. Soil consisted of a gray gravelly sand; loose compaction; depth: 29.5-30 ft. bgs.
AGS-S02	B3S27	MB3S27	1/25/07	0955	Surface soil sample adjacent to former drum/tire/5-gallon container storage area west of the site building. Soil consisted of light-brown loose fine sand mixed with crushed stone (gravel); depth: 0.5-1 ft. bgs.
AGS-SS02	B3S28	MB3S28	1/25/07	1017	Subsurface soil sample adjacent to former drum/tire/5-gallon container storage area west of the site building. Soil consisted of gravel mixed with medium to coarse sand, loose; depth: 22-25 ft. bgs.
AGS-SS02A	B3S29	MB3S29	1/25/07	1020	Duplicate of subsurface soil sample AGS-SS02 for QA/QC purposes.
AGS-S03	B3S32	MB3S32	1/25/07	1530	Surface soil sample south of former underground storage tanks east of the site building. Soil consisted of light-brown sand mixed with crushed stone (gravel); depth: 0.5-1 ft. bgs.
AGS-SS03	B3S33	MB3S33	1/25/07	1555	Subsurface soil sample south of former underground storage tanks east of the site building. Soil consisted of light-gray medium sand with crushed stone (gravel); depth: 21.5-22.5 ft. bgs.

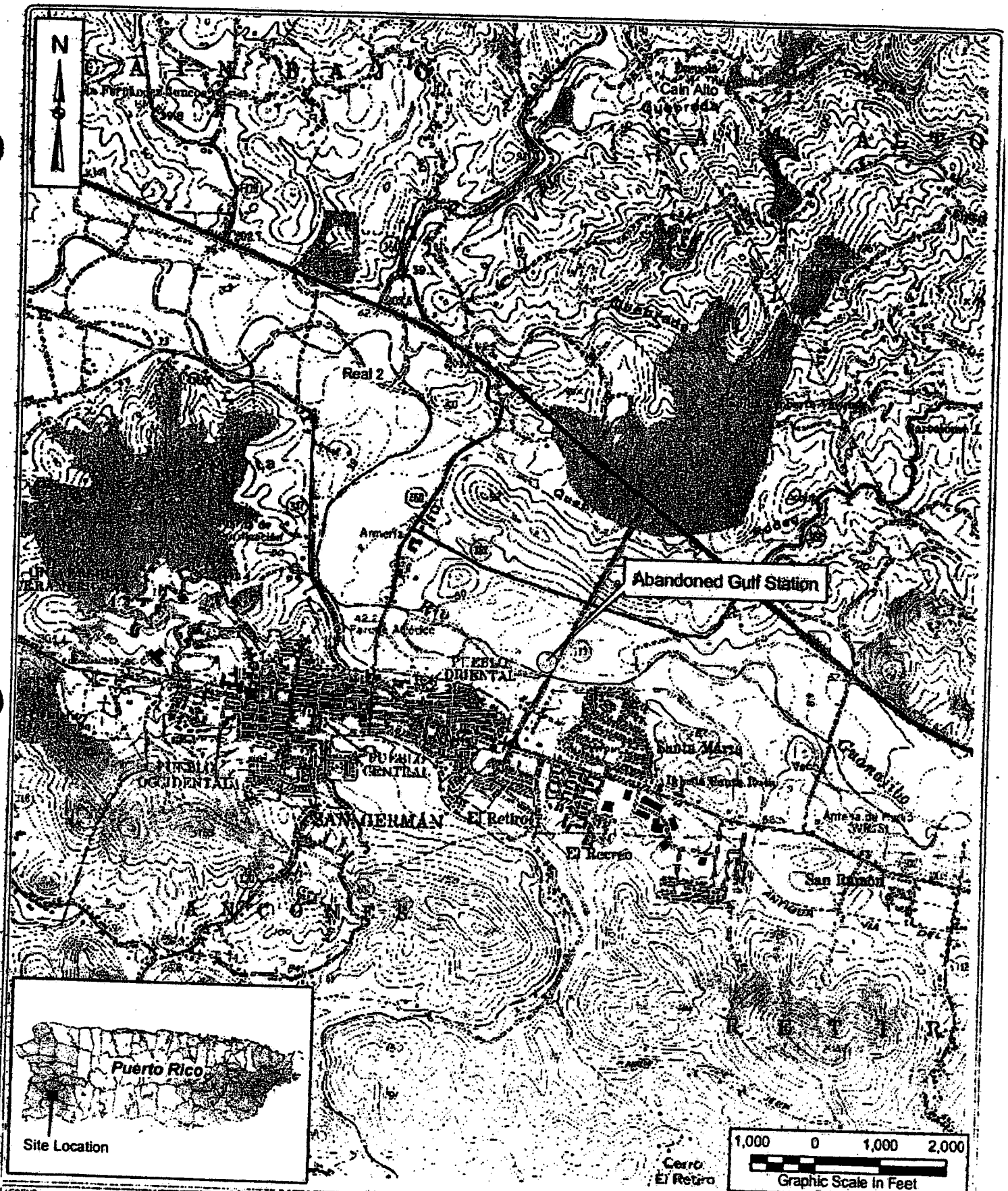
TABLE 1 (continued)
SAMPLE DESCRIPTIONS
ABANDONED GULF STATION
SAN GERMAN, PUERTO RICO

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AGS-S04	B3S35	MB3S35	1/25/07	1440	Surface soil sample from former drum and stained soil area adjacent to the northwest corner of the site building. Soil consisted of loose light-brown sand; depth: 0.5-1 ft. bgs.
AGS-SS04	B3S36	MB3S36	1/25/07	1510	Subsurface soil sample from former drum and stained soil area adjacent to the northwest corner of the site building. Soil consisted of heavy gravel with trace light-gray loose sand; depth: 29-29.5 ft. bgs.
AGS-S05	B3S38	MB3S38	1/25/07	1310	Background surface soil sample in the northeast portion of the site property; collected from an area not believed to have been impacted by previous site activities. Soil consisted of loose light-brown sand; depth: 0.5-1 ft. bgs.
AGS-SS05	B3S39	MB3S39	1/25/07	1349	Background subsurface soil sample in the northeast portion of the site property; collected from an area not believed to have been impacted by previous site activities. Soil consisted of grayish-brown sandy gravel; depth: 29.5-30 ft. bgs.
AGS-GW01	B3S26	MB3S26	1/25/07	0932	Groundwater sample south of the existing site building; depth: 30 ft. bgs; MS/MSD for QA/QC purposes.
AGS-GW02	B3S30	MB3S30	1/25/07	1505	Groundwater sample adjacent to former drum/tire/5-gallon container storage area west to the site building; depth: 25 ft. bgs.
AGS-GW02A	B3S31	MB3S31	1/25/07	1155	Duplicate of groundwater sample AGS-GW02 for QA/QC purposes.
AGS-GW03	B3S34	MB3S34	1/25/07	1620	Groundwater sample south of former underground storage tanks east of the site building; depth: 30 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
ABANDONED GULF STATION
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLIENT	INORGANIC CLIENT	DATE	TIME	COMMENTS
AGS-GW04	B3S37	MB3S37	1/25/07	1250	Groundwater sample from piezometer near the northwest corner of the site building; depth: 30 ft. bgs.
AGS-GW05	B3S40	MB3S40	1/25/07	1415	Background groundwater sample in the northeast portion of the site property; collected from an area not believed to have been impacted by previous site activities; depth: 30 ft. bgs.
AGS-RIN01	B3S41	MB3S41	1/25/07	1400	Rinsate Blank (Geoprobe™ cutting shoe, disposable plastic scoop, and aluminum tray) for QA/QC purposes.
AGS-TB01	B3S42	NA	1/25/07	0920	Trip Blank collected for QA/QC purposes.

SITE LOCATION AND SAMPLE LOCATION MAPS



LEGEND

Approximate Site Location

7.5 Minute Series Topographic Quadrangle: San German, PR

PROJECT

Abandoned Gulf Station

CLIENT NAME

EPA

TITLE

Abandoned Gulf Station
San German Sites
San German, PR

7

WESTON

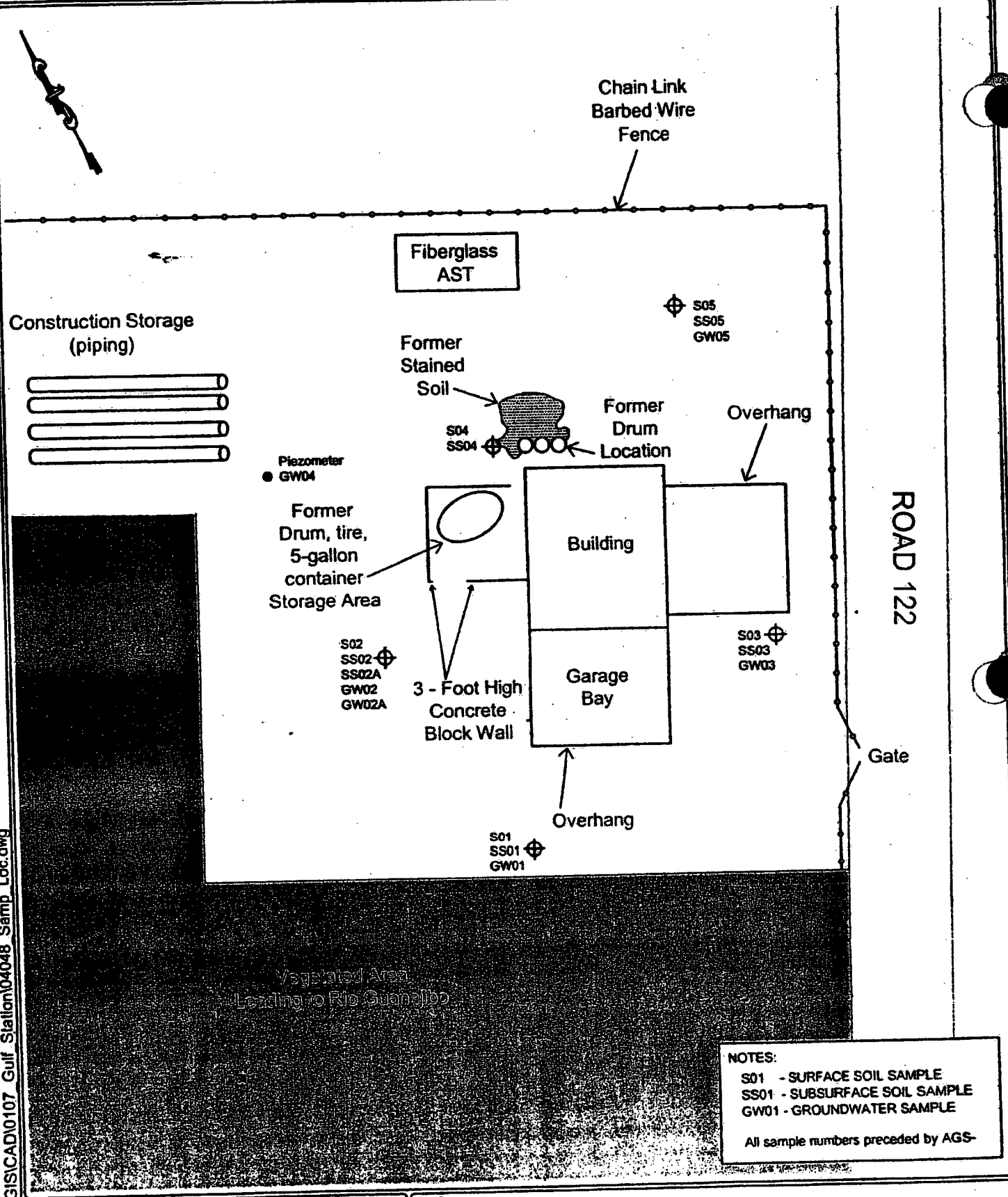
DATE

12/04/2006

FIGURE #

1

P:\SAT2\Abandoned_Gulf_Station\GIS\MXD\03846_AGS_Site.mxd



LEGEND:
Not to scale
● - PIEZOMETER LOCATION
⊕ - BORING LOCATION

TITLE:
SAMPLE LOCATION MAP

(8)

PROJECT: Abandoned Gulf Station
San German, Puerto Rico

CLIENT NAME: EPA

WESTON

DATE: Jan 31 2007

FIGURE #: 2

P:\EPA\San_German\GIS\CAD\0107_Gulf_Station\04048_Samp_Loc.dwg

ATTACHMENT 1

**TRAFFIC REPORTS/CHAIN OF CUSTODY RECORDS/
FEDEX AIRBILLS**

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36111
DAS No:
R

Region: 2	Date Shipped: 1/25/2007	Chain of Custody Record	Sampler Signature:
Project Code:	Carrier Name: FedEx	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:	Airbill: 8392 8885 4200	1 1/25/07 1830	Fed Ex 1/25/07 1830
CERCLIS ID:	Shipped to: Mitkem Corporation, 175 Metro Center Blvd., Warwick RI 02888, (401) 732-3400	2	
Spill ID:		3	
Site Name/State: Abandoned Gulf Station/PR		4	
Project Leader: Dennis Foerter			
Action: Preliminary Assessment/Site Inspection (PA/SI)			
Sampling Co: Weston - SAT 2			

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3S24	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-S01	S: 1/25/2007 8:10	MB3S24	–
B3S25	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS01	S: 1/25/2007 8:40	MB3S25	–
B3S26	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW01	S: 1/25/2007 9:32	MB3S26	–
B3S27	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-S02	S: 1/25/2007 9:55	MB3S27	–
B3S28	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS02	S: 1/25/2007 10:17	MB3S28	–
B3S29	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS02A	S: 1/25/2007 10:20	MB3S29	Field Duplicate
B3S30	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW02	S: 1/25/2007 15:05	MB3S30	–
B3S31	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW02A	S: 1/25/2007 11:55	MB3S31	Field Duplicate
B3S32	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-S03	S: 1/25/2007 15:30	MB3S32	–
B3S33	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS03	S: 1/25/2007 15:55	MB3S33	–
B3S34	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW03	S: 1/25/2007 16:20	MB3S34	–

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: B3S24, B3S26	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

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TR Number: 2-291174636-012507-0001

PR provides p[illegible]ry results. Requests for preliminary results will increase analytical costs.
Send Copy to: [illegible]le Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., [illegible]y, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36111
DAS No:
R

Region:	2	Date Shipped:	1/25/2007
Project Code:		Carrier Name:	FedEx
Account Code:		Airbill:	8392 8685 4200
CERCLIS ID:		Shipped to:	Mitkem Corporation 175 Metro Center Blvd. Warwick RI 02886 (401) 732-3400
Spill ID:			
Site Name/State:	Abandoned Gulf Station/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature: [signature]

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1	[signature]	1/25/07 1830	Fed Ex	1/25/07 1830
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		INORGANIC SAMPLE No.	QC Type
B3S35	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-S04	S: 1/25/2007	14:40	MB3S35	--
B3S36	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS04	S: 1/25/2007	15:10	MB3S36	--
B3S37	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW04	S: 1/25/2007	12:50	MB3S37	--
B3S38	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-S05	S: 1/25/2007	13:10	MB3S38	--
B3S39	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	AGS-SS05	S: 1/25/2007	13:49	MB3S39	--
B3S40	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-GW05	S: 1/25/2007	14:15	MB3S40	--
B3S41	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-RIN01	S: 1/25/2007	14:00	MB3S41	Rinsate
B3S42	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	AGS-TB01	S: 1/25/2007	9:20		Trip Blank

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: B3S24, B3S28	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012507-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

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For FedEx services worldwide

Sender's Copy

1 From *Please print and press hard.*

Date 01/25/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Nathan Reynolds Phone (401)732-3400

Company Mitkem Corporation

Address 175 Metro Center Blvd. Dept./Floor

Address

City Warwick State Province RI

Country USA ZIP Postal Code 02886

Recipient's Tax I.D. number for Customs purposes
e.g., GST/RFC/VAT/IN/FIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 60 lbs. ☒ kg ☐ DIM 21/14/16 in. ☒ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500 -

U.S. Export Only Check One ☐ No SED required per Exemption ☐ No SED required, value $2500 or less per Schedule B Commodity number ☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage 500 -

Total Value for Customs (Specify Currency) 500 - USD

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☐ ☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available

Not all services and options are available to all destinations.

5 Packaging These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations Available for FedEx Intl. Priority only

7a Payment *Bill transportation charges to:*

☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. or Credit Card No. below. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. below. ☐ Recipient ☒ Third Party

FedEx Acct. No. 1080-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.

2043.011.004.0054.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: [signature] Date Executed: 1/25/07

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For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 4200 Form I.D. No. 0402

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12

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36111
DAS No:
R

Region:	2	Date Shipped:	1/25/2007
Project Code:		Carrier Name:	FedEx
Account Code:		Airbill:	8392 8685 4211
CERCLIS ID:		Shipped to:	ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountainside NJ 07092 (908) 789-8900
Spill ID:			
Site Name/State:	Abandoned Gulf Station/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature:

Relinquished By	(Date / Time)	Received By	(Date / Time)
1	1/25/07 1830	Fed Ex	1/26/07 1830
2			
3			
4			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		ORGANIC SAMPLE No.	QC Type
MB3S24	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-S01	S: 1/25/2007	8:10	B3S24	–
MB3S25	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS01	S: 1/25/2007	8:40	B3S25	–
MB3S26	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW01	S: 1/25/2007	9:32	B3S26	–
MB3S27	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-S02	S: 1/25/2007	9:55	B3S27	–
MB3S28	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS02	S: 1/25/2007	10:17	B3S28	–
MB3S29	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS02A	S: 1/25/2007	10:20	B3S29	Field Duplicate
MB3S30	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW02	S: 1/25/2007	15:05	B3S30	–
MB3S31	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW02A	S: 1/25/2007	11:55	B3S31	Field Duplicate
MB3S32	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-S03	S: 1/25/2007	15:30	B3S32	–
MB3S33	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS03	S: 1/25/2007	15:55	B3S33	–
MB3S34	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW03	S: 1/25/2007	16:20	B3S34	–

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: MB3S24, MB3S26	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

TR Number: 2-291174636-012507-0002

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

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USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36111
DAS No:
R

Region:	2	Date Shipped:	1/25/2007
Project Code:		Carrier Name:	FedEx
Account Code:		Airbill:	8392 8685 4211
CERCLIS ID:		Shipped to:	ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountainside NJ 07092 (908) 789-8900
Spill ID:			
Site Name/State:	Abandoned Gulf Station/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature: [signature]

Relinquished By	(Date / Time)	Received By	(Date / Time)
1 [signature]	1/25/07 1830	Fed Ex	1/25/07 1830
2			
3			
4			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MB3S35	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-S04	S: 1/25/2007 14:40	B3S35	--
MB3S36	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS04	S: 1/25/2007 15:10	B3S36	--
MB3S37	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW04	S: 1/25/2007 12:50	B3S37	--
MB3S38	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-S05	S: 1/25/2007 13:10	B3S38	--
MB3S39	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	AGS-SS05	S: 1/25/2007 13:49	B3S39	--
MB3S40	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-GW05	S: 1/25/2007 14:15	B3S40	--
MB3S41	Field QC/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	AGS-RIN01	S: 1/25/2007 14:00	B3S41	Rinsate

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: MB3S24, MB3S26	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Number: 2-291174636-012507-0002

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PR provides p[illegible]y results. Requests for preliminary results will increase analytical costs.
Send Copy to: [illegible]e Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., [illegible]y, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

F2V&[illegible] Page 2 of 2

FedEx Express **International Air Waybill** For FedEx services worldwide

Sender's Copy

1 From Please print and press hard.

Date 01/29/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732) 406-8640

Company Weston Solutions

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State/Province PR

Country Puerto Rico ZIP/Postal Code 00680

2 To Recipient's Name Parveen Hasan Phone (908) 789-8900

Company ChemTech Consulting

Address 284 Sheffield St. Dept./Floor

Address

City Mountainside State/Province NJ

Country USA ZIP/Postal Code 07092

Recipient's Tax I.D. number for Customs purposes e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Ctrls: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 66 ☒ lbs. ☐ kg DIM 21 x 14 x 16 ☒ in. ☐ cm

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500

For U.S. Export Only: Check One: ☐ No SED required per Exemption ☐ No SED required, value ≤$2500 or less per Schedule B Commodity number

Total Declared Value for Carriage 500

Total Value for Customs (Specify Currency) 500 USD

☐ SED attached (provide export date no. and exp. date or Itr.xxx exception syntax, w/ECCN if applicable)

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☐ HOLD at FedEx Location ☐ SATURDAY Delivery (Available to select locations. Available for FedEx Intl. Priority only)

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FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment Bill duties and taxes to: ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance. (Enter FedEx Acct. No. below.)

☐ Sender (Acct. No. in Section 1 will be billed.) ☐ Recipient ☒ Third Party

FedEx Acct. No. 1080-6769-1

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20113.012.BOONA0054.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain International treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 1/25/07

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(5)

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REFERENCE 19

RECORD OF COMMUNICATION
REGIONAL SAMPLE CONTROL CENTER

DATE: 2/6/2007
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section (HWSS)/RSCC
TO: HWSS ESAT-TOPO

TDF# 06-0397

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: Abandoned Gulf Station **CASE #:** 36111

SDG#: B3S26, B3S24 **SAMPLER:** W-SAT

PROJ. CODE: QB **SITE SPILL #:** ZZ

LAB: MITKEM **OPERABLE UNIT:** 00

TURN-AROUND-TIME: 7 day

CERCLIS ID #: PRN000205925

#SAMPLES	MATRIX
8	Water
11	Soil

FRACTION: VOA

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	Date/Time	Signature	Date/Time
[signature]	2/12/07 9:53 am	[signature]	2-12-07 9:53 Am
[signature]	2/12/07	[signature]	2/12/07
[signature]	2/14/07	[signature]	2/14/07
[signature]	2/14/07 11:03 am	[signature]	2/14/07 11:03 am
[signature]	2/15/07 9:11 AM	[signature]	2/15/07 9:11 AM
[signature]	2/15/07 1:50 AM	[signature]	2/15/07 1:50 pm
[signature]	2/15/07 2:00 pm	[signature]	2/15/07 2:00 PM
[signature]	2/15/07	[signature]	2/15/07

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 36111
LABORATORY: MITCHEM
SAMPLER: W-SAT

SDG No.: B3S24 & B3S26
SITE: Abandoned Gulf Station
ANALYSIS: LOW/MED VOA

DATA ASSESSMENT

The current SOP HW-33A/VOA (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N" (presumptive evidence for the presence of the material), "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Shobitha Amin — Date: February / 14 / 2007

Peer Reviewer's Signature: C. Stone — Date: 2 / 14 / 2007

Verified By: [signature] — Date: 2 / 15 / 2007

SDG#B3S26

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this criteria.

2. DMC's

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have one or more DMC/SMC recovery values greater than the primary limit. Detected compounds are qualified J. Nondetected compounds are not qualified.

Chloroethane-d5 B3S41

Bromomethane, Carbon disulfide, Chloroethane, Chloromethane, Dichlorodifluoromethane

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:
No problems found for this criteria.

B) Field or rinse blank contamination:
Field blank contamination has not been used to qualify samples.

C) Trip blank contamination for VOA aqueous samples:
Trip blank contamination has not been used to qualify samples.

D) **Storage Blank associated with VOA samples only:**
Storage blank is not contaminated.

E) **Tics "R" rejected:**
None.

5. **MASS SPECTROMETER TUNING:**

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this criteria.

6. **CALIBRATION:**

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) **Response Factor GC/MS:**

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

The following volatile samples are associated with a initial, continuing and a closing calibration relative response factor (RRF50) outside primary criteria. Hits are flagged "J" and non-detects are qualified "R".

1,4-Dioxane:

B3S26, B3S30, B3S31, B3S34, B3S37, B3S40, B3S41, B3S42, VBLK20, VBLK2E, VHBLK2E

The following volatile samples are associated with an initial, continuing calibration and closing calibration in which a SMC/DMC did not meet relative response factor (RRF) criteria. Associated hits are flagged "J" and non-detects are qualified "R".

****1,4-Dioxane-d8**
B3S26, B3S30, B3S31, B3S34, B3S37, B3S40, B3S41, B3S42, VBLK20, VBLK2E, VHBLK2E

** - 1,4-Dioxane has already been qualified "R" based on Average Response factor.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

No problems found for this criteria.

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than "30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this criteria.

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within " 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

1,4-Dioxane :

Average response factor (RRF) is below Contractual criteria in the initial calibration.

Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

1,4-Dioxane-d8 :

Average response factor (RRF) is below Contractual criteria in the initial calibration.
Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

11. **FIELD DOCUMENTATION:**

12. **OTHER PROBLEMS:**

13. **This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.**

SDG#B3S24

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this criteria.

2. DMC's

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have one or more DMC/SMC recovery values greater than the primary limit. Detected compounds are qualified J. Nondetected compounds are not qualified.

1,4-Dioxane-d8 B3S24, B3S25, B3S32, B3S38, B3S39
1,4-Dioxane

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:
No problems found for this criteria.

B) Field or rinse blank contamination:
Field blank contamination has not been used to qualify samples.

C) Trip blank contamination for VOA aqueous samples:
Trip blank contamination has not been used to qualify samples.

D) **Storage Blank associated with VOA samples only:**
Storage blank contamination has not been used to qualify samples..

E) **Tics "R" rejected:**
Siloxanes in the following samples:
B3S38

5. **MASS SPECTROMETER TUNING:**

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this criteria.

6. **CALIBRATION:**

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) **Response Factor GC/MS:**

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

The following volatile samples are associated with a initial, continuing and a closing calibration relative response factor (RRF50) outside primary criteria. Hits are flagged "J" and non-detects are qualified "R".

1,4-Dioxane:
B3S24, B3S25, B3S27, B3S28, B3S29, B3S32, B3S33, B3S35, B3S36, B3S38, B3S39, VBLK5L, VBLK5N, VBLK5S, VHBLK5S

The following volatile samples are associated with an initial, continuing calibration and closing calibration in which a SMC/DMC did not meet relative response factor (RRF) criteria. Associated hits are flagged "J" and non-detects are qualified "R".

****1,4-Dioxane-d8**
B3S24, B3S25, B3S27, B3S28, B3S29, B3S32, B3S33, B3S35, B3S36, B3S38, B3S39, VBLK5L, VBLK5N, VBLK5S, VHBLK5S

** - 1,4-Dioxane has already been qualified "R" based on Average Response factor.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

No problems found for this criteria.

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than "30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this criteria.

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within " 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

1,4-Dioxane :

Average response factor (RRF) is below Contractual criteria in the initial calibration.
Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

1,4-Dioxane-d8 :

Average response factor (RRF) is below Contractual criteria in the initial calibration.
Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

11. FIELD DOCUMENTATION:

12. OTHER PROBLEMS:

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 36111 LAB: MITKEM

SITE NAME: ABANDONED GULF STATION SITE SDG No(s).: B3526 & B3524

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? ☑ ___ ___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples? ☑ ___ ___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ ☑ ___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package? ☑ ___ ___

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report? ___ ☑ ___

	YES	NO	N
ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.			

3.0 Cover Letter SDG Narrative

3.1	Is the SDG Narrative or Cover Letter Present?	[✓]	___	___
3.2	Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[✓]	___	___
3.3	Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[✓]	___	___
3.4	Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations?	[✓]	___	___
3.5	Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[✓]	___	___
3.6	Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?	[✓]	___	___
3.7	Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[✓]	___	___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary

YES NO N/A

resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

a. Is the package paginated in ascending order starting from the SDG narrative? [✓] ___ ___

b. Are all forms and copies legible? [✓] ___ ___

c. Assembled in the order set forth in the SOW? [✓] ___ ___

Low/Med Concentration Volatiles Data present? [✓] ___

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [✓] ___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with $NaHSO_4$.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

	YES	NO	N/A
3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)			
3.1 Are the Volatile SMC Recovery Summaries (Form II present?	✓		
ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.			
3.2 Were outliers marked correctly with an asterisk?	✓		
ACTION: Circle all outliers in red.			
3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?		✓	
If yes, were samples re-analyzed?	[ ]		✓
Were method blanks re-analyzed?	[ ]		✓

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5	1,2-Dichloropropane-d6	1,2-Dichlorobenzene-d4
Dichlorodifluoromethane Chloromethane Bromomethane Chloroethane Carbon Disulfide	Cyclohexane Methylcyclohexane 1,2-Dichloropropane Bromodichloromethane	Chlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene

1,4-Dioxane-d8 1,4-Dioxane	trans-1,3-Dichloropropene-d4 cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	Chloroform-d 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
2-Butanone-d5 Acetone 2-butanone	1,1-dichloroethene-d2 trans-1,2-Dichloroethene cis-1,2-Dichloroethene	2-Hexanone-d5 4-Methyl-2-pentanone 2-Hexanone
Vinyl Chloride-d3 Vinyl Chloride	Benzene-d6 Benzene	1,1,2,2-Tetrachloroethane-d2 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
1,2-Dichloroethane-d4 Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	Toluene-d8 Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.

b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

a. Qualify "J" all positive associated target compounds.
b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 <u>Matrix Spike/Matrix Spike Duplicate Recovery (Form III)</u>

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present? [✓] ✓ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ✓ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data <u>alone.</u> However, using professional judgement, the validator may use the MS and MSD results in conjunction with other

	YES	NO	N/A
QC criteria and determine the need for some qualification of the data.			
5.0 Method Blanks (Form IV)			
5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples?	[✓]		
5.2 Frequency of Analysis: For the analysis of Low/Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent?	[✓]		
5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used?	[✓]		
5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)?	[ ]		✓

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed?	[✓]		

. . . . . .

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low/Med VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [✓] ___ ___

Exception: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs? ✓* [✓] ___

* STORAGE BLANK IS CONTAMINATED FOR SDG# B3524.

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs?

___ [✓] ___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA. ("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)?

✓ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank.

Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument **	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report blank concentration for sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

	YES	NO	N/A

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.
Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? ✓ ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? ✓ ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

		YES	NO	N/A
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.		

7.4 Have the ion abundances been normalized to m/z 95 ✓ ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ✓ ___

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ? ✓ ___ ___

	YES	NO	N/A
. . . . .			
ACTION: If large errors exist, take action as specified in section 3.1 above.			
7.8 Is the spectrum of the mass calibration compound acceptable?	[✓]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 Target Compound List (TCL) Analytes (Form I)			
8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	[✓]	___
c. Blanks (method, trip, etc)?	[✓]	___	___
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	[✓]	___
c. Blanks (method, trip, etc)?	[✓]	___	___
ACTION: If any data are missing, take action specified in 3.1 above.			
8.3 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[ ]	___	___
Peak shape?	[ ]	___	___
Full-scale graph (attenuation)?	[ ]	___	___
Other: _____?	[ ]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

	YES	NO	N/A

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? ✓ ___ ___

8.7 Do sample and standard relative ion intensities agree to within ± 20%? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier? ✓ ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? ✓ ___ ___

b. Blanks? ✓ ___ ___

b. Are Alkanes listed in/or part of the Case Narrative? ✓ ___ ___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

YES NO N/A

. . . . . .

ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.

9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.) ___ [ ] ✓

ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum? [ ] ___ ✓

9.5 Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.) ___ [✓] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the

YES NO N/A

higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [✓] ___ ___

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1250, 2000, and 4000 ug/L for 1,4-dioxane. [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [✓] ___ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ ☐ ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in

	YES	NO	N/A
the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.)		✓	

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	✓		
13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument?	✓		

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 25% for the remaining compounds?		✓	

ACTION: Circle all outliers in red.

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers?	✓		

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

. . . . . .

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ N/A ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 **Internal Standard (Form VIII)**

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response in the most recent opening CCV standard calibration? [✓] ___ ___

If no, were affected sample reanalyzed? [ ] ___ ___

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ±30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data:

INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM VOLATILES

Criteria	ACTION	
	Detected Associated Compounds *	Non-detected Associated Compounds *
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R**	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

For volatile compounds associated to each internal standard, see Table 3-Low/Medium Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

. . . . . .

Http://www.epa.gov/superfund/programs/clp/som1.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? ☑ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

SDG Narrative

Mitkem Corporation submits the enclosed data package in response to USEPA Case # 36111 and SDG# B3S24. Analyses were performed for eleven soil samples that were received on January 26, 2007. The analyses were performed under USEPA Contract # EP-W-05-030. Please note that the sample-shipping cooler received on January 26 was measured at 3°C.

Sample B3S24 was designated as the sample for laboratory QC on the TR/COC. The scheduling notification says laboratory QC is not required. Per the Region, laboratory QC is only required for the Pesticides/Aroclor fractions.

No sample tags were received with the samples. Per the Region, proceed with analysis of the samples.

The following samples are submitted in this data package:

Client ID	Lab ID	Analysis
B3S24	F0105-01B	V
B3S25	F0105-02B	V
B3S27	F0105-03B	V
B3S28	F0105-04B	V
B3S29	F0105-05B	V
B3S32	F0105-06B	V
B3S33	F0105-07B	V
B3S35	F0105-08B	V
B3S36	F0105-09B	V
B3S38	F0105-10B	V
B3S39	F0105-11B	V

V = Volatiles

The analyses were performed using USEPA CLP Multi-Media, Multi-Concentration (SOM01.1) protocols. The analyses were performed with strict adherence to the SOW with the following exceptions and observations:

1. Overall Observation:

Where needed, manual integrations were performed to improve data quality. The corrections were reviewed and associated hardcopies generated and reported as required. Manual integrations are coded to provide the data reviewer justification for such action.

The codes are labeled on the ion chromatogram signal (GC/MS signal) and chromatogram for GC based analysis as follows:

- M1 peak tailing or fronting.
- M2 peak co-elution.
- M3 rising or falling baseline.
- M4 retention time shift.
- M5 miscellaneous – under this category, the justification is explained.

2. Volatile Analysis:

Trap used for instrument V5: OI Analytical #10 trap containing 8 cm each of Tenax, silica gel and carbon molecular sieve.

GC column used: 30 m x 0.25 mm id (1.4 um film thickness) DB-624 capillary column.

cis-1,3-Dichloropropene-d4 was detected in method blanks and in samples. The volatile organic deuterated monitoring compound spike solution contains both the cis- and trans-1,3-dichloropropene isomers. cis-1,3-Dichloropropene-d4 is not a dueterated monitoring compound for SOM01.1, while the trans isomer is. The cis isomer is considered a laboratory artifact, and is not reported as a tentatively identified compound.

The following equation was used to calculate the concentration of target analytes for soil samples:

$$\text{Concentration } (\mu g/Kg) = \frac{(Amt)(DF)(UF)(5)}{\left(\frac{Ws * (100 - M)}{100}\right)}$$

where: Amt = CAL – AMT on raw data
DF = Dilution factor
UF = ng unit correction factor
Ws = Weight of sample extracted (g)
M = %moisture (not decanted)

The soil samples were received in Encore samplers. The samples were extruded into unpreserved VOA vials and kept frozen until time of analysis.

DMC recoveries were within the QC limits with the exception of high recovery of 1,4-dioxane-d8 in samples B3S24, B3S25, B3S32, B3S38 and B3S39.

No manual integrations were performed.

For 1,4-dioxane and 1,4-dioxane-d8, the laboratory was unable to achieve the minimum average RRF of 0.0050 for both the initial calibration as well as the opening and closing calibration verifications. In our experience, this compound will not reliably achieve the SOM method performance criteria due to its high water solubility. Please note that a better approach is to analyze this as an extractable semivolatile organic compound.

No other unusual observation was made for the analysis.

All of the submittals to the region are originals other than logbook pages. Photocopies of logbook pages are included, with the originals maintained on file at the laboratory. Tunes, calibration verifications and initial calibrations that are shared among several cases are photocopies indicating the location of the originals.

I certify that this Sample Data Package is in compliance with the terms and condition of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Agnes Ng
CLP Project Manager
02/01/07

Contract Laboratory Program

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3S24

Laboratory Name	Mitkem Coroporation	Lab Code	MITKEM
Contract No.	EP-W-05-030	Case No.	36111
Analysis Price	$ 0.00	SDG Turnaround	7 days

EPA Sample Numbers in SDG (Listed in Numerical Order)

01) B3S24	08) B3S35		
02) B3S25	09) B3S36		
03) B3S27	10) B3S38		
04) B3S28	11) B3S39		
05) B3S29			
06) B3S32			
07) B3S33			

First Sample in SDG	Last Sample in SDG
B3S24	B3S39
First Sample Receipt Date	**Last Sample Receipt Date**
01/26/2007	01/26/2007

Note: There are a maximum of 20 field samples (excluding Performance Evaluation (PE) samples in an SDG. Attach the TR/COC Records to this form in alphanumeric order (the order listed above on this form).

Signature [illegible] Date 01/26/2007

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S24

Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-01B

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: V5H4986.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 15

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.9	U
74-87-3	Chloromethane	5.9	U
75-01-4	Vinyl chloride	5.9	U
74-83-9	Bromomethane	5.9	U
75-00-3	Chloroethane	5.9	U
75-69-4	Trichlorofluoromethane	5.9	U
75-35-4	1,1-Dichloroethene	1.3	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.9	U
67-64-1	Acetone	5.9	U
75-15-0	Carbon disulfide	12	U
79-20-9	Methyl acetate	5.9	U
75-09-2	Methylene chloride	5.9	U
156-60-5	trans-1,2-Dichloroethene	5.9	U
1634-04-4	Methyl tert-butyl ether	5.9	U
75-34-3	1,1-Dichloroethane	5.9	U
156-59-2	cis-1,2-Dichloroethene	5.9	U
78-93-3	2-Butanone	5.9	U
74-97-5	Bromochloromethane	12	U
67-66-3	Chloroform	5.9	U
71-55-6	1,1,1-Trichloroethane	5.9	U
110-82-7	Cyclohexane	5.9	U
56-23-5	Carbon tetrachloride	5.9	U
71-43-2	Benzene	5.9	U
107-06-2	1,2-Dichloroethane	5.9	U
123-91-1	1,4-Dioxane	5.9	U
		120	~~U~~ R

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1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S24

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-01B

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: V5H4986.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 15

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.9	U
108-87-2	Methylcyclohexane	5.9	U
78-87-5	1,2-Dichloropropane	5.9	U
75-27-4	Bromodichloromethane	5.9	U
10061-01-5	cis-1,3-Dichloropropene	5.9	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	5.9	U
10061-02-6	trans-1,3-Dichloropropene	5.9	U
79-00-5	1,1,2-Trichloroethane	5.9	U
127-18-4	Tetrachloroethene	5.9	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	5.9	U
106-93-4	1,2-Dibromoethane	5.9	U
108-90-7	Chlorobenzene	5.9	U
100-41-4	Ethylbenzene	5.9	U
179601-23-1	m,p-Xylene	5.9	U
95-47-6	o-Xylene	5.9	U
100-42-5	Styrene	5.9	U
75-25-2	Bromoform	5.9	U
98-82-8	Isopropylbenzene	5.9	U
79-34-5	1,1,2,2-Tetrachloroethane	5.9	U
541-73-1	1,3-Dichlorobenzene	5.9	U
106-46-7	1,4-Dichlorobenzene	5.9	U
95-50-1	1,2-Dichlorobenzene	5.9	U
96-12-8	1,2-Dibromo-3-chloropropane	5.9	U
120-82-1	1,2,4-Trichlorobenzene	5.9	U
87-61-6	1,2,3-Trichlorobenzene	5.9	U

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SOM01.1 (5/2005)

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S24

Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-01B
Sample wt/vol: 5.00 (g/mL) G
Lab File ID: V5H4986.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 15
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S25

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-02B

Sample wt/vol: 6.50 (g/mL) G

Lab File ID: V5H4987.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 10

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	4.3	U
74-87-3	Chloromethane	4.3	U
75-01-4	Vinyl chloride	4.3	U
74-83-9	Bromomethane	4.3	U
75-00-3	Chloroethane	4.3	U
75-69-4	Trichlorofluoromethane	4.3	U
75-35-4	1,1-Dichloroethene	4.3	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	8.5	U
67-64-1	Acetone	4.3	U
75-15-0	Carbon disulfide	4.3	U
79-20-9	Methyl acetate	4.3	U
75-09-2	Methylene chloride	4.3	U
156-60-5	trans-1,2-Dichloroethene	4.3	U
1634-04-4	Methyl tert-butyl ether	4.3	U
75-34-3	1,1-Dichloroethane	4.3	U
156-59-2	cis-1,2-Dichloroethene	8.5	U
78-93-3	2-Butanone	4.3	U
74-97-5	Bromochloromethane	4.3	U
67-66-3	Chloroform	4.3	U
71-55-6	1,1,1-Trichloroethane	4.3	U
110-82-7	Cyclohexane	4.3	U
56-23-5	Carbon tetrachloride	4.3	U
71-43-2	Benzene	4.3	U
107-06-2	1,2-Dichloroethane	85	~~U~~ R
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S25

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-02B
Sample wt/vol: 6.50 (g/mL) G
Lab File ID: V5H4987.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 10
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	4.3	U
108-87-2	Methylcyclohexane	4.3	U
78-87-5	1,2-Dichloropropane	4.3	U
75-27-4	Bromodichloromethane	4.3	U
10061-01-5	cis-1,3-Dichloropropene	4.3	U
108-10-1	4-Methyl-2-pentanone	4.3	U
108-88-3	Toluene	8.5	U
10061-02-6	trans-1,3-Dichloropropene	4.3	U
79-00-5	1,1,2-Trichloroethane	4.3	U
127-18-4	Tetrachloroethene	4.3	U
591-78-6	2-Hexanone	4.3	U
124-48-1	Dibromochloromethane	8.5	U
106-93-4	1,2-Dibromoethane	4.3	U
108-90-7	Chlorobenzene	4.3	U
100-41-4	Ethylbenzene	4.3	U
179601-23-1	m,p-Xylene	4.3	U
95-47-6	o-Xylene	4.3	U
100-42-5	Styrene	4.3	U
75-25-2	Bromoform	4.3	U
98-82-8	Isopropylbenzene	4.3	U
79-34-5	1,1,2,2-Tetrachloroethane	4.3	U
541-73-1	1,3-Dichlorobenzene	4.3	U
106-46-7	1,4-Dichlorobenzene	4.3	U
95-50-1	1,2-Dichlorobenzene	4.3	U
96-12-8	1,2-Dibromo-3-chloropropane	4.3	U
120-82-1	1,2,4-Trichlorobenzene	4.3	U
87-61-6	1,2,3-Trichlorobenzene	4.3	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S25

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-02B
Sample wt/vol: 6.50 (g/mL) G
Lab File ID: V5H4987.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 10
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S27

Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-03B
Sample wt/vol: 5.70 (g/mL) G
Lab File ID: V5H4988.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 20
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.5	U
74-87-3	Chloromethane	5.5	U
75-01-4	Vinyl chloride	5.5	U
74-83-9	Bromomethane	5.5	U
75-00-3	Chloroethane	5.5	U
75-69-4	Trichlorofluoromethane	5.5	U
75-35-4	1,1-Dichloroethene	5.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.5	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.5	U
79-20-9	Methyl acetate	5.5	U
75-09-2	Methylene chloride	5.5	U
156-60-5	trans-1,2-Dichloroethene	5.5	U
1634-04-4	Methyl tert-butyl ether	5.5	U
75-34-3	1,1-Dichloroethane	5.5	U
156-59-2	cis-1,2-Dichloroethene	5.5	U
78-93-3	2-Butanone	11	U
74-97-5	Bromochloromethane	5.5	U
67-66-3	Chloroform	5.5	U
71-55-6	1,1,1-Trichloroethane	5.5	U
110-82-7	Cyclohexane	5.5	U
56-23-5	Carbon tetrachloride	5.5	U
71-43-2	Benzene	5.5	U
107-06-2	1,2-Dichloroethane	5.5	U
123-91-1	1,4-Dioxane	110	UR

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S27

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-03B

Sample wt/vol: 5.70 (g/mL) G

Lab File ID: V5H4988.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 20

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.5	U
108-87-2	Methylcyclohexane	5.5	U
78-87-5	1,2-Dichloropropane	5.5	U
75-27-4	Bromodichloromethane	5.5	U
10061-01-5	cis-1,3-Dichloropropene	5.5	U
108-10-1	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	5.5	U
10061-02-6	trans-1,3-Dichloropropene	5.5	U
79-00-5	1,1,2-Trichloroethane	5.5	U
127-18-4	Tetrachloroethene	5.5	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	5.5	U
106-93-4	1,2-Dibromoethane	5.5	U
108-90-7	Chlorobenzene	5.5	U
100-41-4	Ethylbenzene	5.5	U
179601-23-1	m,p-Xylene	5.5	U
95-47-6	o-Xylene	5.5	U
100-42-5	Styrene	5.5	U
75-25-2	Bromoform	5.5	U
98-82-8	Isopropylbenzene	5.5	U
79-34-5	1,1,2,2-Tetrachloroethane	5.5	U
541-73-1	1,3-Dichlorobenzene	5.5	U
106-46-7	1,4-Dichlorobenzene	5.5	U
95-50-1	1,2-Dichlorobenzene	5.5	U
96-12-8	1,2-Dibromo-3-chloropropane	5.5	U
120-82-1	1,2,4-Trichlorobenzene	5.5	U
87-61-6	1,2,3-Trichlorobenzene	5.5	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S27

Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-03B
Sample wt/vol: 5.70 (g/mL) G
Lab File ID: V5H4988.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 20
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S28

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-04B

Sample wt/vol: 5.20 (g/mL) G

Lab File ID: V5H4989.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 8.0

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.2	U
74-87-3	Chloromethane	5.2	U
75-01-4	Vinyl chloride	5.2	U
74-83-9	Bromomethane	5.2	U
75-00-3	Chloroethane	5.2	U
75-69-4	Trichlorofluoromethane	5.2	U
75-35-4	1,1-Dichloroethene	5.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	5.2	U
75-15-0	Carbon disulfide	5.2	U
79-20-9	Methyl acetate	5.2	U
75-09-2	Methylene chloride	5.2	U
156-60-5	trans-1,2-Dichloroethene	5.2	U
1634-04-4	Methyl tert-butyl ether	5.2	U
75-34-3	1,1-Dichloroethane	5.2	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	5.2	U
74-97-5	Bromochloromethane	5.2	U.
67-66-3	Chloroform	5.2	U
71-55-6	1,1,1-Trichloroethane	5.2	U
110-82-7	Cyclohexane	5.2	U
56-23-5	Carbon tetrachloride	5.2	U
71-43-2	Benzene	5.2	U
107-06-2	1,2-Dichloroethane	5.2	U
123-91-1	1,4-Dioxane	100	~~U~~ R

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1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S28

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-04B
Sample wt/vol: 5.20 (g/mL) G
Lab File ID: V5H4989.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 8.0
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.2	U
108-87-2	Methylcyclohexane	5.2	U
78-87-5	1,2-Dichloropropane	5.2	U
75-27-4	Bromodichloromethane	5.2	U
10061-01-5	cis-1,3-Dichloropropene	5.2	U
108-10-1	4-Methyl-2-pentanone	5.2	U
108-88-3	Toluene	10	U
061-02-6	trans-1,3-Dichloropropene	5.2	U
79-00-5	1,1,2-Trichloroethane	5.2	U
127-18-4	Tetrachloroethene	5.2	U
591-78-6	2-Hexanone	5.2	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	5.2	U
108-90-7	Chlorobenzene	5.2	U
100-41-4	Ethylbenzene	5.2	U
179601-23-1	m,p-Xylene	5.2	U
95-47-6	o-Xylene	5.2	U
100-42-5	Styrene	5.2	U
75-25-2	Bromoform	5.2	U
98-82-8	Isopropylbenzene	5.2	U
79-34-5	1,1,2,2-Tetrachloroethane	5.2	U
541-73-1	1,3-Dichlorobenzene	5.2	U
106-46-7	1,4-Dichlorobenzene	5.2	U
95-50-1	1,2-Dichlorobenzene	5.2	U
96-12-8	1,2-Dibromo-3-chloropropane	5.2	U
120-82-1	1,2,4-Trichlorobenzene	5.2	U
87-61-6	1,2,3-Trichlorobenzene	5.2	U
		5.2	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S28

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-04B
Sample wt/vol: 5.20 (g/mL) G
Lab File ID: V5H4989.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 8.0
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S29

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-05B

Sample wt/vol: 5.60 (g/mL) G

Lab File ID: V5H4990.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 10

Date Analyzed: 01/29/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	9.9	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	9.9	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	5.0	U
		99	~~D~~ R

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1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S29

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-05B

Sample wt/vol: 5.60 (g/mL) G

Lab File ID: V5H4990.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 10

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	9.9	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	9.9	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S29

Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-05B
Sample wt/vol: 5.60 (g/mL) G
Lab File ID: V5H4990.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 10
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S32

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-06B

Sample wt/vol: 5.50 (g/mL) G

Lab File ID: V5H4994.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 22

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.8	U
74-87-3	Chloromethane	5.8	U
75-01-4	Vinyl chloride	5.8	U
74-83-9	Bromomethane	5.8	U
75-00-3	Chloroethane	5.8	U
75-69-4	Trichlorofluoromethane	5.8	U
75-35-4	1,1-Dichloroethene	5.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	12	U
67-64-1	Acetone	5.8	U
75-15-0	Carbon disulfide	5.8	U
79-20-9	Methyl acetate	5.8	U
75-09-2	Methylene chloride	5.8	U
156-60-5	trans-1,2-Dichloroethene	5.8	U
1634-04-4	Methyl tert-butyl ether	5.8	U
75-34-3	1,1-Dichloroethane	5.8	U
156-59-2	cis-1,2-Dichloroethene	12	U
78-93-3	2-Butanone	5.8	U
74-97-5	Bromochloromethane	5.8	U
67-66-3	Chloroform	5.8	U
71-55-6	1,1,1-Trichloroethane	5.8	U
110-82-7	Cyclohexane	5.8	U
56-23-5	Carbon tetrachloride	5.8	U
71-43-2	Benzene	5.8	U
107-06-2	1,2-Dichloroethane	120	~~U~~ R
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S32

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-06B

Sample wt/vol: 5.50 (g/mL) G

Lab File ID: V5H4994.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 22

Date Analyzed: 01/30/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.8	U
108-87-2	Methylcyclohexane	5.8	U
78-87-5	1,2-Dichloropropane	5.8	U
75-27-4	Bromodichloromethane	5.8	U
10061-01-5	cis-1,3-Dichloropropene	5.8	U
108-10-1	4-Methyl-2-pentanone	5.8	U
108-88-3	Toluene	12	U
10061-02-6	trans-1,3-Dichloropropene	5.8	U
79-00-5	1,1,2-Trichloroethane	5.8	U
127-18-4	Tetrachloroethene	5.8	U
591-78-6	2-Hexanone	5.8	U
124-48-1	Dibromochloromethane	12	U
106-93-4	1,2-Dibromoethane	5.8	U
108-90-7	Chlorobenzene	5.8	U
100-41-4	Ethylbenzene	5.8	U
179601-23-1	m,p-Xylene	5.8	U
95-47-6	o-Xylene	5.8	U
100-42-5	Styrene	5.8	U
75-25-2	Bromoform	5.8	U
98-82-8	Isopropylbenzene	5.8	U
79-34-5	1,1,2,2-Tetrachloroethane	5.8	U
541-73-1	1,3-Dichlorobenzene	5.8	U
106-46-7	1,4-Dichlorobenzene	5.8	U
95-50-1	1,2-Dichlorobenzene	5.8	U
96-12-8	1,2-Dibromo-3-chloropropane	5.8	U
120-82-1	1,2,4-Trichlorobenzene	5.8	U
87-61-6	1,2,3-Trichlorobenzene	5.8	U

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3S32

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111 Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0105-06B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4994.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/26/2007

% Moisture: not dec. 22 Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown-01	10.748	6.8	J
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S33

Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-07B

Sample wt/vol: 4.80 (g/mL) G

Lab File ID: V5H4995.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 10

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.8	U
74-87-3	Chloromethane	5.8	U
75-01-4	Vinyl chloride	5.8	U
74-83-9	Bromomethane	5.8	U
75-00-3	Chloroethane	5.8	U
75-69-4	Trichlorofluoromethane	5.8	U
75-35-4	1,1-Dichloroethene	5.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.8	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	5.8	U
79-20-9	Methyl acetate	5.8	U
75-09-2	Methylene chloride	5.8	U
156-60-5	trans-1,2-Dichloroethene	5.8	U
1634-04-4	Methyl tert-butyl ether	5.8	U
75-34-3	1,1-Dichloroethane	5.8	U
156-59-2	cis-1,2-Dichloroethene	5.8	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	5.8	U
67-66-3	Chloroform	5.8	U
71-55-6	1,1,1-Trichloroethane	5.8	U
110-82-7	Cyclohexane	5.8	U
56-23-5	Carbon tetrachloride	5.8	U
71-43-2	Benzene	5.8	U
107-06-2	1,2-Dichloroethane	5.8	U
123-91-1	1,4-Dioxane	120	~~U~~ R

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SOM01.1 (5/2005)

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S33

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-07B

Sample wt/vol: 4.80 (g/mL) G

Lab File ID: V5H4995.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 10

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.8	U
108-87-2	Methylcyclohexane	5.8	U
78-87-5	1,2-Dichloropropane	5.8	U
75-27-4	Bromodichloromethane	5.8	U
10061-01-5	cis-1,3-Dichloropropene	5.8	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	5.8	U
10061-02-6	trans-1,3-Dichloropropene	5.8	U
79-00-5	1,1,2-Trichloroethane	5.8	U
127-18-4	Tetrachloroethene	5.8	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	5.8	U
106-93-4	1,2-Dibromoethane	5.8	U
108-90-7	Chlorobenzene	5.8	U
100-41-4	Ethylbenzene	5.8	U
179601-23-1	m,p-Xylene	5.8	U
95-47-6	o-Xylene	5.8	U
100-42-5	Styrene	5.8	U
75-25-2	Bromoform	5.8	U
98-82-8	Isopropylbenzene	5.8	U
79-34-5	1,1,2,2-Tetrachloroethane	5.8	U
541-73-1	1,3-Dichlorobenzene	5.8	U
106-46-7	1,4-Dichlorobenzene	5.8	U
95-50-1	1,2-Dichlorobenzene	5.8	U
96-12-8	1,2-Dibromo-3-chloropropane	5.8	U
120-82-1	1,2,4-Trichlorobenzene	5.8	U
87-61-6	1,2,3-Trichlorobenzene	5.8	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S33

Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-07B
Sample wt/vol: 4.80 (g/mL) G
Lab File ID: V5H4995.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 10
Date Analyzed: 01/30/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S35

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-08B

Sample wt/vol: 4.80 (g/mL) G

Lab File ID: V5H4996.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 21

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.6	U
74-87-3	Chloromethane	6.6	U
75-01-4	Vinyl chloride	6.6	U
74-83-9	Bromomethane	6.6	U
75-00-3	Chloroethane	6.6	U
75-69-4	Trichlorofluoromethane	6.6	U
75-35-4	1,1-Dichloroethene	6.6	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	13	U
67-64-1	Acetone	6.6	U
75-15-0	Carbon disulfide	6.6	U
79-20-9	Methyl acetate	6.6	U
75-09-2	Methylene chloride	6.6	U
156-60-5	trans-1,2-Dichloroethene	6.6	U
1634-04-4	Methyl tert-butyl ether	6.6	U
75-34-3	1,1-Dichloroethane	6.6	U
156-59-2	cis-1,2-Dichloroethene	13	U
78-93-3	2-Butanone	6.6	U
74-97-5	Bromochloromethane	6.6	U
67-66-3	Chloroform	6.6	U
71-55-6	1,1,1-Trichloroethane	6.6	U
110-82-7	Cyclohexane	6.6	U
56-23-5	Carbon tetrachloride	6.6	U
71-43-2	Benzene	6.6	U
107-06-2	1,2-Dichloroethane	130	~~U~~ R
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S35

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-08B

Sample wt/vol: 4.80 (g/mL) G

Lab File ID: V5H4996.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 21

Date Analyzed: 01/30/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.6	U
108-87-2	Methylcyclohexane	6.6	U
78-87-5	1,2-Dichloropropane	6.6	U
75-27-4	Bromodichloromethane	6.6	U
10061-01-5	cis-1,3-Dichloropropene	6.6	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.6	U
10061-02-6	trans-1,3-Dichloropropene	6.6	U
79-00-5	1,1,2-Trichloroethane	6.6	U
127-18-4	Tetrachloroethene	6.6	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.6	U
106-93-4	1,2-Dibromoethane	6.6	U
108-90-7	Chlorobenzene	6.6	U
100-41-4	Ethylbenzene	6.6	U
179601-23-1	m,p-Xylene	6.6	U
95-47-6	o-Xylene	6.6	U
100-42-5	Styrene	6.6	U
75-25-2	Bromoform	6.6	U
98-82-8	Isopropylbenzene	6.6	U
79-34-5	1,1,2,2-Tetrachloroethane	6.6	U
541-73-1	1,3-Dichlorobenzene	6.6	U
106-46-7	1,4-Dichlorobenzene	6.6	U
95-50-1	1,2-Dichlorobenzene	6.6	U
96-12-8	1,2-Dibromo-3-chloropropane	6.6	U
120-82-1	1,2,4-Trichlorobenzene	6.6	U
87-61-6	1,2,3-Trichlorobenzene	6.6	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S35

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-08B
Sample wt/vol: 4.80 (g/mL) G
Lab File ID: V5H4996.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 21
Date Analyzed: 01/30/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S36

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-09B
Sample wt/vol: 4.00 (g/mL) G
Lab File ID: V5H4997.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 7.0
Date Analyzed: 01/30/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.7	U
74-87-3	Chloromethane	6.7	U
75-01-4	Vinyl chloride	6.7	U
74-83-9	Bromomethane	6.7	U
75-00-3	Chloroethane	6.7	U
75-69-4	Trichlorofluoromethane	6.7	U
75-35-4	1,1-Dichloroethene	6.7	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.7	U
67-64-1	Acetone	6.7	U
75-15-0	Carbon disulfide	19	
79-20-9	Methyl acetate	6.7	U
75-09-2	Methylene chloride	6.7	U
156-60-5	trans-1,2-Dichloroethene	6.7	U
1634-04-4	Methyl tert-butyl ether	6.7	U
75-34-3	1,1-Dichloroethane	6.7	U
156-59-2	cis-1,2-Dichloroethene	6.7	U
78-93-3	2-Butanone	6.7	U
74-97-5	Bromochloromethane	13	U
67-66-3	Chloroform	6.7	U
71-55-6	1,1,1-Trichloroethane	6.7	U
110-82-7	Cyclohexane	6.7	U
56-23-5	Carbon tetrachloride	6.7	U
71-43-2	Benzene	6.7	U
107-06-2	1,2-Dichloroethane	6.7	U
123-91-1	1,4-Dioxane	6.7	U
		130	UR

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S36

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-09B

Sample wt/vol: 4.00 (g/mL) G

Lab File ID: V5H4997.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 7.0

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.7	U
108-87-2	Methylcyclohexane	6.7	U
78-87-5	1,2-Dichloropropane	6.7	U
75-27-4	Bromodichloromethane	6.7	U
10061-01-5	cis-1,3-Dichloropropene	6.7	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.7	U
10061-02-6	trans-1,3-Dichloropropene	6.7	U
79-00-5	1,1,2-Trichloroethane	6.7	U
127-18-4	Tetrachloroethene	6.7	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.7	U
106-93-4	1,2-Dibromoethane	6.7	U
108-90-7	Chlorobenzene	6.7	U
100-41-4	Ethylbenzene	6.7	U
179601-23-1	m,p-Xylene	6.7	U
95-47-6	o-Xylene	6.7	U
100-42-5	Styrene	6.7	U
75-25-2	Bromoform	6.7	U
98-82-8	Isopropylbenzene	6.7	U
79-34-5	1,1,2,2-Tetrachloroethane	6.7	U
541-73-1	1,3-Dichlorobenzene	6.7	U
106-46-7	1,4-Dichlorobenzene	6.7	U
95-50-1	1,2-Dichlorobenzene	6.7	U
96-12-8	1,2-Dibromo-3-chloropropane	6.7	U
120-82-1	1,2,4-Trichlorobenzene	6.7	U
87-61-6	1,2,3-Trichlorobenzene	6.7	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S36

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-09B
Sample wt/vol: 4.00 (g/mL) G
Lab File ID: V5H4997.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 7.0
Date Analyzed: 01/30/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown-01	11.707	62	J
02		Unknown-02	12.044	71	J
03	135-01-3	Benzene, 1,2-diethyl-	12.195	63	NJ
04	874-41-9	Benzene, 1-ethyl-2,4-dimethyl-	12.764	200	NJ
05	3454-07-7	Benzene, 1-ethenyl-4-ethyl-	12.892	91	NJ
06		Unknown-03	13.066	75	J
07	1595-16-0	Benzene, 1-methyl-4-(1-methylprop	13.403	94	NJ
08		Unknown-04	13.449	59	J
	824-63-5	1H-Indene, 2,3-dihydro-2-methyl-	13.635	80	NJ
	767-58-8	Indan, 1-methyl-	13.832	300	NJ
		Unknown-05	13.96	140	J
12		Unknown-06	14.041	58	J
13		Unknown-07	14.169	71	J
14	97664-18-1	Benzene, 1-methyl-4-(1-methyl-2-p	14.239	120	NJ
15		Unknown-08	14.297	180	J
16		Unknown-09	14.378	99	J
17	27087-54-3	Bicyclo[4.2.0]octa-1,3,5-triene,	14.425	93	NJ
18	4706-89-2	Benzene, 2,4-dimethyl-1-(1-methyl	14.46	150	NJ
19		Unknown-10	14.576	95	J
20		Unknown-11	14.645	73	J
21		Unknown-12	14.703	98	J
22		Unknown-13	14.854	160	J
23		Unknown-14	14.924	88	J
24	6682-71-9	1H-Indene, 2,3-dihydro-4,7-dimeth	15.098	150	NJ
25		Unknown-15	15.238	90	J
26		Unknown-16	15.319	240	J
27		Unknown-17	15.493	120	J
28		Unknown-18	15.574	130	J
29		Unknown-19	15.749	64	J
30	90-12-0	Naphthalene, 1-methyl-	16.19	85	NJ
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S38

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-10B

Sample wt/vol: 5.30 (g/mL) G

Lab File ID: V5H4998.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 17

Date Analyzed: 01/30/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.7	U
74-87-3	Chloromethane	5.7	U
75-01-4	Vinyl chloride	5.7	U
74-83-9	Bromomethane	5.7	U
75-00-3	Chloroethane	5.7	U
75-69-4	Trichlorofluoromethane	5.7	U
75-35-4	1,1-Dichloroethene	5.7	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	11	U
67-64-1	Acetone	5.7	U
75-15-0	Carbon disulfide	5.7	U
79-20-9	Methyl acetate	5.7	U
75-09-2	Methylene chloride	5.7	U
156-60-5	trans-1,2-Dichloroethene	5.7	U
1634-04-4	Methyl tert-butyl ether	5.7	U
75-34-3	1,1-Dichloroethane	5.7	U
156-59-2	cis-1,2-Dichloroethene	11	U
78-93-3	2-Butanone	5.7	U
74-97-5	Bromochloromethane	5.7	U
67-66-3	Chloroform	5.7	U
71-55-6	1,1,1-Trichloroethane	5.7	U
110-82-7	Cyclohexane	5.7	U
56-23-5	Carbon tetrachloride	5.7	U
71-43-2	Benzene	5.7	U
107-06-2	1,2-Dichloroethane	110	UR
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S38

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-10B
Sample wt/vol: 5.30 (g/mL) G
Lab File ID: V5H4998.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 17
Date Analyzed: 01/30/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.7	U
108-87-2	Methylcyclohexane	5.7	U
78-87-5	1,2-Dichloropropane	5.7	U
75-27-4	Bromodichloromethane	5.7	U
10061-01-5	cis-1,3-Dichloropropene	5.7	U
108-10-1	4-Methyl-2-pentanone	5.7	U
108-88-3	Toluene	11	U
10061-02-6	trans-1,3-Dichloropropene	5.7	U
79-00-5	1,1,2-Trichloroethane	5.7	U
127-18-4	Tetrachloroethene	5.7	U
591-78-6	2-Hexanone	5.7	U
124-48-1	Dibromochloromethane	11	U
106-93-4	1,2-Dibromoethane	5.7	U
108-90-7	Chlorobenzene	5.7	U
100-41-4	Ethylbenzene	5.7	U
179601-23-1	m,p-Xylene	5.7	U
95-47-6	o-Xylene	5.7	U
100-42-5	Styrene	5.7	U
75-25-2	Bromoform	5.7	U
98-82-8	Isopropylbenzene	5.7	U
79-34-5	1,1,2,2-Tetrachloroethane	5.7	U
541-73-1	1,3-Dichlorobenzene	5.7	U
106-46-7	1,4-Dichlorobenzene	5.7	U
95-50-1	1,2-Dichlorobenzene	5.7	U
96-12-8	1,2-Dibromo-3-chloropropane	5.7	U
120-82-1	1,2,4-Trichlorobenzene	5.7	U
87-61-6	1,2,3-Trichlorobenzene	5.7	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S38

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-10B
Sample wt/vol: 5.30 (g/mL) G
Lab File ID: V5H4998.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 17
Date Analyzed: 01/30/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	556-67-2	Cyclotetrasiloxane, octamethyl-	10.755	6.4	~~NJ~~ R
02	90-12-0	Naphthalene, 1-methyl-	16.202	6.5	NJ
03	1127-76-0	Naphthalene, 1-ethyl-	17.003	5.9	NJ
04	575-43-9	Naphthalene, 1,6-dimethyl-	17.119	9.0	NJ
05	575-37-1	Naphthalene, 1,7-dimethyl-	17.27	14	NJ
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S39

Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-11B

Sample wt/vol: 5.30 (g/mL) G

Lab File ID: V5H5054.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 9.0

Date Analyzed: 01/31/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.2	U
74-87-3	Chloromethane	5.2	U
75-01-4	Vinyl chloride	5.2	U
74-83-9	Bromomethane	5.2	U
75-00-3	Chloroethane	5.2	U
75-69-4	Trichlorofluoromethane	5.2	U
75-35-4	1,1-Dichloroethene	5.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.2	U
67-64-1	Acetone	5.2	U
75-15-0	Carbon disulfide	10	U
79-20-9	Methyl acetate	5.2	U
75-09-2	Methylene chloride	5.2	U
156-60-5	trans-1,2-Dichloroethene	5.2	U
1634-04-4	Methyl tert-butyl ether	5.2	U
75-34-3	1,1-Dichloroethane	5.2	U
156-59-2	cis-1,2-Dichloroethene	5.2	U
78-93-3	2-Butanone	5.2	U
74-97-5	Bromochloromethane	10	U
67-66-3	Chloroform	5.2	U
71-55-6	1,1,1-Trichloroethane	5.2	U
110-82-7	Cyclohexane	5.2	U
56-23-5	Carbon tetrachloride	5.2	U
71-43-2	Benzene	5.2	U
107-06-2	1,2-Dichloroethane	5.2	U
123-91-1	1,4-Dioxane	5.2	U
		100	~~U~~ R

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1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S39

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S24

Matrix: (SOIL/SED/WATER) SOIL

Lab Sample ID: F0105-11B

Sample wt/vol: 5.30 (g/mL) G

Lab File ID: V5H5054.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec. 9.0

Date Analyzed: 01/31/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.2	U
108-87-2	Methylcyclohexane	5.2	U
78-87-5	1,2-Dichloropropane	5.2	U
75-27-4	Bromodichloromethane	5.2	U
10061-01-5	cis-1,3-Dichloropropene	5.2	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	1.2	J
10061-02-6	trans-1,3-Dichloropropene	5.2	U
79-00-5	1,1,2-Trichloroethane	5.2	U
127-18-4	Tetrachloroethene	5.2	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.2	U
106-93-4	1,2-Dibromoethane	5.2	U
108-90-7	Chlorobenzene	5.2	U
100-41-4	Ethylbenzene	1.1	J
179601-23-1	m,p-Xylene	4.8	J
95-47-6	o-Xylene	1.2	J
100-42-5	Styrene	5.2	U
75-25-2	Bromoform	5.2	U
98-82-8	Isopropylbenzene	5.2	U
79-34-5	1,1,2,2-Tetrachloroethane	5.2	U
541-73-1	1,3-Dichlorobenzene	5.2	U
106-46-7	1,4-Dichlorobenzene	5.2	U
95-50-1	1,2-Dichlorobenzene	5.2	U
96-12-8	1,2-Dibromo-3-chloropropane	5.2	U
120-82-1	1,2,4-Trichlorobenzene	5.2	U
87-61-6	1,2,3-Trichlorobenzene	5.2	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S39

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S24
Matrix: (SOIL/SED/WATER) SOIL
Lab Sample ID: F0105-11B
Sample wt/vol: 5.30 (g/mL) G
Lab File ID: V5H5054.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec. 9.0
Date Analyzed: 01/31/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG
Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

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Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "'Agnes Ng'" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 14:17
Subject: Region 02 | Case 36111 | Lab MITKEM | Issue Insufficient/inappropriate designation of laboratory QC | FINAL

Agnes,

This is Keri Schaffer, Beth is out of the office.

*** Summary Start ***

Issue: VOA samples B3S24 and B3S26 are designated for laboratory QC on the TR/COC, however the Scheduling Notification says laboratory QC is not required for this Case.
Resolution: In accordance with previous direction from Region 2, Region 2 only requires MS/MSD on the Pest/PCB fraction for SOM01.1. The laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

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-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 1:58 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36111

Hi Beth,

This case was scheduled for water and soil samples for VOA. Samples B3S24 and B3S26 are designated on the TR/COC as samples for laboratory QC. Scheduling notification form says laboratory QC is not required. Are we to perform laboratory QC?

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****
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that is privileged, confidential, and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at 401-732-3400.

Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 15:25
Subject: Region 02 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multiple | FINAL

Agnes,

*** Summary Start ***

- Non-standard matrix -

Issue 1: Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, for VOA analysis, had sediment in all vials for each sample. In most cases, at least half of vial is sediment. This may be an issue with DMC recoveries.
Resolution 1: Per Region 2, the laboratory will make every effort to avoid the sediment in the samples and note the issue in the SDG Narrative.

- Non-sampler issue -

Issue 2: Samples were received without sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

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-----Original Message-----
From: Michael.Adly@epamail.epa.gov [mailto:Michael.Adly@epamail.epa.gov]
Sent: Friday, January 26, 2007 3:16 PM
To: Rudolph, Elizabeth
Cc: feranda.jennifer@epa.gov
Subject: Re: New Issue #6 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multip le

Keri,

Regarding issue #1, please advise the lab to proceed with the analysis

of the samples, make every effort to avoid the sediment in the samples, and note the issue in the SDG narrative.

Thanks.

dly A. Michael
egion 2 - HWSB - HWSS
Phone: (732) 906-6161
Fax: (732) 321-6622

"Rudolph, Elizabeth" <erudolph@fedcsc.com>
01/26/2007 02:41 PM

To
Adly Michael/R2/USEPA/US@EPA,
Jennifer Feranda/R2/USEPA/US@EPA
cc

Subject
New Issue #6 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multiple

Adly,

MITKEM has reported the following issues regarding Case 36111. Issue 2 may be resolved using a standard answer. Please advise on how the lab should proceed for issue 1.

e 1: Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, OA analysis, had sediment in all vials for each sample. In most es, at least half of vial is sediment. This may be an issue with DMC recoveries.

Issue 2: Samples were received without sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

Please contact me if you have any questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

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-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 2:28 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36111 SDG B3S26

Hi Beth,

1. Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, for VOA analysis, had sediment in all vials for each sample. In most cases, at least half of vial is sediment. This may be an issue with DMC recoveries.

2. For all the soil and aqueous samples in this case, we did not receive any tags.

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****
This message is intended only for the use of the individual to whom it is addressed and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at 401-732-3400.

SDG Narrative

Mitkem Corporation submits the enclosed data package in response to USEPA Case # 36111 and SDG# B3S26. Analyses were performed for eight aqueous samples that were received on January 26, 2007. The analyses were performed under USEPA Contract # EP-W-05-030. Please note that the sample-shipping cooler received on January 26 was measured at 3°C.

All the vials for the following samples contained sediment: B3R26, B3S30, B3S31, B3S34, B3S37 and B3S40. The sediment may interfere with DMC recoveries. Per the Region, proceed with analysis of the samples.

All three vials for sample B3S34 is almost full of sediment. Due to the amount of sediment, the laboratory will have a hard time analyzing the sample. Per the Region, the laboratory is to analyze the sample at the least possible dilution. The laboratory was able to get enough sample from all three vials to analyze the sample without any dilution.

Sample B3S26 was designated on the TR/COC as sample for laboratory QC. The scheduling notification form says laboratory QC is not required. Per the Region, laboratory QC is only required for pesticides and Aroclor fractions.

No sample tags were received with the samples. Per the Region, proceed with analysis of the samples.

The following samples are submitted in this data package:

Client ID	Lab ID	Analysis	VOA pH
B3S26	F0108-01A	V	<2
B3S30	F0108-02A	V	<2
B3S31	F0108-03A	V	<2
B3S34	F0108-04A	V	<2
B3S37	F0108-05A	V	<2
B3S40	F0108-06A	V	<2
B3S41	F0108-07A	V	<2
B3S42	F0108-08A	V	<2

V = Volatiles

The analyses were performed using USEPA CLP Multi-Media, Multi-Concentration (SOM01.1) protocols. The analyses were performed with strict adherence to the SOW with the following exceptions and observations:

1. Overall Observation:

Where needed, manual integrations were performed to improve data quality. The corrections were reviewed and associated hardcopies generated and reported as required. Manual integrations are coded to provide the data reviewer justification for such action. The codes are labeled on the ion chromatogram signal (GC/MS signal) and chromatogram for GC based analysis as follows:

- M1 peak tailing or fronting.
- M2 peak co-elution.
- M3 rising or falling baseline.
- M4 retention time shift.
- M5 miscellaneous – under this category, the justification is explained.

2. Volatile Analysis:

Trap used for instrument V2: OI Analytical #10 trap containing 8 cm each of Tenax, silica gel and carbon molecular sieve.

GC column used: 30 m x 0.25 mm id (1.4 um film thickness) DB-624 capillary column.

cis-1,3-Dichloropropene-d4 was detected in method blanks and in samples. The volatile organic deuterated monitoring compound spike solution contains both the cis- and trans-1,3-dichloropropene isomers. cis-1,3-Dichloropropene-d4 is not a dueterated monitoring compound for SOM01.1, while the trans isomer is. The cis isomer is considered a laboratory artifact, and is not reported as a tentatively identified compound.

The following equation was used to calculate the concentration of target analytes for aqueous samples:

$$\text{Concentration } (\mu g/L) = \frac{(Amt)(DF)(UF)(5)}{V_o}$$

where: Amt = CAL – AMT on raw data
DF = Dilution factor
UF = ng unit correction factor
V_o = Sample volume purged (mL)

DMC recoveries were within the QC limits with the exception of high recovery of chloroethane-d5 in sample B3S41.

0002

No manual integrations were performed.

For 1,4-dioxane and 1,4-dioxane-d8, the laboratory was unable to meet the minimum average RRF of 0.0050 in both the initial calibration and calibration verifications. In our experience, this compound will not reliably achieve the SOM method performance criteria due to its high water solubility. This compound is able to be reliably analyzed as an extractable semivolatile organic compound.

No other unusual observation was made for the analysis.

All of the submittals to the region are originals other than logbook pages. Photocopies of logbook pages are included, with the originals maintained on file at the laboratory. Tunes, calibration verifications and initial calibrations that are shared among several cases are photocopies indicating the location of the originals.

I certify that this Sample Data Package is in compliance with the terms and condition of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Agnes Ng
CLP Project Manager
02/01/07

Contract Laboratory Program

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3S26

Laboratory Name	Mitkem Corporation	Lab Code	MITKEM
Contract No.	EP-W-05-030	Case No.	36111
Analysis Price	$ 0.00	SDG Turnaround	7 days

EPA Sample Numbers in SDG (Listed in Numerical Order)

01) B3S26	08) B3S42		
02) B3S30			
03) B3S31			
04) B3S34			
05) B3S37			
06) B3S40			
07) B3S41			

First Sample in SDG	Last Sample in SDG
B3S26	B3S42
First Sample Receipt Date	**Last Sample Receipt Date**
01/26/2007	01/26/2007

Note: There are a maximum of 20 field samples [excluding Performance Evaluation (PE) samples in an SDG. Attach the TR/COC Records to this form in alphanumeric order (the order listed above on this form).

Signature _____ Date 01/26/2007

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S26

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-01A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2375.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	10	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	10	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	5.0	U
		100	~~U~~ R

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1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S26

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-01A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2375.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S26

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-01A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2375.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S30

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-02A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2376.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	100	~~U~~ R
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S30

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-02A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2376.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S30

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36111
Mod. Ref No.: SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-02A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2376.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624 ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S31

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-03A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2377.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	10	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	10	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	5.0	U
		100	~~U~~ R

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S31

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-03A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2377.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S31

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-03A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2377.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S34

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-04A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2493.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 02/01/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	14	
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	~~U~~ R

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1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S34

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-04A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2493.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 02/01/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	2.3	J
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U
		5.0	U

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1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3S34

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-04A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2493.D

Level: (TRACE or LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 02/01/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S37

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-05A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2379.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	10	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	10	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	5.0	U
		100	~~U~~ R

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S37

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-05A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2379.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S37

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-05A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2379.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S40

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-06A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2380.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	100	~~U~~ R
123-91-1	1,4-Dioxane		

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S40

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-06A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2380.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S40

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-06A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2380.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S41 FB 1/25

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-07A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2381.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	2.3	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	U R

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S41

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-07A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2381.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

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1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3S41

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-07A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2381.D
Level: (TRACE or LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3S42 TB 1/25

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36111

Mod. Ref No.: SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-08A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2382.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	2.8	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	100	UR

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3S42

Lab Name: MITKEM CORPORATION
Contract: EP-W-05-030
Lab Code: MITKEM
Case No.: 36111
Mod. Ref No.:
SDG No.: B3S26
Matrix: (SOIL/SED/WATER) WATER
Lab Sample ID: F0108-08A
Sample wt/vol: 5.00 (g/mL) ML
Lab File ID: V2J2382.D
Level: (TRACE/LOW/MED) LOW
Date Received: 01/26/2007
% Moisture: not dec.
Date Analyzed: 01/29/2007
GC Column: DB-624
ID: 0.25 (mm)
Dilution Factor: 1.0
Soil Extract Volume: (uL)
Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3S42

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM

Case No.: 36111

Mod. Ref No.:

SDG No.: B3S26

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0108-08A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2382.D

Level: (TRACE or LOW/MED) LOW

Date Received: 01/26/2007

% Moisture: not dec.

Date Analyzed: 01/29/2007

GC Column: DB-624

ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

Purge Volume: 5.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

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Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "'Agnes Ng'" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 14:17
Subject: Region 02 | Case 36111 | Lab MITKEM | Issue Insufficient/inappropriate designation of laboratory QC | FINAL

Agnes,

This is Keri Schaffer, Beth is out of the office.

*** Summary Start ***

Issue: VOA samples B3S24 and B3S26 are designated for laboratory QC on the TR/COC, however the Scheduling Notification says laboratory QC is not required for this Case.
Resolution: In accordance with previous direction from Region 2, Region 2 only requires MS/MSD on the Pest/PCB fraction for SOM01.1. The laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
dolph@fedcsc.com
-818-4215

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-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 1:58 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36111

Hi Beth,

This case was scheduled for water and soil samples for VOA. Samples B3S24 and B3S26 are designated on the TR/COC as samples for laboratory QC. Scheduling notification form says laboratory QC is not required. Are we to perform laboratory QC?

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****

105

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Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 15:25
Subject: Region 02 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multiple | FINAL

Agnes,

*** Summary Start ***

- Non-standard matrix -

Issue 1: Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, for VOA analysis, had sediment in all vials for each sample. In most cases, at least half of vial is sediment. This may be an issue with DMC recoveries.
Resolution 1: Per Region 2, the laboratory will make every effort to avoid the sediment in the samples and note the issue in the SDG Narrative.

- Non-sampler issue -

Issue 2: Samples were received without sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

. Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

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-----Original Message-----
From: Michael.Adly@epamail.epa.gov [mailto:Michael.Adly@epamail.epa.gov]
Sent: Friday, January 26, 2007 3:16 PM
To: Rudolph, Elizabeth
Cc: feranda.jennifer@epa.gov
Subject: Re: New Issue #6 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multip le

K

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Regarding issue #1, please advise the lab to proceed with the analysis

of the samples, make every effort to avoid the sediment in the samples, and note the issue in the SDG narrative.

Thanks.

Adly A. Michael
Region 2 - HWSB - HWSS
Phone: (732) 906-6161
Fax: (732) 321-6622

"Rudolph, Elizabeth" <erudolph@fedcsc.com>
01/26/2007 02:41 PM

To
Adly Michael/R2/USEPA/US@EPA, Jennifer Feranda/R2/USEPA/US@EPA

cc

Subject
New Issue #6 | Case 36111 | Lab MITKEM | SDG B3S26 | Issue Multiple

Adly,

MITKEM has reported the following issues regarding Case 36111. Issue 2 may be resolved using a standard answer. Please advise on how the lab should proceed for issue 1.

Issue 1: Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, for VOA analysis, had sediment in all vials for each sample. In most cases, at least half of vial is sediment. This may be an issue with DMC recoveries.

Issue 2: Samples were received without sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

Please contact me if you have any questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

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-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 2:28 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36111 SDG B3S26

Hi Beth,

1. Aqueous samples B3S26, B3S30, B3S31, B3S34, B3S37 and B3S40, for VOA analysis, had sediment in all vials for each sample. In most cases, at least half of vial is sediment. This may be an issue with DMC recoveries.

2. For all the soil and aqueous samples in this case, we did not receive any tags.

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****
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Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>; "Joy Boudreau (E-mail)" <jboudreau@mitkem.com>
Cc: "Hanif (E-mail)" <sheikh.muhammad@epa.gov>; "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Wednesday, January 31, 2007 17:04
Subject: Region 02 | Case 36111 | Lab MITKEM | Issue Insufficient volume | FINAL

Agnes,

Summary Start

Issue: Sample B3S34, aqueous sample for VOA analysis, all three vials are almost full of sediment. The laboratory has reported that it will be hard for the lab to analyze this sample due to the amount of sediment.
Resolution: Per Region 2, the laboratory shall analyze the sample (B3S34) at the least possible dilution and note the issue in the SDG Narrative.

Summary End

Please let me know if you have any questions.
Thanks,

Beth

-----Original Message-----
From: Sheikh.Muhammad@epamail.epa.gov
[mailto:Sheikh.Muhammad@epamail.epa.gov]
Sent: Wednesday, January 31, 2007 5:00 PM
To: Rudolph, Elizabeth
Cc: Michael.Adly@epa.gov; dennis.foerter@westonsolutions.com; Rudolph, Elizabeth; Acosta.Ildefonso@epa.gov; Feranda.Jennifer@epa.gov; Mauel.Linda@epa.gov
Subject: RE: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matrix

Elzabeth,

I talked to the RPM to let him know that the lab has separated the aqueous phase from sediment, but the water phase is not enough to analyze the sample at full volume. The lab, however, can analyze the sample at a dilution not exceeding 5 times. Please advise the lab to analyze the sample B3S34 at the least possible dilution and note the issue in the SDG narrative.

Thanks,

Hanif Sheikh
Alt. CLP PO
EPA-Region 2
Tel. (732)906-6169
Fax# (732)321-6169

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~Please note that the sample volume should state 1 to 2 ml.

1/31/227 4:30 PM Phone conversation between Beth Rudolph, SMO, and Hanif Sheikh, Region 2. Beth reported that reduced volume was possible and that CRQLS could be up to 5 times higher. Beth also noted that the sample could be analyzed as a sediment. Hanif indicated that reduced volume would be ok however he would respond in an email.

1/31/2007 4:20 PM Phone conversation between Beth Rudolph, SMO, and Agnes Ng, MITKEM. Agnes indicated that the sample could be analyzed at a reduced volume with CRQLS 5 times higher in the worst case situation. The sample could also be analyzed as a soil but the sample was preserved in HCL.

1/31/2007 4:15 PM Phone conversation between Beth Rudolph, SMO, and Hanif Sheikh, Region 2. Hanif asked if reduced volume QC was an option and if so what the CRQLs would be. Hanif also inquired if the sample could be analyzed as a soil.

-----Original Message-----
From: Foerter, Dennis [mailto:Dennis.Foerter@WestonSolutions.com]
Sent: Wednesday, January 31, 2007 4:00 PM
To: Rudolph, Elizabeth; Sheikh.Muhammad@epamail.epa.gov
Cc: Acosta.Ildefonso@epamail.epa.gov; Feranda.Jennifer@epamail.epa.gov; Michael.Adly@epamail.epa.gov; Mauel.Linda@epamail.epa.gov
Subject: RE: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matrix

Hanif:

After our conference with Ilde Acosta, Ilde and myself discussed the issue further. After this discussion, Ilde determined that if there is a way to analyze the sample as an aqueous sample, please analyze as sediment.

Ilde: please confirm

Dennis

-----Original Message-----
From: Sheikh.Muhammad@epamail.epa.gov [mailto:Sheikh.Muhammad@epamail.epa.gov]
Sent: Wednesday, January 31, 2007 3:43 PM
To: Rudolph, Elizabeth
Cc: Acosta.Ildefonso@epamail.epa.gov; Feranda.Jennifer@epamail.epa.gov; Michael.Adly@epamail.epa.gov; Mauel.Linda@epamail.epa.gov; dennis.foerter@westonsolutions.com
Subject: Re: FW: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matrix

Elizabeth,

I talked to the RPM and sampler in a conference call. They both indicated that they definitely need the water sample (B3S34) data. They have suggested that the lab separate the water phase from the sediment and analyze it as water sample. Please advise the lab of this option and let me know if they agree to it.

Thanks,

Hanif Sheikh
Alt. CLP PO

111

EPA-Region 2
Tel. (732)906-6169
Fax# (732)321-6169

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1/31/2007 3:10 PM Phone conversation between Beth Rudolph, SMO, and Agnes Ng, MITKEM. Agnes indicated that 1 to 2 ml (100-200), leaning toward 100 ml of water is available for analysis.

1/31/2007 3:05 PM Phone conversation between Beth Rudolph, SMO, and Hanif Sheikh, Region 2. Beth reported that MITKEM had contacted her regarding a resolution because the TAT is 7 days.

1/31/2007 3:00 PM Phone conversation between Beth Rudolph, SMO, and Agnes Ng, MITKEM. Agnes asked Beth about a resolution for Case 36111. Agnes stressed how the data needs to be sent out tomorrow in order for the data to not be late.

"Rudolph, Elizabeth" <erudolph@fedcsc.com>

01/31/2007 11:57 AM

To: Muhammad Sheikh/R2/USEPA/US@EPA

cc:

Subject: FW: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matrix

Hanif,

Please see email trail.

Thanks,
Beth

-----Original Message-----
From: Rudolph, Elizabeth
Sent: Wednesday, January 31, 2007 9:15 AM
To: Agnes Ng (E-mail)
Subject: FW: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matrix

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Good morning Agnes,

02/01/200

Regarding the issue reported below, Region 2 has asked that you hold off on
the analysis of this sample until they are able to reach the sampler. I will let you know when I receive a response.

ue: Sample B3S34, aqueous sample for VOA analysis, all three vials e almost full of sediment. The laboratory has reported that it will be hard for the lab to analyze this sample due to the amount of sediment.

Thanks,
Beth
-----Original Message-----
From: Michael.Adly@epamail.epa.gov [mailto:Michael.Adly@epamail.epa.gov]
Sent: Tuesday, January 30, 2007 5:27 PM
To: Rudolph, Elizabeth
Cc: feranda.jennifer@epa.gov
Subject: Re: New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matr ix

Beth,

Please advise the lab to hold off the analysis of this sample until I get response from the sampler.

Thanks.

Adly A. Michael
Region 2 - HWSB - HWSS
one: (732) 906-6161
: (732) 321-6622

"Rudolph, Elizabeth" <erudolph@fedcsc .com>
01/30/2007 04:37 PM

To
Adly Michael/R2/USEPA/US@EPA, Jennifer Feranda/R2/USEPA/US@EPA

cc

Subject
New Issue #10 | Case 36111 | Lab MITKEM | Issue Non-standard matr ix

Adly,

MITKEM is reporting the following issue. Please advise how the laboratory should proceed.

Issue: Sample B3S34, aqueous sample for VOA analysis, all three vials are almost full of sediment. The laboratory has reported that it will be hard for the lab to analyze this sample due to the amount of ment.

I let me know if you have any questions.
Thanks,

(113)

Beth

-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Tuesday, January 30, 2007 4:30 PM
To: Rudolph, Elizabeth
Subject: Case 36111

Hi Beth,

For sample B3S34, aqueous sample for VOA analysis, all three vials are almost full of sediment. It will be hard for the lab to analyze this sample due to the amount of sediment. How is the lab to proceed?

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****
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REFERENCE 20

Geology and Hydrogeology of the Caribbean Islands Aquifer System of the Commonwealth of Puerto Rico and the U.S. Virgin Islands

By ROBERT A. RENKEN[1], W.C. WARD[2], I.P. GILL[3], FERNANDO GÓMEZ-GÓMEZ[1], JESÚS RODRÍGUEZ-MARTÍNEZ[1], *and* others

REGIONAL AQUIFER-SYSTEM ANALYSIS—CARIBBEAN ISLANDS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1419

[1]U.S. Geological Survey, [2]Department of Geology and Geophysics, University of New Orleans, 2000 Lakeshore Drive, New Orleans, LA 70148 (retired), [3]Department of Geology, University of Puerto Rico, Mayagüez, PR 00681

U.S. DEPARTMENT OF THE INTERIOR

GALE A. NORTON, *Secretary*

U.S. GEOLOGICAL SURVEY

Charles G. Groat, *Director*

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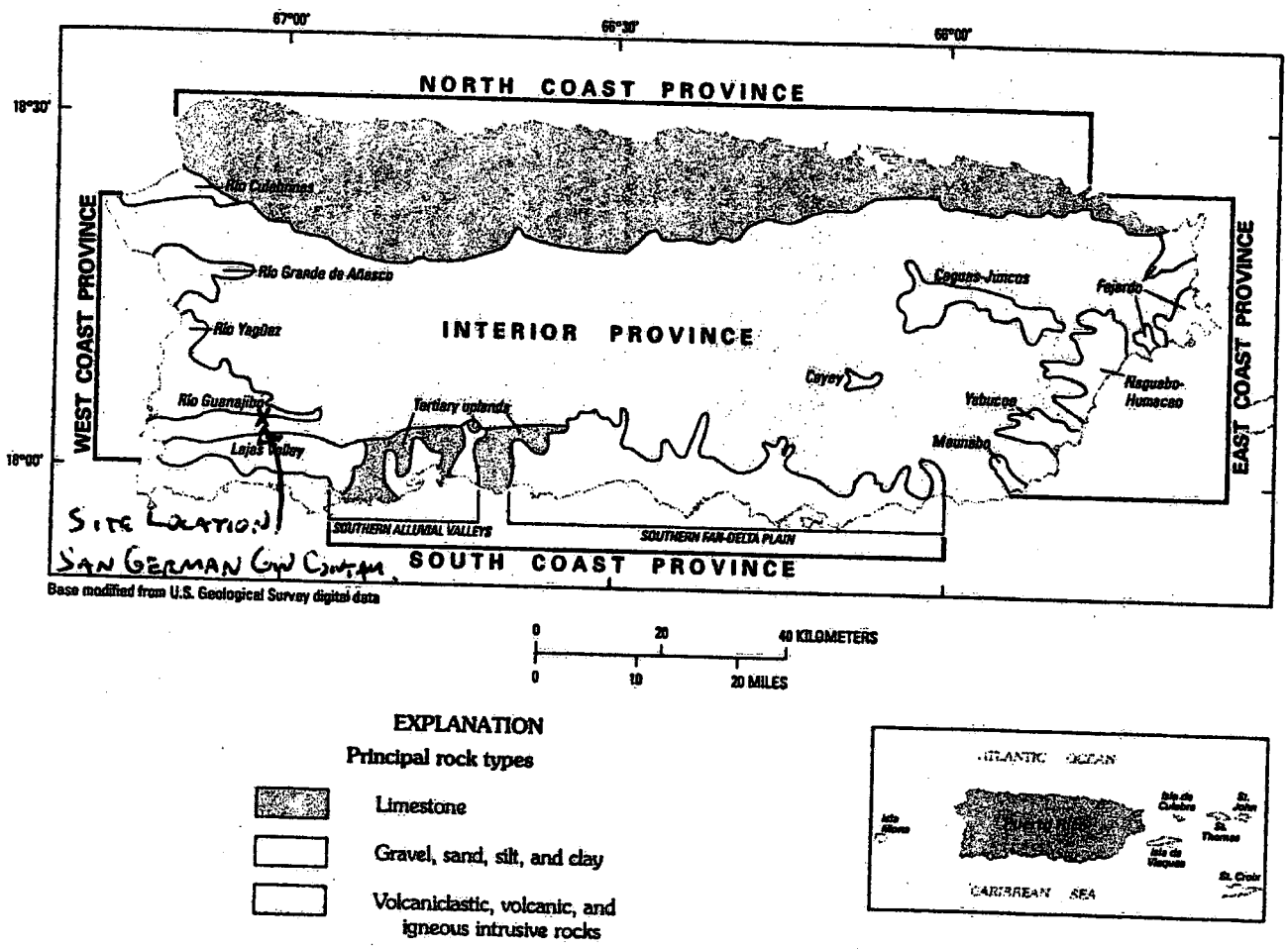
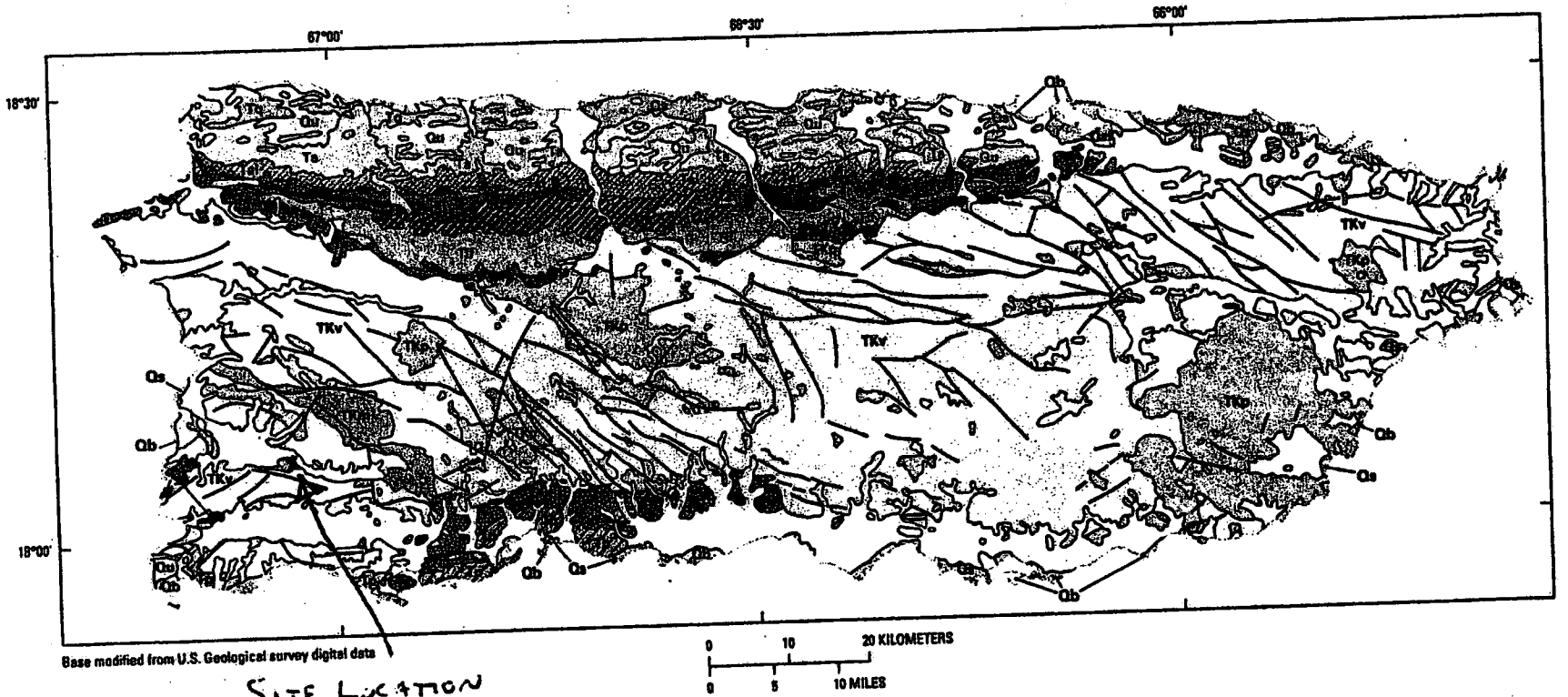


FIGURE 2.—Ground-water provinces of Puerto Rico (modified from McGuinness, 1948).

third of the South Coast ground-water province contains an upland area of low-ridge foothills underlain by carbonate and clastic rocks of late Tertiary age. The eastern two-thirds of the South Coast ground-water province is underlain by fan-delta deposits of Quaternary age that form a low-lying plain. The North Coast ground-water province, characterized by scenic karst topography, is underlain by limestone and minor clastic deposits of Oligocene to Holocene age. A series of discontinuous low-lying alluviated valleys occur along the eastern (East Coast ground-water province) and western (West Coast ground-water province) sides of the island and in the eastern part of the interior (Interior ground-water province). The physiography of Puerto Rico's semiarid South Coast ground-water province is highlighted by a steep-faced mountain front and thin soil cover on the lower mountains and foothill areas. Coastal plain foothills in the western half of the South Coast ground-water province are incised by alluvial-filled stream valleys along the Ríos Tallaboa, Macaná, Guayanilla, Yauco, and Loco. In the Bahía de Guayanilla area, the alluvial valleys of Macaná-Guayanilla-Yauco coalesce to form a low-lying plain that is about 8-km-wide (pl. 2*A*). A fan-delta plain, formed by several large and small fans, extends 70 km eastward from Ponce to Patillas and varies from 3 to 8 km wide (pl. 1*A*). The southern plain slopes gently coastward (1 to 6 meters per kilometers [m/km]) near the coast but at a steeper gradient (4 to 8 m/km) near the apex of the fans. A narrow coastal zone separates the plain from the Caribbean Sea. Bedrock hills, or cerros, protrude the plain in several localities. Mountain streams that enter the southern plain are comparatively straight and have incised deep valleys in the lower mountains and foothills. Recent erosion by the trunk streams where they enter the plain has resulted in different degrees of fanhead incisement.

Trunk streams that traverse the fan-delta plain display a straight to slightly sinuous channel morphology. For example, the stream that drains the Salinas fan, the Río Nigua at Salinas, is relatively straight and extends southwest from the fan apex. A similar channel morphology is present along the Río Coamo that drains the Coamo fan delta. Several of the fans that lie to the west are drained by two streams, which are



SITE LOCATION
SAN GERMAN GROUND WATER CENTER.

EXPLANATION

Quaternary deposits

- Qa — Alluvium
- Ql — Landslide deposits
- Qb — Beach deposits
- Qs — Swamp, marsh deposits
- Qad — Artificial fill
- Qu — Undifferentiated surficial deposits

Pliocene and Miocene rocks

- Tq — Quebradillas Limestone
- Tp — Ponce Limestone

Miocene rocks

- Ta — Aymamón Limestone
- Ag — Aguada (Los Puertos) Limestone
- Guanajibo Formation
- Cibao Formation
- Montebello Limestone Member
- Quebrada Arenas Limestone Member—Includes Miranda Sand Member
- Rio Indio Limestone Member—Includes Almirante Sur Lentil
- Guajataca Member

Miocene and Oligocene rocks

- Mucarabones Sand
- Juana Díaz Formation
- Ll — Lares Formation
- San Sebastián Formation

Eocene, Paleocene, and Cretaceous rocks

- TKv — Volcanic and sedementary rocks
- TKp — Plutonic rocks—Mostly quartz diorite and granodiorite
- Metamorphic (serpentine), sedementary, and igneous rocks

Fault

FIGURE 3.—Geology of Puerto Rico (modified from Briggs and Ackers, 1965; Monroe, 1980; and R.D. Krushensky, written commun., 1993).

fairly straight where they enter the fan-delta plain, but develop a sinuous to meandering pattern as they extend coastward. Prior to being channelized for flood control, the confining channels of these western streams became distributaries and were lost in the distal coastal lowland areas allowing water to spread out as sheetflow.

Carbonate rocks of the North Coast ground-water province form the caprock of intensely karstified, northward-dipping cuesta slopes. Northern cueseta slopes conform to the gentle northward dip of beds and have been greatly modified by processes of karstification. Differential erosion of these carbonates has created a belted series of steep, south-facing scarps that range in height from 10 to 400 m and are scalloped or indented by blind valleys. The Lares cuesta scarp (Monroe, 1976, p. 19), the southernmost of the three east-west trending cuesta scarps, is nearly continuous and mappable for 100 km. Karst features are widely- and well-distributed within the North Coast ground-water province and documented in reports by Lehmann (1954), Gurnee (1967, 1972), Thrailkill (1967), Birot and others (1968), Blume (1968, 1970), Moussa (1969), Miotke (1973), Monroe (1976, 1980), Guisti (1978), and Troester and White (1984). Dissolution along a poorly defined fracture system and mass transport have contributed to the wide variety of karst relief features. Positive relief structures of the North Coast ground-water province include cone and tower karst. Negative relief structures include fracture-controlled zanjones, closed sinkhole depressions or dolines, and dry valleys. Cave collapse locally reveals an extensive, subterranean river system. With the exception of the Río Tanamá caves, Río Camuy cave, the Quebrada Infierno cave system, and the Río Encantado cave system (near Florida), however, most Puerto Rican caves have not been surveyed.

East Coast and West Coast ground-water provinces of Puerto Rico (figs. 2, 3) are indented by several alluvial valleys. The low-lying Humacao and Naguabo Valleys of the East Coast ground-water province are drained by several streams whose headwaters lie in the foothills and mountains of the Sierra de Cayey or Sierra de Luquillo. Both valleys are surrounded by steep-faced slopes and separated by a ridge that rises more than 90 m above the valley floor. A third alluvium-filled valley, the Yabucoa Valley, lies south of the Naguabo-Humacao area. Alluvium-filled valleys of the West Coast ground-water province include those drained by the Río Guanajibo, Río Grande de Añasco, Río Culebrinas, Río Yagüez, and Lajas Valley. Surrounded by dissected hills and ridges, the valleys are low-lying and narrow with the alluvial surface of the valley floor rising from the coast to no more than 60 m above sea level. The Lajas Valley (Valle de Lajas) is relatively narrow (1.5 to 9.5 km) and low-lying and extends 29 km in a nearly east-west direction. Foothills surround the valley on the northern and southern sides, rising nearly 300 m above sea level. Alluvium represents the principal aquifer in the Interior ground-water province and is located in the east-central part of the island. Alluvial deposits underlie a 91 km^2 area in this valley.

PUERTO RICO'S OFFSHORE ISLANDS

The principal offshore islands of Puerto Rico include Isla de Vieques and Isla de Culebra that lies to the east, Isla Mona and Isla Desecheo that are to the west. A generalized geologic description follows.

Isla de Vieques

Vieques, largest of Puerto Rico's adjacent islands, is located 14 km east-southeast of Puerto Rico's eastern coast. Vieques is approximately 23 km long, but no more than 5 km wide. The island's central ridge trends east-northeast with the altitude of its summit nearly 300 m above sea level at Monte Pirata (fig. 4). The central ridge is asymmetric, with northern slopes steeper than the south. The island's land surface is hilly, but includes two alluvial valleys, the Esperanza and Resolución alluvial valleys (fig. 4). The island of Vieques is underlain by highly weathered, plutonic rocks (dominated by granodiorite and quartz similar to the San Lorenzo Batholith in eastern Puerto Rico) and marine volcaniclastic rocks of Cretaceous age (Learned and others, 1973; U.S. Department of Defense, 1980). These older rocks are overlain by limestone of late Tertiary age in several localities, most notably along the northern coastline near Desembarcadero Mosquito, Punta Salinas on the eastern peninsula, and in isolated areas between Esperanza and Ensenada Honda on the southern coast. Alluvial deposits, consisting of sand, silt, and clay lie within the narrow (0.5 to 1 km wide by 5 to 6 km long) Esperanza alluvial valley on the south-central coast of Vieques. Alluvial fan deposits fringe the north side of Monte Pirata and coalesce to form Resolución alluvial valley located on the northwestern coast (McGuinness, 1945). Reported thickness of the alluvial section in Esperanza alluvial valley near Ensenada Sombe is 27 m. Geophysical studies in the Resolución alluvial valley area indicate alluvial deposits are less than 30 m (Torres-Gonzaléz, 1989).

Isla de Culebra

The island of Culebra is approximately 27 km east of Puerto Rico and 9 km north of Vieques (fig. 1); the island encompasses an area of 28 km^2. The island rises to a maximum altitude of only 195 m with ridge crests that average from 75 to 175 m in altitude. Culebra is underlain by volcanic, volcaniclastic, and dioritic rocks of Late Cretaceous age (Donnelly, 1959). Some minor alluvial deposits of silt, clay and some sand and gravel are located in major stream valleys near the coast (Jordan and Gilbert, 1976). Bedrock is exposed at land surface in 50 to 70 percent of the island and a

ley and form a low foothill ridge with a maximum altitude of 246 m; the northern side of the valley is flanked by dissected hills and ridges that rise to altitudes of 200 m. Lajas Valley, open at its eastern and western ends, drains to Guánica valley and Bahía de Boqueron, respectively. Ephermeral streams drain from the north and south and once fed three large lagoons. The two easternmost lagoons have been drained for agricultural purposes, while Laguna Cartegena in the western part of the valley is maintained as a wildlife refuge.

Upland areas adjacent to Lajas Valley are underlain by Cretaceous and Tertiary volcanic and volcaniclastic bedrock and minor limestone beds, Cretaceous to Jurassic serpentinite, amphibolite, and siliceous chert. However, the distribution and character of bedrock units that underlie the clayey alluvium of the central valley is poorly known, largely due to scattered well control. Limestone strata that represent potential aquifers underlie the central part of the valley and are possibly equivalent to irregularly-distributed sequences of Cretaceous limestone strata exposed along nearby foothills. West of Laguna Cartegena, clayey alluvium overlies a carbonate-clastic sequence that could be equivalent to nearby outliers of the Juana Díaz Formation and Ponce Limestone.

Alluvial deposits of Lajas valley range are 60 to 90 m thick and consist mostly of clayey silt, interspersed with stringers of sand. Deposits of sand and gravel are restricted largely to several small alluvial fans located on the perimeter of the valley. Clayey silt underlying the central part of the valley is distal fan or lacustrine in origin.

The Añasco Valley (39 km^2) (figs. 2, 3) and the Guanajibo Valley (34 km^2) are among the largest alluvial valleys of the West Coast ground-water province. The Añasco Valley, drained by two streams, is formed by a low-lying alluvial plain having a maximum altitude of 15 m above sea level and is surrounded on three sides by hills and mountains. The east-southeast trending Guanajibo alluvial valley lies south of the Añasco Valley and north of Lajas Valley. The 22-km-long valley is 1 to 4.5 km wide and is drained principally by Río Guanajibo. Two small alluvial fans border the north side of the valley, formed and fed by tributary streams.

The vertical sequence of stratigraphic units within the Guanajibo and Añasco Valleys suggest that both contain a similar geology. In both valley areas unconsolidated alluvial to marginal marine deposits are underlain by clay and limestone of Pleistocene(?) age that, in turn, unconformably overlie volcaniclastic bedrock. Alluvial deposits in the Añasco Valley consist of clay, minor sand, and occasional channel gravel; clastic nonmarine deposits grade coastward to beach, dune and marsh deposits of clay, silt, sand and skeletal carbonate debris. Alluvial deposits are locally 45 m thick with coarse-grained detritus forming 15 to 30 m-thick beds. A 75 m-thick zone of hard, dense clay interlayered with 15 m-thick, soft limestone beds of Pleistocene(?) age underlies alluvial deposits of the Añasco Valley; the underlying bedrock floor occurs at depths of 100 m below sea level (Díaz and Jordan, 1987). In the Guanajibo Valley, alluvial deposits consist of sand, gravel, and clay reported to be, in some places, 30 m thick. An approximately 50 m-thick limestone unit of Pleistocene(?) age separates alluvial deposits, and unconformably overlies volcaniclastic and volcanic bedrock.

GEOLOGY OF THE EAST COAST GROUND-WATER PROVINCE OF PUERTO RICO

Ridges and mountains of Puerto Rico's East Coast ground-water province (figs. 2, 3) are flanked by a discontinuous plain of alluvial fan fanglomerates and floodplain alluvium that infill several incised stream valleys and grade coastward to lagoonal, swamp, and beach deposits. These valleys are, in turn, underlain by Cretaceous volcaniclastics and Tertiary intrusive and extrusive volcanic rocks akin to the adjoining highlands. The alignment of the alluvial lowland areas and intervening highland ridges indicates that bedrock topography is probably structurally-controlled. Upland stream linearity, trellis or rectilinear drainage patterns, shape of the alluviated valleys, and the configuration of buried bedrock surfaces all strongly reflect joint and fault control.

Alluvial floodplain deposits of unconsolidated, poorly sorted to moderately well-sorted, thick bedded sand, gravel, and clay form a 35-m-thick Piedmont plain in the Río Fajardo valley (Briggs and Aguilar-Cortes, 1980). Sandy lime mud and organic clay deposited within a mangrove swamp and pebbly, coarse to fine-grained carbonate and terrigenous sand separate alluvial plain deposits from Sonda de Vieques. Twenty-five m-thick fanglomerate deposits of poorly- to well-sorted, clay to boulder-size detritus dominates much of the coastal area between the Río Fajardo floodplain and Naguabo (M'Gonigle, 1978).

The Humacao-Naguabo alluvial area encompasses approximately 39 km^2 (figs. 2, 3). Infilled with clay, silt, and sand deposits, the Humacao alluvial valley is formed as a broad triangular-shaped valley and plain that widens coastward. Fanglomerate deposits fringe the edge of the valley with coastal marsh and beach deposits lining the coastline. The thickness of alluvial deposits can exceed 50 m near the coast (Graves, 1989).

The Yabucoa Valley (31 km^2) is a broad, 23-km-wide by 33-km-long valley incised into the granodiorite of the San Lorenzo Batholith (figs. 2, 3). Boulder- to clay-size alluvial fan fanglomerates dominate the landward margin of the valley, but in the central part of the valley these sediments grade to alluvial plain deposits of stratified, poorly consolidated sand, silt, clay, with scattered pebbles and boulders. The thickness of the alluvial deposits is reported to be as much as 100 m, but usually averages less than 50 m near the coast (Robison and Anders, 1973; Rodgers, 1977). The Río Maun-

ALLUVIAL VALLEY AQUIFERS OF THE SOUTH COAST

Boulder- to sand-size sediments form the principal water-bearing units within alluvial and fan-delta deposits of the Ríos Tallaboa, Guayanilla, Yauco, Macaná and in the Guánica alluvial valley area. Recharge to the aquifer is principally by stream and irrigation ditch seepage (McClymonds, 1967; Crooks and others, 1968) with minor recharge occurring from infiltration of infrequent precipitation that is usually short in duration (Quiñones-Aponte, 1986b). Ground water within the different alluvial valleys occurs mostly under water-table conditions; local artesian conditions also are reported and probably due to stratification of silt and sand-to-boulder sized material. Core data are not currently available within the coastward portions of these alluviated/fan-delta valleys. It is likely, however, that vertical stratification of coarse- and fine-grained bedded units also occurs here, possibly similar to that present within the South Coast aquifer. Ground water is available locally from volcanic and volcaniclastic, fractured or weathered bedrock, or both, or from caverous limestone sequences that underlie the alluvial sequences.

The estimated hydraulic conductivity for alluvial deposits within the Yauco alluvial valley aquifer ranges from 4 m/d near the coast to 60 m/d in upland channel areas (Bennett, 1976). Estimates based on simulation (Quiñones-Aponte, 1986b) indicate that transmissivity within the Yauco alluvial valley ranges between 1,400 to 2,300 square meters per day (m^2/d) in the upland valley and diminishes down valley. Transmissivity in the midfan and distal part of the fan-delta plain range from less than 10 to 900 m^2/d (fig. 53). If a direct correlation between estimates of specific capacity and hydraulic conductivity is assumed, coarse-grained deposits within the Guayanilla and Macaná fan deltas are probably less permeable. Specific-capacity estimates in the Guayanilla and Macaná alluvial valleys range from 1 to 10 liters per second per meter [(L/s)/m] drawdown as compared to the upstream parts of the Yauco which ranged from 1 to more than 21 [(L/s)/m] of drawdown. Higher conductivities within the Yauco alluvial valley as compared to the Guayanilla and Macaná alluvial valleys are attributed to a slightly larger drainage basin size and the narrower upland channel width. Such features may result in higher floodflow velocities and transport of coarser bedload. The transmissivity of alluvium within the Guánica alluvial valley is reported to range from 100 to 7,500 m^2/d; the hydraulic conductivity of the aquifer is reported to range from 20 to 220 m/d (McClymonds, 1967).

THE PONCE-JUANA DÍAZ AQUIFER

The Ponce-Juana Díaz aquifer is most productive where buried beneath the fan-delta plain near Ponce or beneath alluvium in the Tallaboa-Guánica area. In these areas, alluvium is relatively permeable and recharged with ground water, low in dissolved solids and undersaturated with respect to calcite. Monroe (1976, p. 14) reports that the only part of the Juana Díaz Formation that exhibits karstic dissolution and cave development is within the reef tract sediments of the formation that are south and southwest of Peñuelas. Cavernous limestone was reportedly encountered in wells drilled in proximal and midfan areas of the Portugúez-Bucaná and Capitanejo fan deltas; these permeable limestone units are probably associated with fracturing and jointing of beds by nearby faults. Cavernous limestone porosity also was reported in the Guayanilla-Yauco area; wells that penetrate the limestone strata reportedly yield 8 to 63 L/s (42 L/s average) (Crooks and others, 1968).

Although there are limited occurrences of cavernous limestone reported in some localized areas, extensive dissolution within the Ponce-Juana Díaz aquifer has not developed notwithstanding periods of subaerial exposure from the end of the Oligocene to Holocene time. Frost and others (1983, p. 82) suggest three factors that could have effectively reduced the opportunity for solution diagenesis with the reef deposits of the Juana Díaz Formation: (1) meteoric waters were captured by sandy alluvial and nearshore deposits as they moved downgradient; (2) reef deposits were overlain and diagenetically sheltered by poorly permeable forereef and island slope mud; and (3) lime mud, internal sediment, and cementation reduced the original depositional porosity. Arid to semiarid climatic conditions that have prevailed on Puerto Rico's south coast since Pliocene time could have also contributed to the lack of dissolution within the reef tract deposits of the Juana Díaz Formation. Conglomeratic beds in the Juana Díaz Formation, probably deposited as part of an early Oligocene fan-delta sequence, consist of bedded cobble- to sand-size material. Despite their conglomeratic nature, they are not considered a reliable source of ground water. Intergranular voids of the conglomeratic Juana Díaz Formation are infilled with partially-cemented sand and silt, effectively reducing porosity and permeability within the aquifer. For the most part, limestone strata within the Ponce-Juana Díaz aquifer also do not represent important water-bearing units ($K<1.5$ m/d). Secondary permeability within the aquifer is only locally well-developed due to dissolution along fracture and fault zones that lie buried beneath unconsolidated clastic deposits of Quaternary age.

THE WEST COAST GROUND-WATER PROVINCE

Sandier beds within silt- and clay-dominated alluvium and minor underlying limestone beds represent the principal water-bearing units within Lajas Valley. Igneous and volcaniclastic bedrock units that extend beneath the valley are poorly permeable; wells located on the valley sides and tapping weathered bedrock are reported to yield about 1 L/s. Irregularly-distributed limestone rock of Cretaceous to Tertiary age exposed in the foothill areas is believed to extend beneath the Lajas Valley

alluvial cover (Anderson, 1977). This limestone aquifer, which is as much as 12 to 15 m thick, underlies a large area in the central part of Lajas Valley. Eighteen wells tapped the limestone bedrock during the 1920's and 1930's and were reported to yield 30 to 130 L/s; however, these wells were later abandoned due to the toxic effects of mineralized water (greater than 300 mg/L chloride concentration) on crops (Anderson, 1977, p. 32). Ground water within the Lajas Valley aquifer occurs under confined and unconfined conditions. Unconfined conditions generally occur along valley sides where alluvial deposits are most permeable, and the outcropping limestone bedrock has been exposed to dissolution processes. Ground water within the central part of the valley is confined by clayey, poorly permeable, distal fan or lacustrine deposits, or both. Transmissivity is reported to range from 60 to 3,000 m^2/d. Well yields from the alluvial deposits are reported to range from 0.32 to 43 L/s (Graves, 1991), but may yield 10 to 60 L/s where screened in both alluvial and underlying limestone units (Anderson, 1977).

Water-bearing strata within the Añasco alluvial valley aquifer are comprised of sand and minor gravel. However, the Añasco alluvial valley aquifer is poorly permeable and dominated by fine sand- and silt-sized sediment, reportedly yielding less than 9.5 L/s (Díaz and Jordan, 1987). However, an underlying, interlayered limestone-clay sequence also serves as a source of ground water. One well, developed in a 15-m-thick limestone bed having an estimated transmissivity of 200 m^2/d, reportedly yields 32 L/s.

Bedded sand and gravel alluvium and an underlying limestone sequence compose the Guanajibo alluvial valley aquifer. However, fractured andesitic tuff and tuff-breccia along the southwestern edge of the valley also function as important local sources of ground water. The reported transmissivity for wells penetrating both alluvium and limestone ranges from 60 to 560 m^2/d (Colón-Dieppa and Quiñones-Marquez, 1985). Two wells screened in the fractured bedrock aquifer have transmissivities that range from 150 to 1,020 m^2/d. Well performance data indicate that the maximum yield of 7 wells screened in alluvium and limestone ranges from 5 to 70 L/s. Two wells screened in an adjoining fractured bedrock aquifer reportedly yield 12 to 25 L/s.

ALLUVIAL VALLEY AQUIFERS OF THE EAST COAST GROUND-WATER PROVINCE

Coarse-grained (sand- to boulder-size) fanglomerates and alluvial plain deposits function as principal water-bearing units of the East Coast ground-water province. For the most part, East Coast ground-water province alluvial aquifers are unconfined with recharge to the aquifer originating by stream seepage or entering the system through buried, weathered, or fractured bedrock. In coastal areas, discontinuous lenses of coarse sediment are interbedded with less-permeable silt beds. Assuming that areas of greatest hydraulic conductivity reflect highest concentrations of sand and gravel, coarse-grained deposits are probably centered along the axis of the principal streams that drained the valleys.

In the Fajardo area, the most prolific aquifers are located in the upper part of the alluvial valley, where recharge can be induced from flowing streams (Gómez-Gómez, 1987). In the Humacao-Naguabo area, the aquifer is characterized by coarse-grained alluvial valley-fill sediment and an underlying 6-m-thick weathered bedrock zone (Graves, 1989). A weathered bedrock zone underlies alluvial deposits in the Maunabo area, but is relatively thin and not a reliable source of water.

The hydraulic conductivity of Maunabo Valley alluvium reportedly ranges from 30 m/d along the course of the Río Maunabo, to 15 to 23 m/d along its major tributaries (Adolphson and others, 1977). In the Yabucoa Valley, estimated transmissivity of alluvial deposits ranges from 93 to 650 m^2/d with hydraulic conductivity ranging from 3 to 9 m/d. Interstream and colluvial deposits are least permeable (3 m/d). In the Humacao-Naguabo area, aquifer test data collected from two wells screened in the alluvial aquifer indicate that transmissivity of the alluvial aquifer ranges from 56 to 74 m^2/d. The transmissivity of alluvium and underlying fracture weathered bedrock is reported to be 186 m^2/d (Graves, 1989). Transmissivity values were calculated also from specific capacity data for three wells completed in alluvium; on the basis of these data, transmissivity of the aquifer is reported to range from 65 to 140 m^2/d. Specific capacity data were collected from two wells completed in weathered bedrock; transmissivity of the weathered-bedrock aquifer is reported to range from 56 to 84 m^2/d. The hydraulic conductivity of weathered bedrock underlying Maunabo Valley is approximately 1.5 m/d. The clay-and-silt dominated lithology of East Coast ground-water alluvial valley aquifers limits the yield of water to wells. Wells screened in the alluvium of the Humacoa-Naguabo are reported to yield only 2 to 6 L/s with higher yields (as much as 11 L/s) reported in wells completed in alluvium and underlying fractured bedrock. Wells screened in the alluvium of the Maunabo alluvial valley are reported to yield 1.3 to 38 L/s.

ALLUVIAL VALLEY AQUIFERS OF THE INTERIOR GROUND-WATER PROVINCE

Ground water within the Caguas-Juncos alluvial aquifer occurs largely under unconfined conditions and is hydraulically interconnected with streams that cut across the valley (Puig and Rodríguez, 1993). Coarse-grained beds of boulder- to sand-sized deposits function as the principal water-bearing zones in the Caguas-Juncos aquifer. Well yields in the Caguas-Juncos alluvial valley are reported to range from 0.6 to

REFERENCE 21

Geology and Hydrology Conditions of the San Germán Groundwater Contamination Site

Preliminary Report
IAG # DW14941962-01-3
March 21, 2007

by Jesús Rodríguez-Martínez and
Fernando Gómez-Gómez

U.S. Geological Survey
Caribbean Water Science Center

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Appendices

Appendix 1. Lithologic logs of wells within and near the study area
Appendix 2. Section of potentiometric surface map of the Rio Gurabo valley in vicinity of the Gurabo Agricultural Substation
Appendix 3. Puerto Rico Aqueducts and Sewers Authority wells in the study area.
Appendix 4. Extent of unconsolidated deposits in the Rio Guanajibo valley and stream low-flow stations.

Description of Study Area

The area under consideration is located in the municipio of San Germán in southwestern Puerto Rico and is part of the Río Guanajibo flood plain (figure 1). The study area lies within the eastern part in its narrowest portion. The Río Guanajibo flood plain within the study area is limited to the north and south by highlands of predominantly igneous rocks and serpentinite. The land-surface elevation of the flood plain within the study area ranges from about 157 feet above mean sea level (ft amsl) in the eastern margin to about 98 ft amsl in the western part. The long-term mean annual rainfall for 65 years of record (1948 - 1973) is 57.43 inches at the National Weather Service station, San Germán 4 (http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMAIN.pl?pr8757). Minimum monthly rainfall typically occurs in February (long-term average of 1.70 inches) and maximum monthly rainfall in September (long-term average of 9.21 inches). The mean annual temperature at this station for the same period of record indicates a maximum annual average temperature of 89.5°F and minimum annual average of 64.8 °F. Long-term temperature data indicates that the highest monthly average temperature occurs in July (91.5 °F) and the minimum monthly average in February (60.4 °F).

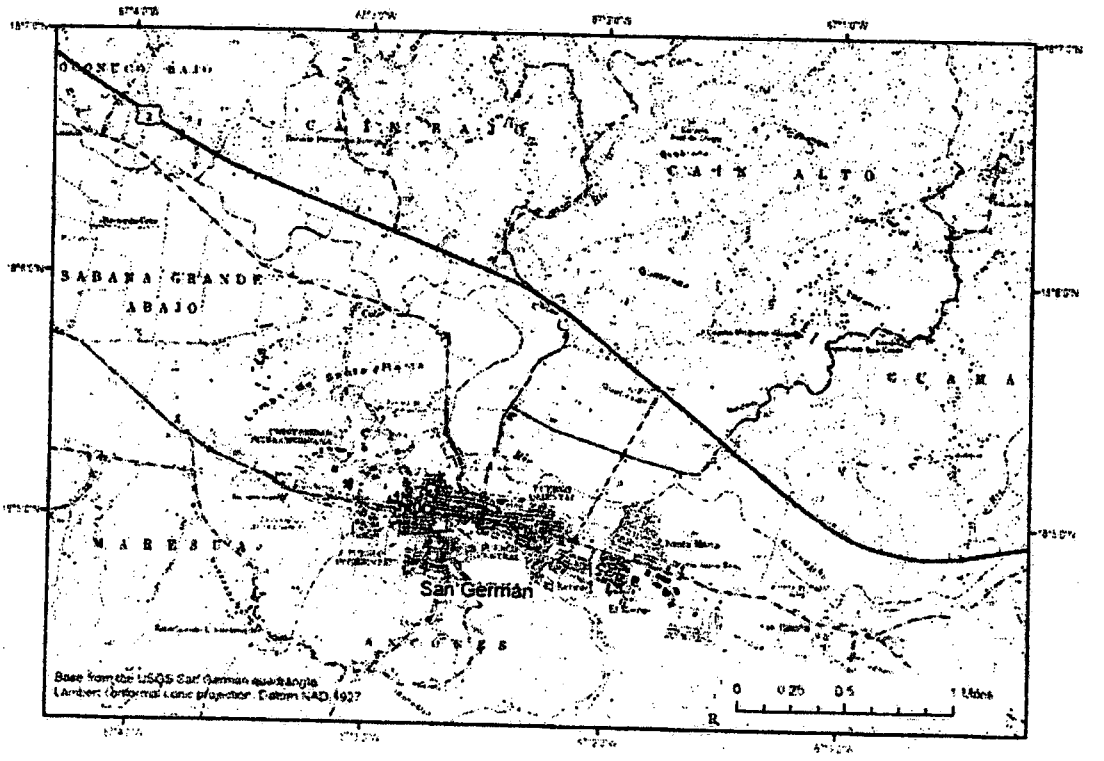


Figure 1. Study area, San Germán, Puerto Rico

Geology

The geologic units exposed in the study area or presumed to lie in the subsurface are from oldest to younger the following: Serpentinite or serpentinized peridotite of Upper Jurassic and Lower Cretaceous age or older, the Mariquita Chert of Upper Jurassic and Lower Cretaceous with rare amygdular basalt and silicified limestone, the Sabana Grande formation of Middle Cretaceous age consisting mainly of andesitic tuff and conglomerate with minor basaltic lava and breccia , and an unnamed unit of altered volcanic rocks of presumably Cretaceous age (Volckmann, 1984). This sequence of Upper Jurassic and Lower Cretaceous rocks are shown undifferentiated in figure 2. The Upper Jurassic and Cretaceous rocks are overlain by colluvium, landslide, and alluvial deposits of Quaternary age made up of sand, clay, and gravel (Volckmann, 1984). The Upper Jurassic and Cretaceous rocks in the study area have been highly folded and faulted. Depth to the rock basement within the valley alluvial deposits in the study area is generally less than 100 ft as determined from examination of available water well lithologic logs and data from Colón-Dieppa and Quiñones-Marquez (1985) (see Appendix 1 for lithologic logs of wells within and near the study area).

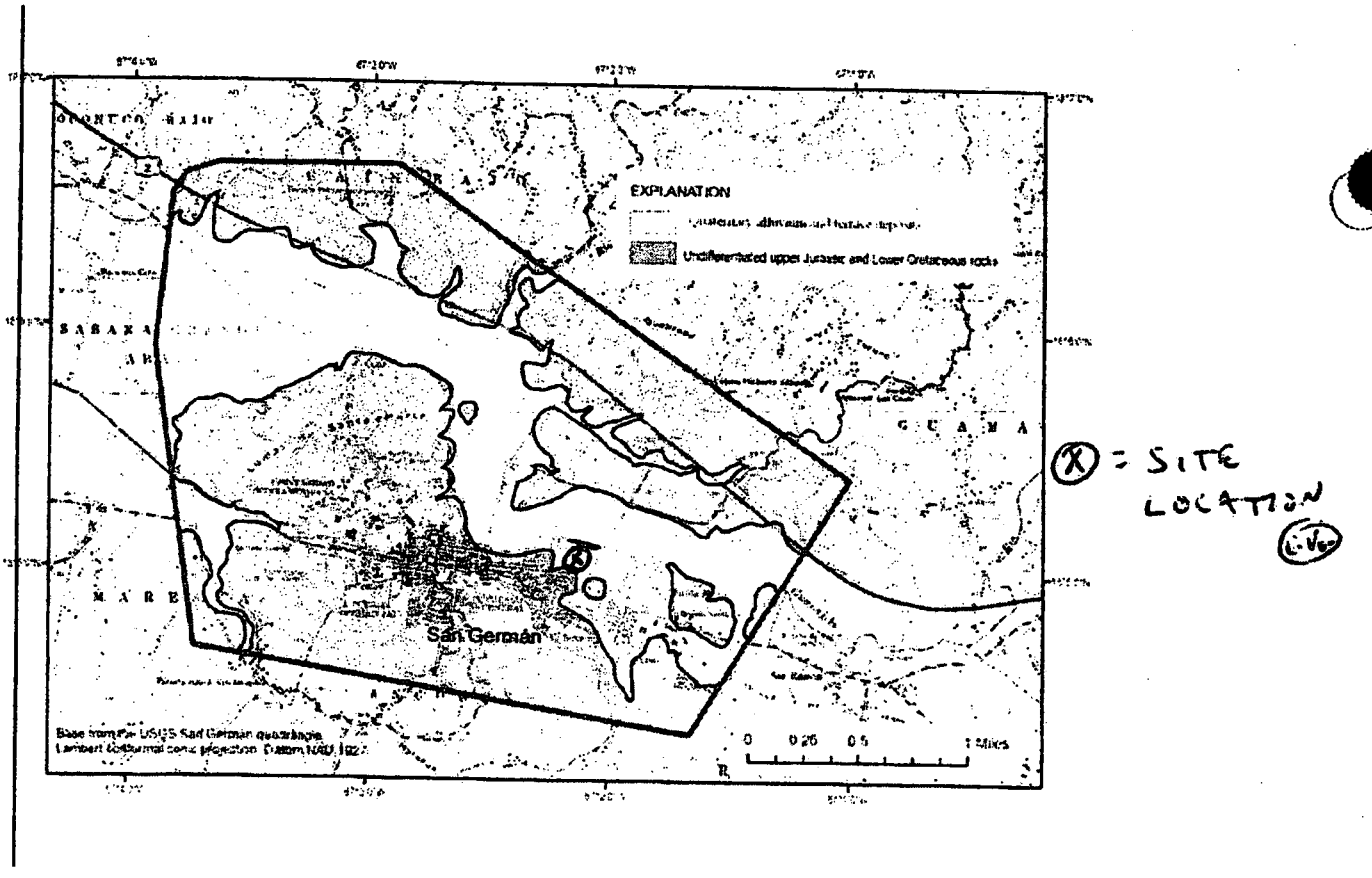


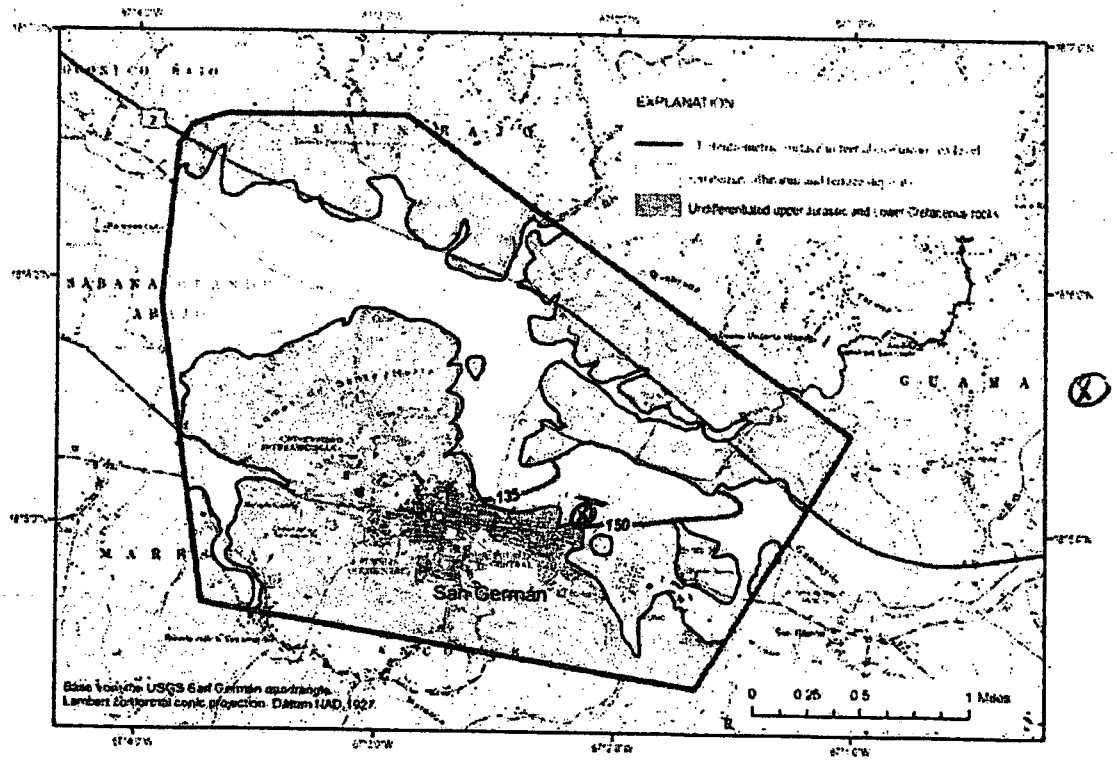
Figure 2. Generalized geology of area of concern

Hydrogeology

The aquifer within the study area is part of the Río Guanajibo Alluvial Valley Aquifer located in southwestern Puerto Rico. The aquifer is contained predominantly within the poorly to moderately consolidated deposits of sand and gravel of alluvial origin. The colluvial deposits, because of their higher clayey and silty content, are less permeable and, thus, poor water-bearing units. The ground-water bearing potential of the underlying rocks of Upper Jurassic and Cretaceous age is minimum, except where these may be highly fractured and weathered. Ground-water flow occurs under semi-confined and unconfined conditions. Unconfined conditions predominantly occur in the eastern part of the study area, including the sub-urban areas overlying unconsolidated deposits in San Germán, and results from the much shallower basement and reduced thickness of surficial clay and silt. The occurrence of semi-confining conditions within the unconsolidated deposits generally increases west of the town of San Germán as the depth to basement and thickness of both surficial and subsurface clay and silt strata increases.

Ground-Water Flow and Hydraulic Properties

The general ground-water flow direction in the study area can be inferred from the potentiometric-surface map developed by the USGS as part of an assessment of the water resources of the Río Guanajibo Valley conducted during 1979 and 1980 (Colón-Dieppa and Quiñones-Márquez, 1985). However, the potentiometric-surface map from Colón-Dieppa and Quiñones-Marquez (1985) was developed to show the regional ground-water surface gradient in the Río Guanajibo Alluvial Valley. The drainage of the aquifer by the Río Guanajibo should be similar to conditions in the Río Gurabo alluvial valley. The Río Gurabo alluvial valley aquifer in the vicinity of the University of Puerto Rico Gurabo Agricultural Substation is similar to the Río Guanajibo alluvial valley aquifer where relatively impermeable bedrock units bound the aquifer along its longitudinal axis (Plate 1 in Puig and Rodríguez, 1990)(see Appendix 2 – section of potentiometric surface map of the Rio Gurabo valley in vicinity of the Gurabo Agricultural Substation) . In these conditions the aquifer is drained by the river and the potentiometric surface contours are significantly v-shaped upstream. In general, the predominant movement of groundwater in the Rio Guanajibo alluvial valley upstream from San German should be preferentially toward the course of the Río Guanajibo (figure 3). In addition, the northward flowing tributary streams to the Rio Guanajibo would act as aquifer drains. Depth to water level ranges from stream level at the Río Guanajibo to about 15 ft at higher land-surface elevations.



⊗ = SITE LOCATION

Figure 3. Generalized distribution of the potentiometric surface in the Rio Guanajibo valley near San German [the potentiometric contours shown take into consideration the effectiveness of the Rio Guanajibo on aquifer drainage (modified from Colón-Dieppa and Quiñones-Marques, 1985)

Estimates of the transmissivity of the aquifer within the study area are scarce. Data available indicate that it is significantly less than in the lower reaches of the Río Guanajibo Alluvial Valley aquifer due to the reduced thickness of the unconsolidated deposits, and may be in the range of 500 to 1,000 feet squared per day (ft2/d) (Colón-Dieppa and Quiñones-Márquez, 1985; Anders, USGS written comm.. 1968). This would be equivalent to hydraulic conductivity values in the range of 5 to 10 feet per day (ft/d). The higher values are in the alluvial sands and gravels in the narrows near San German.

Annual net rainfall recharge to the aquifer within the study area may be less than one inch per year (about 0.77 inch/year) as estimated from stream low-flow gain from the vicinity of Sabana Grande to San German. The net aquifer recharge estimate is based on the Q7-10-yr (the seven-day 10-year streamflow statistic) obtained from studies conducted in the early 1990s (Santiago-Rivera, 1996; Appendix 4). The 7 day-10yr flows are fairly close to the Q_{98} flow-duration characteristic (flow equaled or exceeded 98 percent of the time). The Q_{98} flow duration statistic has been used as a good estimate of net ground-water recharge (Gómez-Gómez and others, 2001).This recharge to the aquifer within the study area is entirely from infiltration of

rainfall.Discharge from the aquifer within the study area is to public-supply wells, seepage to the Río Guanajibo and evapotranspiration. The water for human use is provided by public-supply sources operated by the Puerto Rico Aqueduct and Sewer Authority (PRASA). At present (December 2006), the public water-supply wells (PRASA wells) are inactive. However, withdrawals from public supply wells in the vicinity of San German may have been as much as 430,000 gallons per day from the PRASA public-supply water wells Lola Tió 1, Lola Ti 2 and Retiro (Wanda Molina, USGS, written comm.., 2007). The PRASA wells located within the study area are shown in Appendix 3. As of 2006, there is no reported ground-water withdrawal for agricultural use in the study area and there are no known privately owned wells within the study area for domestic use.

The source of water, if not all, of the Retiro public-supply well may be induced streamflow from the Río Guanajibo, due to its proximity to the stream and the limited aquifer storage. The same conditions apply to the now inactive Lola Rodríguez de Tió 1 and Lola Rodríguez de Tió 2 public-supply wells. According to a PRASA field technician, these two last wells were taken out of service because of very low yields. Possibly, the yield to these wells declined as a result of lowering of the streambed as part of the flood channelization works in the Rio Guanajibo. This may have drained permeable sand and gravel deposits near these wells thus, reducing the transmissivity in the saturated zone. The relation between induced streamflow and aquifer storage for wells near streams is shown in figure 4 (adapted from Alley and others, 1999). Withdrawals from wells in close proximity to streams initially come from bank storage or the regional ground-water flow system but with increasing pumping time induced streamflow becomes the primary source of water to the wells (Alley and others, 1999; Jenkins C.T., 1970).

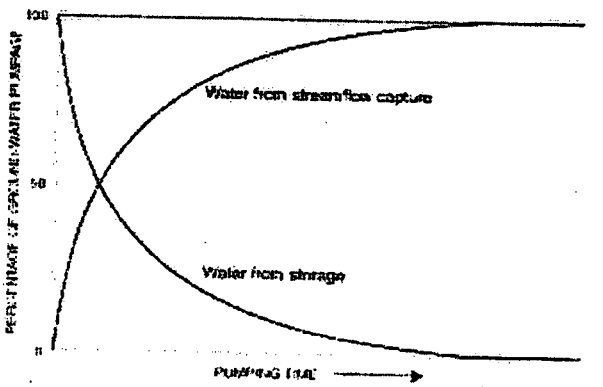


Figure 4. The principal source of water can change with time from ground-water storage to capture of streamflow (after Alley and others, 1999).

Ground-Water Contamination

Delineation of the possible extent and direction of movement as well as determination of the probable source of the contaminant was not made due to the limited data available. Streamflow seepage data along the Rio Guanajibo in conjunction with samples may identify sites along the stream channel where contaminants may originate. Current water-quality data for suspect contaminants in the Río Guanajibo is not available.

Public-supply wells (PRASA) whose water quality is of concern for the EPA and their status are listed ahead. The exact date of cessation of withdrawals from these wells is not given.

Well Name and reference number as in Appendix 3

1. Lola Rodríguez de Tió 1-inactive during the past year
2. Lola Rodríguez de Tió 2-inactive during the past year
3. Retiro-inactive

Major data gaps needed to define source(s) of contamination are:

- Potentiometric surface distribution,
- Detailed lithologic logs of wells near PRASA wells, and
- Water-quality data for suspect contaminants during low-flow conditions along the Río Guanajibo.

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http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMAIN.pl?pr8757,
Climatological data at NWS 08757, San German 4 , accessed March 15,2007

9

Appendix 1. Lithologic logs of wells within and near the study area

Name of well: PRASA Río Guanajibo Latitude 180518 Longitude 670229 Date of Construction: 07/01/1961 USGS File Code:05-67.02-07-66	Hole depth: 73 feet Well depth: 40 feet
Depth Interval in feet	Lithologic Description
0-3	Soil- clayey and silty with organic material (vegetative remains)
3-7	Sand, loose, mostly coarse to very coarse grained, predominantly lithic
7-15	Claystone- medium brown, soft to moderately indurated, with rock fragments (probably colluvium)
15-19	Claystone- generally as above
19-24	Claystone-siltstone with decomposed rock fragments *
24-37	Claystone, yellow, moderately indurated*
37-40	Volcanic rocks- gray, altered
* may had resulted from weathering of basement rock or washed down from the highlands as colluvium	

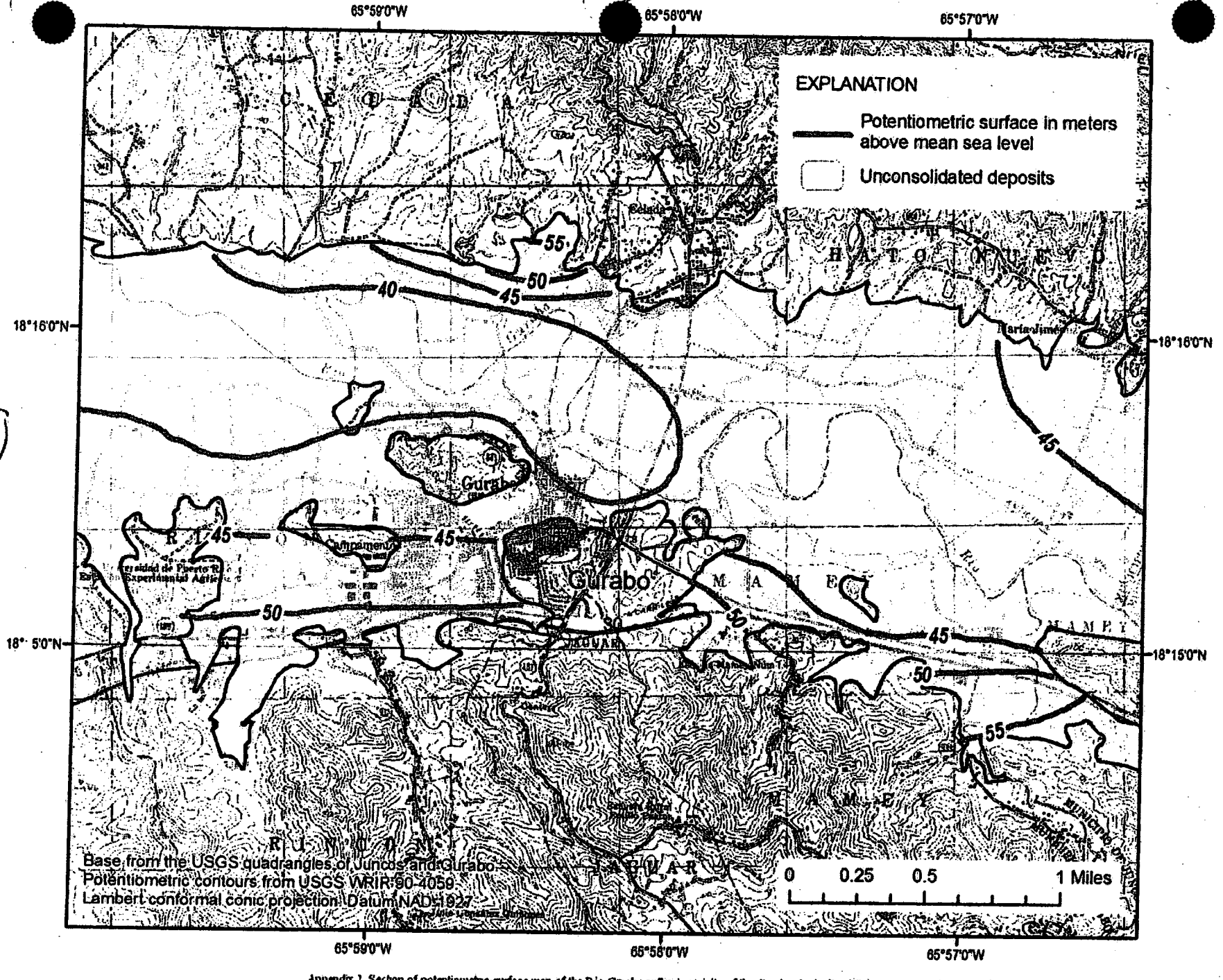
Name of well: Central Eureka-1 Latitude: 180729 Longitude: 670706 Date of construction: 1937 USGS File Code: 07-67.07-01-59	Hole depth: 180 ft Well depth: 100 ft
Depth Interval in feet	Lithologic Description
0-40	Gravel-clayey
40-42	Clay-yellow, soft to moderately indurated
42-60	Sand and Gravel- clean (with minimum or no clay)
60-180	Clay-gray colored

Name of well: PRASA Santa Marta Latitude: 180537 Longitude: 670239 USGS File Code-05-67.02-08-34 Date of Construction: May 1961	Hole depth: 101 ft Well depth: not available
Depth interval in feet	Lithologic Description
0-1	Soil- dark brown, with vegetative remains
1-5	Claystone and Siltstone- Yellow
5-11	Volcanic rock-very altered (described by driller as sandy and decomposed rock)
11-94	Shale-because of the underlying serpentinite, this "shale is interpreted as a lateritic clay (iron-aluminum rich) known to be the residual of the weathering product of the serpentinite, so common in the San German area.
94-101	Serpentinite- (described by driller as red granite)- is the prevalent basement rock in the vicinity and weathers to a reddish color

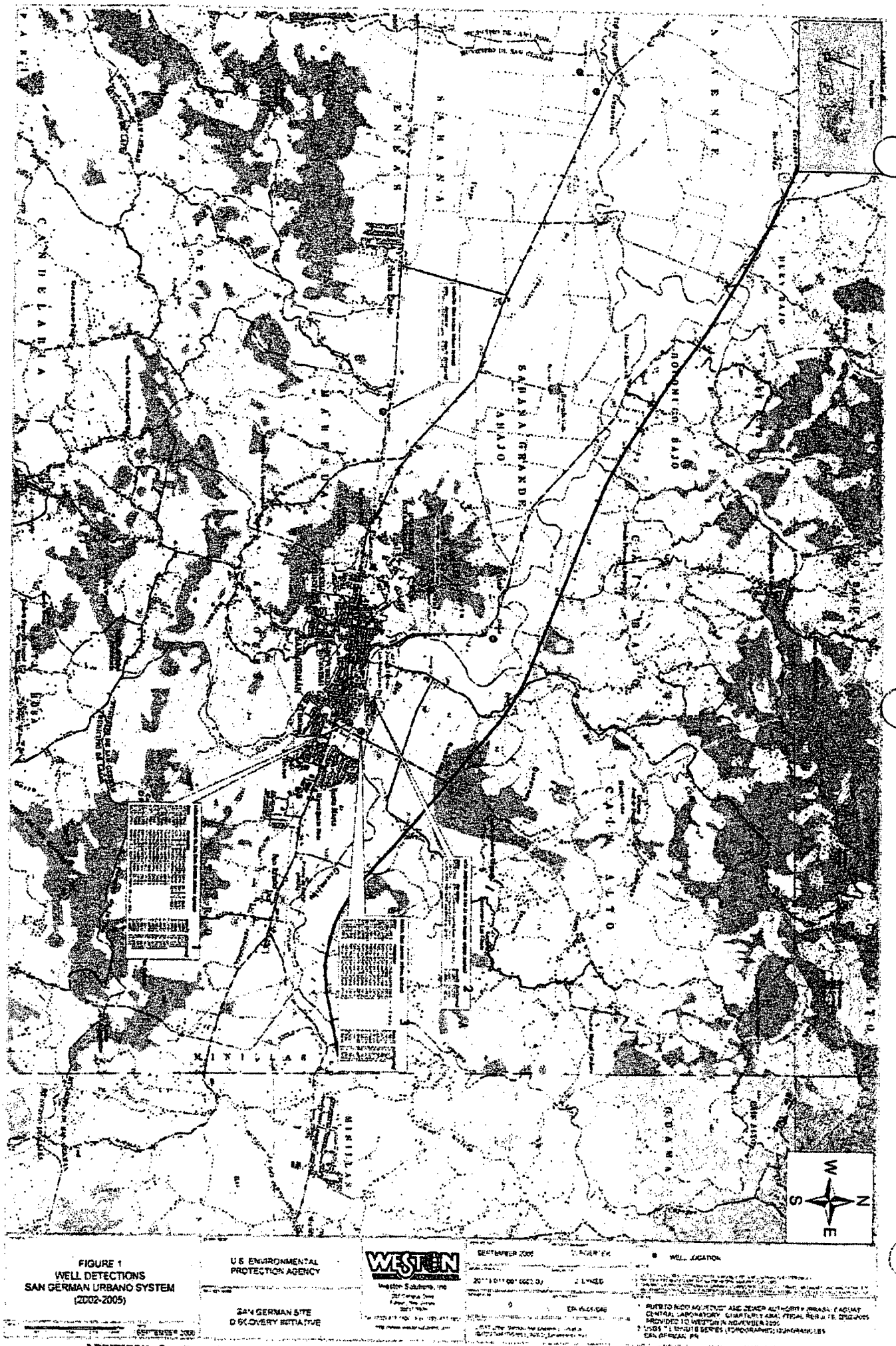
Name of well: Planta de Hielo (Ice Plant) Latitude: 180507 Longitude: 670232 USGS File Code: 05-67.02-01-85 Date of Construction: 1948	Hole depth: 60 ft Well depth: 20 ft
Depth interval in feet	Lithologic Description
0-5	Clay-brown and yellow
5-10	Gravel
10-60	Rock-green (maybe interpreted as serpentinite)

Name of well: PRASA Caín Bajo 2 Latitude: 180555 Longitude: 670241 USGS File Code:05-67.02-06-14 Date of Construction: 11/1961	Hole depth: 65 Well depth: 40
Depth interval in ft	Lithologic Description
0-3	Soil-silty and clayey, with vegetative remains
3-10	Gravel (dry)
10-30	Sand and gravel
30-65	Basement rock described as dark green-can be interpreted as Serpentinite that outcrops in the surroundings

Name of well: PRASA Rodríguez Tió Latitude: 180507 Longitude: 670206 USGS File Code: 05-67.02-11-100	Hole depth: 100
Depth interval in ft	Lithologic Description
0-6	Soil-dark brown, with organic material (vegetative remains)
6-10	Boulders – may be interpreted as chert and/or silicified limestone boulders washed down from hills in the south, maybe part of colluvium deposits; occurring as landslide deposits in the highlands south of the town of San German)
10-30	Brown limestone with boulders- moderately to srongly silicified limestone and chert boulders with the same origin as above
30-100	Serpentinite-described by driller as hard blue rock, predominant rock outcrop in the vicinity

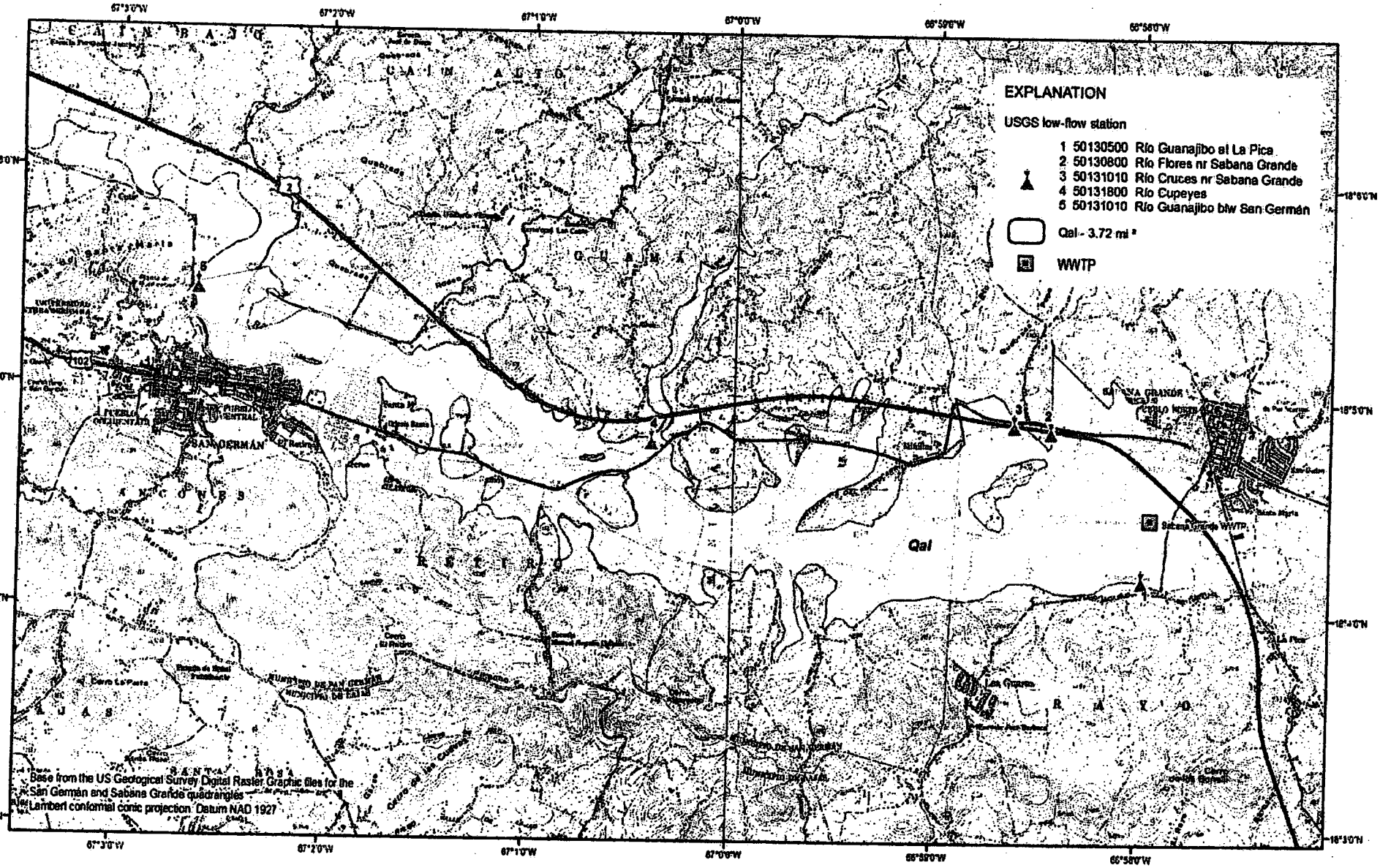


Appendix 2. Section of potentiometric-surface map of the Río Gurabo valley in vicinity of the Gurabo Agricultural Substation (modified from Puig and Rodríguez, 1990)



APPENDIX 3. Puerto Rico Aqueducts and Sewers Authority wells in the study area

(14)



Appendix 4. Extent of unconsolidated deposits in the Río Guanajibo Valley and Stream low-flow stations.

REFERENCE 22

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Gerald V. Gilliland, P.G.
DATE: August 3, 2007

SUBJECT: PRASA Well Construction Details

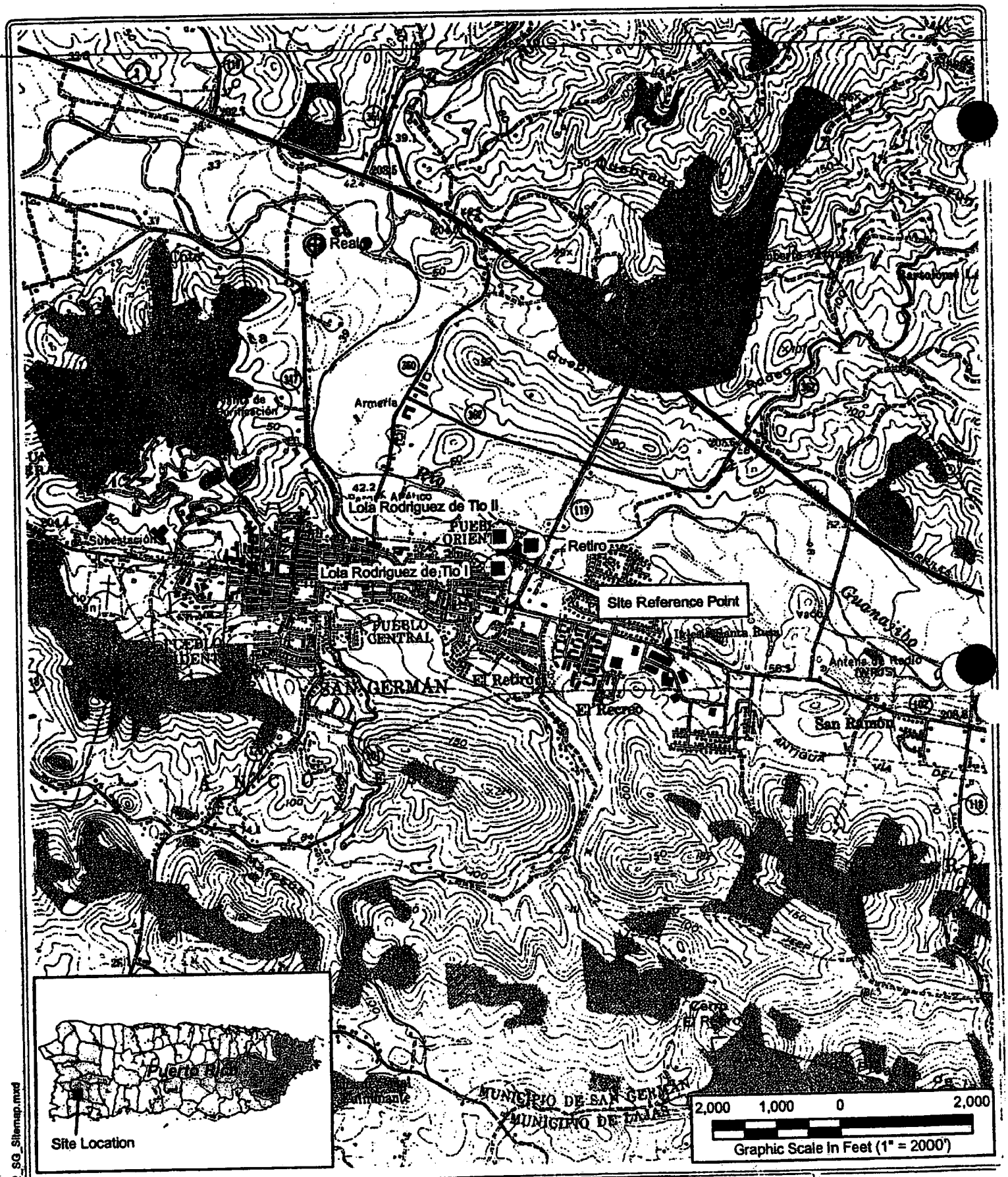
Attached are well logs, obtained from Puerto Rico Aqueduct and Sewer Authority (PRASA), which describe the stratigraphy and well construction details for PRASA's Retiro and El Real public supply wells. Also attached is a well log obtained from the United States Geological Survey (USGS) for PRASA's Lola Rodriguez de Tio I (Lola I) well. The well logs all show that the wells are finished in bedrock. A well log for the Lola Rodriguez de Tio II (Lola II) well was not available upon request from PRASA or USGS. Due to its proximity to the Retiro and Lola I wells, it is considered fair to assume that the stratigraphy and construction at Lola II are similar to those wells. A map showing the location of each of these wells is also attached to this project note.

Based on the attached logs and the assumption that Lola II has similar characteristics to Retiro and Lola I, the following well construction information is obtained:

Well	Elevation (MSL)	Depth (ft bgs)	Well Bottom (MSL)	Screened Interval (ft bgs)	Screened Interval (MSL)	Screen Type	Pump Depth (ft bgs)
Retiro	132	100	32	6-80	126-52	Screen	30
El Real	108*	65	43	10-40	98-68	Screen	33
Lola I	132**	100	32	0-100***	132-32***	unknown	unknown
Lola II	132**	100	32	0-100***	132-32***	unknown	unknown

MSL – feet above mean sea level
ft. bgs – feet below ground surface
* The elevation appears to be reported in meters on the well log; 33 meters equates to 108 feet (1 meter = 3.28 feet).
** Surface elevation estimated to be equal to Retiro, based on proximity to Retiro.
*** The screen depths are unknown, so the maximum possible screened interval is presented.

Signature/Date 8/3/07



SOURCE:
1. 7.5 Minute Series Topographic Quadrangle: San German, PR.
2. Puerto Rico Aqueduct and Sewer Authority (PRASA). Map: Active and Standby Wells in Puerto Rico. Date Unknown.

TITLE:

Site Location Map

San German Groundwater Contamination
San German, PR

2

PROJECT: San German Groundwater Contamination

CLIENT NAME: U.S. EPA

FIGURE #: 1

DATE: 10/25/2006

N W E S

WESTON SOLUTIONS
Restoring Resource Efficiency

SAT2\San_German_GWM\KD\03752_SG_Sitemap.mxd

PRASA Well Logs

12

POZO NUMERO: 1 0 6 6 0 1 2 ULTIMA: A STATUS: OPERACION
FECHA ACTUALIZACION: MAYOS RECORD CODE: 4 FECHA CONSTRUCCION: ABR67
NOMBRE DEL POZO: RETIRO 3
PUEBLO: SAN GERMAN BARRIO : RETIRO
REGION: MAYAGUEZ LATITUD : 18-09-35
ZONA : SAN GERMAN LONGITUD: 67-02-06 ELEVACION(PIES): 132
LARGO COLUMNA DE LA BOMBA(PIES): 36 CAPACIDAD ESPECIFICA(GPM/PIES): 133
PROFUNDIDAD(PIES): 100

NIVEL (PIES)			DIAMETRO		
ESTATICO: 9	FECHA: ABR67	PERFORACION	TUBERIA	TIPO
DINAMICO: 12	FECHA: ABR67	0-100 20	0-6 20	LISA
			6-80 20	PERFORADA

PRODUCCION (GPM)
ORIGINAL: 700 FECHA: ABR67
ACTUAL : 0 FECHA:
FORMA DE MEDIR:
FORMACION GEOLOGICA: 6 CAPA VEGETAL CON BARRO-6 CHINOS CON GRAV
A-18 TOSCA BROWN-70 ROCA AZUL GUAA

CONTAMINANTES MAS COMUNES (PPM)

CONTAMINANTES	FECHA	CONTAMINANTES	FECHA	CONTAMINANTES	FECHA	CONTAMINANTES	FECHA
CLORURO: 20	ABR67	NITRITO : 0	ABR67	NITRATO: .44	ABR67		
HIERRO : 0	ABR67	MANGANESO: 0	ABR67	SULFATO: 26	ABR67		
TDS : 204	ABR67	MARD : 294	ABR67	TURB : 0	ABR67		

OBSERVACIONES:

15

POZO NUMERO: 1 0 6 6 0 1 5 ULTIMA: STATUS: ABANDONADO(OTROS)
FECHA ACTUALIZACION: MAYOS RECORD CODE: 4 FECHA CONSTRUCCION: 09NOV61
NOMBRE DEL POZO: REAL
PUEBLO: SAN GERMAN BARRIO : RETIRO
REGION: MAYAGUEZ LATITUD : 18-09-17
ZONA : SAN GERMAN LONGITUD: 67-02-39 ELEVACION(PIES): 38
LARGO COLUMNA DE LA BOMBA(PIES): 33 CAPACIDAD ESPECIFICA(GPM/PIES): 75
PROFUNDIDAD(PIES): 65

NIVEL (PIES)			DIAMETRO		
ESTATICO: 7	FECHA: 09NOV61	PERFORACION	TUBERIA	TIPO
DINAMICO: 10	FECHA: 09NOV61	0-12 24	0-10 20	LISA
		12-65 14	0-40 14	PERFORADA

PRODUCCION (GPM)
ORIGINAL: 300 FECHA: 09NOV61
ACTUAL : 0 FECHA:
FORMA DE MEDIR:
FORMACION GEOLOGICA: 3 CV-7 BC GRA SECA-20 GRA AR-10 PI BB-25
AO GES NE

CONTAMINANTES MAS COMUNES (PPM)

CONTAMINANTES	FECHA	CONTAMINANTES	FECHA	CONTAMINANTES	FECHA	CONTAMINANTES	FECHA
CLORURO: 0	14NOV61	NITRITO : 0	14NOV61	NITRATO:			
HIERRO : 0	14NOV61	MANGANESO: 0	14NOV61	SULFATO:			
TDS : 325	14NOV61	MARD : 240	14NOV61				

OBSERVACIONES:

USGS Well Log

Name of well: PRASA Rodríguez Tió Hole depth: 100 Latitude: 180507 Longitude: 670206 USGS File Code: 05-67.02-11-100	
Depth interval in ft	Lithologic Description
0-6	Soil-dark brown, with organic material (vegetative remains)
6-10	Boulders – may be interpreted as chert and/or silicified limestone boulders washed down from hills in the south, maybe part of colluvium deposits; occurring as landslide deposits in the highlands south of the town of San German)
10-30	Brown limestone with boulders- moderately to srongly silicified limestone and chert boulders with the same origin as above
30-100	Serpentinite-described by driller as hard blue rock, predominant rock outcrop in the vicinity

REFERENCE 23

SITE LOGBOOK

"Rite in the Rain".
ALL - WEATHER
Environmental
FIELD BOOK
No. 550

SAN German Site Discovery
W.O. 20113.011.001.0023.00

DCN: SAT2.20113.023.001

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER

ENVIRONMENTAL FIELD BOOK

SAT 2 Contract: EP-W-05-048

Name Weston Solutions, Inc.
Region 2 Site Assessment Team (SAT 2)

Address 205 Campus Drive
Edison, NJ 08837

Phone (732) 417-5800

Project San German Site Discovery Initiative
San German, Puerto Rico

W.O.: 20113.011.001.0023.00

DCN: SAT2.20113.023.001

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

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Columnar	1/4" Grid	Item No. 550	Item No. 550F

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148 Sampling guidelines (Liquids)
149 Sampling guidelines (Solids)
150 Approximate Volume of Water in Casing or Hole, Ground Water Monitoring Well
151 PVC Pipe casing tables
152 Soil Classification
153 Soil Classification
154 Conversions (Length, Weight, Volume, Temp. etc.)
155 Conversions (Concentrations, Volume Flow or Time, Velocity, Acceleration)
156 Maximum Concentration of Contaminants for the Toxicity Characteristic

2

Location San German, PR Date 6/20/08

Project / Client San German Site Discovery Initiative / U.S. EPA

8:00	Arrive at PRMA. Enter office to meet with Carmen Mendez, who will bring us to San German Wells and Filtration Plant
0805	DF holds Health & Safety Tailgate meeting at PRMA parking lot. Discuss days activities, health and safety concerns, Route to Hospital etc. DF and Scott Snyder sign Health & Safety Plan.
	weather - partly cloudy ~85° - 90° F.
	weston personnel - Dennis Foster (DF)
	Scott Snyder (SS)
0820	Arrive at Lola Rodriguez II
08:25	well turned on (R) Purge for 15 minutes
	C. Mendez says LOLA I & LOLA II use to pump to Ponce where chlorination occurred prior to distribution
0830	pH - 7.0
0831	no residual chlorine
	HCL - 6 drops added to VOC vials for pH<2
	Nitric 50 drops added to Polys (metals) for pH<2
0835	Scott Snyder collects trip blank (SG-TB01). HCL used as preservative (6 drops) to get pH<2

Draft for 6/20/08

Location San German, PR Date 6/20/06

Project / Client San German Site Discovery Initiative/ U.S. EPA

840 DF collecting sample SG GW01 from well LoLA I. This sample is the MS/MSD

840 Photo 2. DF collecting sample SG GW01 from LoLA I.

Sample SG-GW01 is collected prior to treatment. Pack up vehicle, follow PRASA to next well, which should be Lola Rodriguez de Tío II. The Reto well is also nearby.

900 Arrive at LoLA II. well was turned on at 0855 by PRASA and was purging when we arrived. unpack vehicle and get sample bottles

905 - ph - between 6 and 7 (6.5)

Chlorine test indicates it is chlorine free.

HCL - 5 drops added to get ph < 2

Nitric - 50 drops added to get ph < 2

910 - Photo 3 well LoLA II

910 Photo 4 DF collecting sample SG-GW02 from Pozo LoLA II.

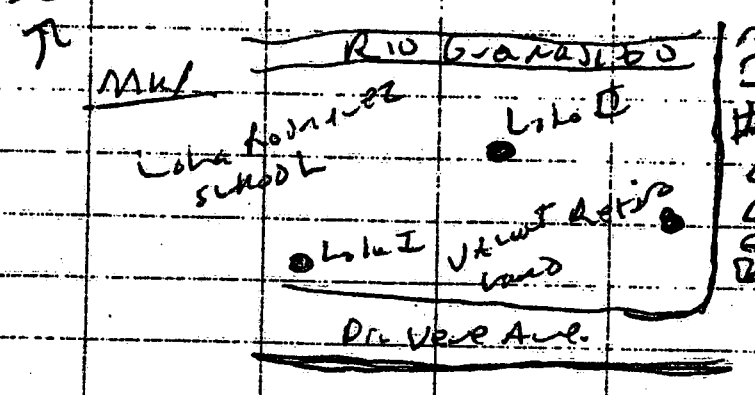
Sample SG-GW02 was collected prior to treatment.

D.M. 6/20/06

Location San German, PR Date 6/20/08

Project / Client San German Site Discovery Initiative/ U.S. EPA

0930 Pick up vehicle, and follow PRASA to well EL Real, located northwest of Lola I/Lola II/Rio well field.



0950 Arrive at EL Real. No treatment well turned on and is purging
pH - 6-7
Chlorine - Chlorine free
HCL - 6 drops added to VOC for pH <2
Nitric Acid - 10 drops added to Metals to pH <2
1000 Photo 5 - Real wellhouse
1005 Photo 6 - DP collected sample SG64003 from Pozo EL Real. This sample was collected prior to treatment. The well was actively pumping. According to Ms. Mendez, this well pumps water to Sanberman Water Treatment plant prior to distribution to public. [signature] 6/20/08

Location SAN Germain, PR Date 6/20/06

Project / Client San Germain Site Discovery Initiative / U.S. EPA

020 Depart for the Providencia wellfield. Located west of San Germain and consists of two wells.

1030 Arrive at Pozo Providencia II located on Rd 114. Well is actively pumping. OF turns on spigot ph - 7, no residual chlorine. Add 6 drops of HCl to VOCs and 50 drops Nitric Acid to Metals.

1044 Photo 7 - Wellhouse - Providencia II

1045 D.F. Collects sample SG-SW04 from Providencia II - Photo 8

1048 Turn off spigot, pack sample bottles. PRASA says Providencia I gate is locked and PRASA does not have a key. There is room on the side gate to walk around the fence to access the well.

1050 Drive over to Providencia I, which is across the street from Providencia II walk around fenced gate and to the well.

1100 Well is actively pumping with no treatment.

Ph - 6-7 Chlorine test indicates none.

[signature] 6/20/06

(6)

Location San German, PR Date 6/20/06

Project / Client San German Site Discovery Initiative/ U.S. EPA

1115 DF collects SG GW05 from Providencia I

1120 Photo 9 - Photo of DF collection point of sample SG GW05 from Pozo Providencia I

1121 Photo 10 Photo of wellhouse at Providencia I

1121 Leave Providencia wellfield for San German Filtration Plant.
Note: 6 drops HCL and 50 drops Nitric Acid were added to VOC and metals bottles, respectively.

1125 Arrive at San German Filtration Plant. Collection point will be from a sink on the bottom floor. This point is prior to treatment - pH 6-7, no chlorine.

1145 DF collects SG GW06 from San German Filtration Plant.
VOC - 6 drops HCL; metals - 50 drops nitric acid

1150 DF collects sample SG GW07
Sample SG-GW07 is a field duplicate of sample SG-GW06, collected from the San German Filtration Plant
Photo 11 collection point at Filtration plant
Photo 12 Collection point at Filtration Plant

[signature] 6/20/06

Location San Germany, PR Date 6/20/06

Project / Client San German Site Discovery Initiative.

San Germans system is currently consisting of 3 wells and 2 Intakes, according to Carmen Mendez, the source ~~Hoff~~ of water are:

- Hoconuco Intake
- Cain Alto Intake
- Providencia I - well
- Providencia II - well
- El Real - well

not sure of locations at this point

Disconnected

Ms. Mendez did not have the % of each source pumps to the system, but she left her e-mail:

- carmen.mendez@acueductospr.com

1200 Leave Filtration Plant to go back to San German Shopping Plaza to pickup ice and pack samples for shipment to Laboratories.

1530 Complete processing of samples. Begin Drive to Federal Express, Located at Aguadilla Airport.

1700 Arrive at Fed Ex ship samples to Laboratories.

1710 - Depart for Mayaguez Resort

[signature] 6/20/06

REFERENCE 24

METHOD 502.2

VOLATILE ORGANIC COMPOUNDS IN WATER BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION AND ELECTROLYTIC CONDUCTIVITY DETECTORS IN SERIES

Revision 2.1

Edited by J.W. Munch (1995)

R.W. Slater, Jr. and J.S. Ho - Method 502.2, Revision 1.0 (1986)

J.S. Ho - Method 502.2, Revision 2.0 (1989)

NATIONAL EXPOSURE RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

VOLATILE ORGANIC COMPOUNDS IN WATER BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION AND ELECTROLYTIC CONDUCTIVITY DETECTORS IN SERIES

1.0 SCOPE AND APPLICATION

1.1 This is a general purpose method for the identification and simultaneous measurement of purgeable volatile organic compounds in finished drinking water, raw source water, or drinking water in any treatment stage[1-3]. The method is applicable to a wide range of organic compounds, including the four trihalomethane disinfection by-products, that have sufficiently high volatility and low water solubility to be efficiently removed from water samples with purge and trap procedures. The following compounds can be determined by this method.

Analyte	Chemical Abstract Services Registry Number
Benzene	71-43-2
Bromobenzene	108-86-1
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform	75-25-2
Bromomethane	74-83-9
n-Butylbenzene	104-51-8
sec-Butylbenzene	135-98-8
tert-Butylbenzene	98-06-6
Carbon Tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane	75-00-3
Chloroform	67-66-3
Chloromethane	74-87-3
2-Chlorotoluene	95-49-8
4-Chlorotoluene	106-43-4
Dibromochloromethane	124-48-1
1,2-Dibromo-3-Chloropropane	96-12-8
1,2-Dibromoethane	106-93-4
Dibromomethane	74-95-3
1,2-Dichlorobenzene	95-50-1
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
Dichlorodifluoromethane	75-71-8

Analyte	Chemical Abstract Services Registry Number
1,1-Dichloroethane	75-34-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethene	75-35-4
cis-1,2-Dichloroethene	156-59-4
trans-1,2-Dichloroethene	156-60-5
1,2-Dichloropropane	78-87-5
1,3-Dichloropropane	142-28-9
2,2-Dichloropropane	590-20-7
1,1-Dichloropropene	563-58-6
cis-1,3-Dichloropropene	10061-01-5
trans-1,3-Dichloropropene	10061-02-6
Ethylbenzene	100-41-4
Hexachlorobutadiene	87-68-3
Isopropylbenzene	98-82-8
4-Isopropylbenzene	99-87-6
Methylene Chloride	75-09-2
Naphthalene	91-20-3
Propylbenzene	103-65-1
Styrene	100-42-5
1,1,2,2-Tetrachloroethane	630-20-6
1,1,1,2-Tetrachloroethane	79-34-5
Tetrachloroethene	127-18-4
Toluene	108-88-3
1,2,3-Trichlorobenzene	87-61-6
1,2,4-Trichlorobenzene	120-82-1
1,1,1-Trichloroethane	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethene	79-01-6
Trichlorofluormethane	75-69-4
1,2,3-Trichloropropane	96-18-4
1,2,4-Trimethylbenene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Vinyl Chloride	75-01-4
o-Xylene	95-47-6
m-Xylene	108-38-3
p-Xylene	106-42-3

1.2 This method is applicable to the determination of total trihalomethanes and other volatile organic compounds (VOCs). Method detection limits (MDLs)[4] are compound and instrument dependent and vary from approximately 0.01-3.0 µg/L. The applicable concentration range of this method is also compound and instrument dependent and is approximately 0.02-200 µg/L. Analytes that are inefficiently purged from water will not be detected when

present at low concentrations, but they can be measured with acceptable accuracy and precision when present in sufficient amounts.

1.3 Two of the three isomeric xylenes may not be resolved on the capillary column, and if not, must be reported as isomeric pairs.

2.0 SUMMARY OF METHOD

2.1 Highly volatile organic compounds with low water solubility are extracted (purged) from the sample matrix by bubbling an inert gas through a 5 mL aqueous sample. Purged sample components are trapped in a tube containing suitable sorbent materials. When purging is complete, the sorbent tube is heated and backflushed with helium to thermally desorb trapped sample components onto a capillary gas chromatography (GC) column. The column is temperature programmed to separate the method analytes which are then detected with a photoionization detector (PID) and an electrolytic conductivity detector (ELCD) placed in series. Analytes are quantitated by procedural standard calibration (Section 3.14).

2.2 Identifications are made by comparison of the retention times of unknown peaks to the retention times of standards analyzed under the same conditions used for samples. Additional confirmatory information can be gained by comparing the relative response from the two detectors. For absolute confirmation, a gas chromatography/ mass spectrometry (GC/MS) determination according to USEPA Method 524.2 is recommended.

2.3 This method requires the use of a PID to measure target analytes that cannot be measured with an electrolytic conductivity detector. If only halogenated analytes, such as the trihalomethanes are to be measured, a PID is not needed.

3.0 DEFINITIONS

3.1 Internal Standard (IS) -- A pure analyte(s) added to a solution in known amount(s) and used to measure the relative responses of other method analytes and surrogates that are components of the same solution. The internal standard must be an analyte that is not a sample component.

3.2 Surrogate Analyte (SA) -- A pure analyte(s), which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amount(s) before extraction and is measured with the same procedures used to measure other sample components. The purpose of a surrogate analyte is to monitor method performance with each sample.

3.3 Laboratory Duplicates (LD1 and LD2) -- Two sample aliquots taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of LD1 and LD2 give a measure of the precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.

3.4 Field Duplicates (FD1 and FD2) -- Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of FD1 and FD2 give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.

3.5 Laboratory Reagent Blank (LRB) -- An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, internal standards, and surrogates that are used with other samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents, or the apparatus.

3.6 Field Reagent Blank (FRB) -- Reagent water placed in a sample container in the laboratory and treated as a sample in all respects, including exposure to sampling site conditions, storage, preservation and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.

3.7 Laboratory Performance Check Solution (LPC) -- A solution of method analytes, surrogate compounds, and internal standards used to evaluate the performance of the instrument system with respect to a defined set of method criteria.

3.8 Laboratory Fortified Blank (LFB) -- An aliquot of reagent water to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

3.9 Laboratory Fortified Sample Matrix (LFM) -- An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.

3.10 Stock Standard Solution -- A concentrated solution containing a single certified standard that is a method analyte, or a concentrated solution of a single analyte prepared in the laboratory with an assayed reference compound. Stock standard solutions are used to prepare primary dilution standards.

3.11 Primary Dilution Standard Solution (PDS) -- A solution of several analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.12 Calibration Standard (CAL) -- A solution prepared from the primary dilution standard solution and stock standard solutions of the internal standards and surrogate analytes. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.

3.13 Quality Control Sample (QCS) -- A sample matrix containing method analytes or a solution of method analytes in a water miscible solvent which is used to fortify reagent water or environmental samples. The QCS is obtained from a source external to the laboratory, and is used to check laboratory performance with externally prepared test materials.

3.14 Procedural Standard Calibration -- A calibration method where aqueous calibration standards are prepared and processed (e.g., purged,extracted, and/or derivatized) in exactly the same manner as a sample. All steps in the process from addition of sampling preservatives through instrumental analyses are included in the calibration. Using procedural standard calibration compensates for any inefficiencies in the processing procedure.

4.0 INTERFERENCES

4.1 During analysis, major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The use of non-polytetrafluoroethylene (PTFE) plastic tubing, non-PTFE thread sealants, or flow controllers with rubber components in the purging device should be avoided since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of laboratory reagent blanks (Section 9.2) provide information about the presence of contaminants. When potential interfering peaks are noted in laboratory reagent blanks, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter. Subtracting blank values from sample results is not permitted.

4.2 Interfering contamination may occur when a sample containing low concentrations of volatile organic compounds is analyzed immediately after a sample containing relatively high concentrations of volatile organic compounds. A preventive technique is between-sample rinsing of the purging apparatus and sample syringes with two portions of reagent water. After analysis of a sample containing high concentrations of volatile organic compounds, one or more laboratory reagent blanks should be analyzed to check for cross contamination.

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

during common liquid/liquid extraction procedures can contribute to sample contamination.

4.4 When traps containing combinations of silica gel and coconut charcoal are used, residual water from previous analyses collects in the trap and can be randomly released into the analytical column. To minimize the possibility of this occurring, the trap is reconditioned after each use as described in Section 11.4.

5.0 SAFETY

5.1 The toxicity or carcinogenicity of chemicals used in this method has not been precisely defined; each chemical should be treated as a potential health hazard, and exposure to these chemicals should be minimized. Each laboratory is responsible for maintaining awareness of OSHA regulations regarding safe handling of chemicals used in this method. Additional references to laboratory safety are available[5-7] for the information of the analyst.

5.2 The following method analytes have been tentatively classified as known or suspected human or mammalian carcinogens: benzene, carbon tetrachloride, 1,4-dichlorobenzene, 1,2-dichlorethane, hexachlorobutadiene, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, chloroform, 1,2-dibromoethane, tetrachloroethene, trichloroethene, and vinyl chloride. Pure standard materials and stock standard solutions of these compounds should be handled in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

6.0 EQUIPMENT AND SUPPLIES (All specifications are suggested. Catalog numbers are included for illustration only.)

6.1 Sample Containers -- 40-120 mL screw cap vials each equipped with a PTFE-faced silicone septum. Prior to use, wash vials and septa with detergent and rinse with tap and distilled water. Allow the vials and septa to air dry at room temperature, place in a 105°C oven for one hour, then remove and allow to cool in an area known to be free of organics.

6.2 Purge and Trap System -- The purge and trap system consists of three separate pieces of equipment: purging device, trap, and desorber. Systems are commercially available from several sources that meet all of the following specifications.

6.2.1 The all glass purging device (Figure 1) must be designed to accept 5 mL samples with a water column at least 5 cm deep. Gaseous volumes above the sample must be kept to a minimum (<15 mL) to eliminate dead volume effects. A glass frit should be installed at the base of the sample chamber so that the purge gas passes through the water column as finely divided bubbles with a diameter of <3 mm at the origin. Needle spargers may be used, however, the purge gas must be introduced at a point ≤5 mm from the base of the water column.

6.2.2 The trap (Figure 2) must be at least 25 cm long and have an inside diameter of at least 0.105 in. Starting from the inlet, the trap must contain the following amounts of adsorbents: ⅓ of 2,6-diphenylene oxide polymer, ⅓ of silica gel, and ⅓ of coconut charcoal. It is recommended that 1.0 cm of methyl silicone coated packing be inserted at the inlet to extend the life of the trap. If it is not necessary to analyze for dichlorodifluoromethane, the charcoal can be eliminated and the polymer increased to fill ⅔ of the trap. If only compounds boiling above 35°C are to be analyzed, both the silica gel and charcoal can be eliminated and the polymer increased to fill the entire trap. Before initial use, the trap should be conditioned overnight at 180°C by backflushing with an inert gas flow of at least 20 mL/min. Vent the trap effluent to the room, not to the analytical column. Prior to daily use, the trap should be conditioned for 10 minutes at 180°C with backflushing. The trap may be vented to the analytical column during daily conditioning; however, the column must be run through the temperature program prior to analysis of samples. The use of alternative sorbents is acceptable provided the data acquired meets all quality control criteria described in Section 9.0, and provided the purge and desorption procedures specified in Section 11.0 of the method are not changed. Specifically, the purging time, the purge gas flow rate, and the desorption time may not be changed. Since many of the potential alternate sorbents may be thermally stable above 180°C, alternate traps may be desorbed and baked out at higher temperatures than those described in Section 11.0. If higher temperatures are used, the analyst should monitor the data for possible analyte and/or trap decomposition.

6.2.3 The use of the methyl silicone coated packing is recommended, but not mandatory. The packing serves a dual purpose of protecting the adsorbent from aerosols, and also of insuring that the adsorbent is fully enclosed within the heated zone of the trap thus eliminating potential cold spots. Alternatively, silanized glass wool may be used as a spacer at the trap inlet.

6.2.4 The desorber (Figure 2) must be capable of rapidly heating the trap to 180°C. The polymer section of the trap described in Section 6.2.2 should not be heated higher than 200°C or the life expectancy of the trap will decrease. Trap failure is characterized by a pressure drop in excess of 3 lbs. per square inch across the trap during purging or by poor bromoform sensitivities.

6.3 Gas Chromatography System

6.3.1 The GC must be capable of temperature programming and should be equipped with variable-constant differential flow controllers so that the column flow rate will remain constant throughout desorption and temperature program operation. The column oven may need to be cooled to <10°C (Section 6.3.3), and therefore, a subambient oven controller may be required.

6.3.2 Capillary Gas Chromatography Columns -- Any gas chromatography column that meets the performance specifications of this method may be used. Separations of the calibration mixture must be equivalent or better than those described in this method. If other GC columns or temperature programs are used, or whenever these procedures are changed, the method performance data in Section 9.3 must be repeated. Three useful columns have been identified: Column 1 (Section 6.3.3) and Column 2 (Section 6.3.4) both provide satisfied separations for sixty organic compounds. Column 3 (Section 6.3.5), which has been satisfactorily demonstrated for the GC/MS method 524.2, may also be used.

6.3.3 Column 1 - 60m long x 0.75 mm ID VOCOL (Supelco, Inc.) wide-bore capillary column with 1.5 µm film thickness, or equivalent. The flow rate of helium carrier gas is adjusted to about 6 mL/min. The column temperature is held for eight minutes at 10°C, then programmed to 180°C at 4°C/min., and held until all expected compounds have eluted. A sample chromatogram obtained with this column is presented in Figure 3. Retention times that may be anticipated with this column are listed in Table 1. Data obtained with this column is presented in Sections 13.0 and 17.0.

6.3.4 Column 2 - 105m long x 0.53mm ID, RTX-502.2 (O.I Corporation/RESTEK Corporation) mega-bore capillary column, with 3.0 µm film thickness, or equivalent. The flow rate of helium carrier gas is adjusted to about 8 mL/min. The column temperature is held for 10 minutes at 35°C, then programmed to 200°C at 4°C/min., and held until all expected compounds have eluted. A sample chromatogram obtained with this column is presented in Figure 4. Retention times that may be anticipated with this column are listed in Table 3. Data obtained with this column is presented in Sections 13.0 and 17.0.

6.3.5 Column 3 - 30 m long x 0.53 mm ID DB-624 mega-bore (J&W Scientific, Inc.) column with 3 µm film thickness.

6.3.6 A series configuration of a high temperature photoionization detector (PID) equipped with 10 eV (nominal) lamp and electroconductivity detector (ELCD) is required. This allows the simultaneous analysis of VOCs that are aromatic or unsaturated by photoionization detector and organohalide by an electrolytic conductivity detector.

6.3.7 A Tracor 703 photoionization detector and a Tracor Hall model 700-A detector connected in series with a short piece of uncoated capillary tube, 0.32 mm ID was used to develop the single laboratory method performance data described in Section 13.0. The system and operating conditions used to collect these data are as follows:

Column:	Column 1 (Section 6.3.3)
The purge-and-trap Unit:	Tekmar LSC-2
PID detector base temperature:	250°C
Reactor tube:	Nickel 1/16 in. OD
Reactor temperature:	810°C
Reactor base temperature:	250°C
Electrolyte:	100% n-propyl alcohol
Electrolyte flow rate:	0.8 mL/min.
Reaction gas:	Hydrogen at 40 mL/min.
Carrier gas plus make-up gas:	Helium at 30 mL/min.

6.3.8 An O.I. Model 4430 photoionization detector mounting together with the model 4420 electrolytic conductivity detector (ELCD) as a dual detector set was used to develop the single laboratory method performance data for Column 2 described in Section 13.0. The system and the operating conditions used to collect these data are as follows:

Column:	Column 2 (Section 6.3.4)
The purge-and-trap unit:	O.I. 4460A
Reactor tube:	Nickel 1/16 in. OD & .02in.ID
Reactor temperature:	950°C
Reactor base temperature:	250°C
Electrolyte:	100 % n-propyl alcohol
Electrolyte flow rate:	0.050 mL/min.
Reaction gas:	Hydrogen at 100 mL/min.
Carrier gas plus make-up gas:	Helium at 30 mL/min.

6.4 Syringe and Syringe Valves

6.4.1 Two 5 mL glass hypodermic syringes with Luer-Lok tip.

6.4.2 Three two-way syringe valves with Luer ends.

6.4.3 One 25 µL micro syringe with a 2 in x 0.006 in ID, 22° bevel needle (Hamilton #702N or equivalent).

6.4.4 Micro Syringes -- 10, 100 µL.

6.4.5 Syringes -- 0.5, 1.0, and 5 mL, gas tight with shut-off valve.

6.5 Miscellaneous

6.5.1 Standard Solution Storage Containers -- 15 mL bottles with PTFE-lined screw caps.

7.0 REAGENT AND STANDARDS

7.1 Trap Packing Materials

7.1.1 2,6-Diphenylene oxide polymer, 60/80 mesh, chromatographic grade (Tenax GC or equivalent).

7.1.2 Methyl Silicone Packing (Optional) -- OV-1 (3%) on Chromosorb-W, 60/80 mesh or equivalent.

7.1.3 Silica Gel -- 35/60 mesh, Davison, Grade 15 or equivalent.

7.1.4 Coconut Charcoal -- Prepare from Barnebey Cheney, CA-580-26 lot #M-2649 (or equivalent) by crushing through 26 mesh screen.

7.2 Reagents

7.2.1 Ascorbic Acid, ACS Reagent Grade -- Granular.

7.2.2 Sodium Thiosulfate, ACS Reagent Grade -- Granular.

7.2.3 Hydrochloric Acid (1+1) -- Carefully add a measured volume of conc. HCl to equal volume of reagent water.

7.2.4 Reagent Water -- It should be demonstrated to be free of interferences. Prepare reagent water by passing tap water through a filter bed containing about 0.5 kg of activated carbon, by using a water purification system, or by boiling distilled water for 15 minutes followed by a one-hour purge with inert gas while the water temperature is held at 90°C. Store in clean, narrow-mouth bottles with PTFE-lined septa and screw caps.

7.2.5 Methanol -- Demonstrated to be free of analytes.

7.2.6 Vinyl Chloride -- 99.9% pure vinyl chloride is available from Ideal Gas Products, Inc., Edison, New Jersey and from Matheson, East Rutherford, New Jersey. Certified mixtures of vinyl chloride in nitrogen at 1.0 and 10.0 ppm (v/v) are available from several sources.

7.3 Stock Standard Solutions (SSS) -- These solutions may be purchased as certified solutions or prepared from pure standard materials using the following procedures:

7.3.1 Place about 9.8 mL of methanol into a 10 mL ground-glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about

10 minutes or until all alcohol-wetted surfaces have dried. Weigh to the nearest 0.1 mg.

7.3.2 If the analyte is a liquid at room temperature, use a 100 µL syringe and immediately add two or more drops of reference standard to the flask. Be sure that the reference standard falls directly into the alcohol without contacting the neck of the flask. If the analyte is a gas at room temperature, fill a 5 mL valved gas-tight syringe with the standard to the 5.0 mL mark, lower the needle to 5 mm above the methanol meniscus, and slowly inject the standard into the neck area of the flask. The gas will rapidly dissolve in the methanol.

7.3.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in micrograms per microliter from the net gain in weight. When compound purity is certified at 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard.

7.3.4 Store stock standard solutions in 15 mL bottles equipped with PTFE-lined screw caps. Methanol solutions prepared from liquid analytes are stable for at least four weeks when stored at 4°C. Methanol solutions prepared from gaseous analytes are not stable for more than one week when stored at <0°C; at room temperature, they must be discarded after one day. Storage time may be extended only if the analyte proves their validity by analyzing quality control samples.

7.4 Primary Dilution Standard Solution (PDS) -- Use stock standard solutions to prepare primary dilution standard solutions that contain the analytes in methanol. The primary dilution standards should be prepared at concentrations that can be easily diluted to prepare aqueous calibration standard solutions (Section 9.2) that will bracket the working concentration range. Store the primary dilution standard solutions with minimal headspace and check frequently for signs of deterioration or evaporation, especially just before preparing calibration standard solutions from them. Storage times described for stock standard solutions in Section 7.3.4 also apply to primary dilution standard solutions.

7.5 Internal Standard Solution -- Prepare a fortified solution containing 1-chloro-2-fluorobenze or fluorobenzene and 2-bromo-1-chloropropane in methanol using the procedures described in Sections 7.3 and 7.4. It is recommended that the primary dilution standard be prepared at a concentration of 5 µg/mL of each internal standard compound. The addition of 10 µL of such a standard to 5.0 mL of sample or calibration standard would be equivalent to 10 µg/L.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

8.1 Sample Collection and Dechlorination

8.1.1 Collect all samples in duplicate. If samples, such as finished drinking water, are suspected to contain residual chlorine, add a dechlorinating agent the bottle. The preferred dechlorinating agent is sodium thiosulfate, but ascorbic acid may also be used. Add 3 mg of sodium thiosulfate or 25 mg of ascorbic acid per 40 mL of sample to the sample bottle before filling.

Note: If the residual chlorine is likely to be present >5 mg/L, a determination of the amount of the chlorine may be necessary. Diethyl-p-phenylenediamine (DPD) test kits are commercially available to determine residual chlorine in the field.

Add an additional 3 mg of sodium thiosulfate or 25 mg of ascorbic acid per each 5 mg/L of residual chlorine.

8.1.2 When sampling from a water tap, open the tap and allow the system to flush until the water temperature has stabilized (usually about 10 minutes). Adjust the flow to about 500 mL/min. and collect duplicate samples containing the desired dechlorinating agent from the flowing stream.

8.1.3 When sampling from an open body of water, partially fill a 1 quart wide-mouth bottle or 1 L beaker with sample from a representative area. Fill duplicate sample bottles containing the desired dechlorinating agent with sample from the larger container.

8.1.4 Fill sample bottles to overflowing, but take care not to flush out the rapidly dissolving dechlorinating agent. No air bubbles should pass through the sample as the bottle is filled, or be trapped in the sample when the bottle is sealed.

8.2 Sample Preservation

8.2.1 Adjust the pH of all samples to <2 <u>at the time of collection</u>, but after dechlorination, by carefully adding two drops of 1:1 HCl for each 40 mL of sample. Seal the sample bottles, Teflon face down, and mix for one minute. Exceptions to the acidification requirement are detailed in Sections 8.2.2 and 8.2.3.

Note: Do not mix the ascorbic acid or sodium thiosulfate with the HCl in the sample bottle prior to sampling.

8.2.2 When sampling for THM analysis only, acidification may be omitted if sodium thiosulfate is used to dechlorinate the sample. This exception to acidification does not apply if ascorbic acid is used for dechlorination.

8.2.3 If a sample foams vigorously when HCl is added, discard that sample. Collect a set of duplicate samples but do not acidify them. These samples

must be flagged as "not acidified" and must be stored at 4°C or below. These samples must be analyzed within 24 hours of collection time if they are to be analyzed for any compounds other than THMs.

8.2.4 The samples must be chilled to about 4°C when collected and maintained at that temperature until analysis. Field samples that will not be received at the laboratory on the day of collection must be packaged for shipment with sufficient ice to ensure that they will arrive at the laboratory with a substantial amount of ice remaining in the cooler.

8.3 Sample Storage

8.3.1 Store samples at ≤4°C until analysis. The sample storage area must be free of organic solvent vapors and direct or intense light.

8.3.2 Analyze all samples within 14 days of collection. Samples not analyzed within this period must be discarded and replaced.

8.4 Field Reagent Blanks (FRB)

8.4.1 Duplicate FRBs must be handled along with each sample set, which is composed of the samples collected from the same general sample site at approximately the same time. At the laboratory, fill field blank sample bottles with reagent water and sample preservatives, seal, and ship to the sampling site along with empty sample bottles and back to the laboratory with filled sample bottles. Wherever a set of samples is shipped and stored, it is accompanied by appropriate blanks. FRBs must remain hermetically sealed until analysis.

8.4.2 Use the same procedures used for samples to add sodium thiosulfate or ascorbic acid and HCl to blanks (Section 8.1.1). The same batch of ascorbic acid and HCl should be used for the field reagent blanks in the field.

9.0 QUALITY CONTROL

9.1 Quality control (QC) requirements are the initial demonstration of laboratory capability followed by regular analyses of laboratory reagent blanks, field reagent blanks, and laboratory fortified blanks. A method detection limit (MDL) must also be determined for each analyte. The laboratory must maintain records to document the quality of the data generated. Additional quality control practices are recommended.

9.2 Initial demonstration of low system background. Before any samples are analyzed, it must be demonstrated that a laboratory reagent blank (LRB) is reasonably free of contamination that would prevent the determination of any analyte of concern. Sources of background contamination are glassware, purge gas, sorbents, and equipment. Background contamination must be reduced to an

acceptable level before proceeding with the next section. In general background from method analytes should be below the method detection limit.

9.3 Initial Demonstration of Capability

9.3.1 Demonstration of laboratory accuracy and precision. Analyze four to seven replicates of a laboratory fortified blank containing each analyte of concern at a concentration in the range of 0.1-5 µg/L. This concentration should represent a concentration of ten times the MDL or a concentration near the middle of the calibration range demonstrated (Section 10.0). It is recommended that a QCS from a source different than the calibration standards be used for this set of LFBs, since it will serve as a check to verify the accuracy of the standards used to generate the calibration curve. This is particularly useful if the laboratory is using the method for the first time, and has no historical data base for standards. Prepare each replicate by adding an appropriate aliquot of a quality control sample to reagent water. Also add the appropriate amounts of internal standard and surrogates if they are being used. If it is expected that field samples will contain a dechlorinating agent and HCl, then add these to the LFBs in the same amounts prescribed in Section 8.1.1. If only THMs are to be determined and field samples do not contain HCl, then do not acidify LFBs. Analyze each replicate according to the procedures described in Section 11.0.

9.3.2 Calculate the measured concentration of each analyte in each replicate, the mean concentration of each analyte in all replicates, and mean accuracy (as mean percentage of true value) for each analyte, and the precision (as relative standard deviation, RSD) of the measurements for each analyte.

9.3.3 For each analyte and surrogate, the mean accuracy, expressed as a percentage of the true value, should be 80-120% and the RSD should be <20%. Some analytes, particularly the early eluting gases and late eluting higher molecular weight compounds, are measured with less accuracy and precision than other analytes. If these criteria are not met for an analyte, take remedial action and repeat the measurements for that analyte to demonstrate acceptable performance before samples are analyzed.

9.3.4 To determine the MDL, analyze a minimum of seven LFBs prepared at a low concentration. MDLs in Tables 2 and 4 were calculated from samples fortified at 0.1 µg/L, which can be used as a guide, or use calibration data to estimate a concentration for each analyte that will yield a peak with a three to five signal to noise ratio. Analyze the seven replicates as described in Section 11.0, and on a schedule that results in the analyses being conducted over several days. Calculate the mean accuracy and standard deviation for each analyte. Calculate the MDL using procedures described in Reference 4. The equation for this calculation is also in Section 13.3.

9.3.5 Develop and maintain a system of control charts to plot the precision and accuracy of analyte and surrogate measurements as a function of time. Charting of surrogate recoveries is an especially valuable activity since these are present in every sample and the analytical results will form a significant record of data quality.

9.4 Laboratory Reagent Blanks (LRBs) -- With each batch of samples processed as a group within a work shift, analyze a laboratory reagent blank to determine the background system contamination. LRBs should contain the same additives (dechlorinating agent and HCl) as field samples.

9.5 Assessing Laboratory Performance -- With each batch of samples processed as a group within a work shift, analyze a single laboratory fortified blank (LFB) containing each analyte of concern at a concentration as determined in Section 9.3.1. LFBs should contain a dechlorination agent and/or HCl as appropriate to match the field samples being analyzed. The minimum frequency of LFB analysis is once every twelve hours. Use the criteria described in Section 9.3.3 to evaluate the accuracy of the measurements, and to estimate whether the method detection limits can be obtained. If acceptable accuracy and method detection limits cannot be achieved, the problem must be located and corrected before further samples are analyzed. Data from all field samples analyzed since the last acceptable LFB should be considered suspect, and duplicate samples should be analyzed, if they are available, after the problem has been corrected. LFB results should be added to the on-going control charts to document data quality.

Since the calibration check sample in Section 10.3.2 and the LFB are made the same way and since procedural standards are used, the sample analyzed here may also be used as the calibration check in Section 10.3.2.

9.6 Assessing the Internal Standard -- If internal standard calibration is used, the analyst must assess the response of the internal standard in every LRB, FRB, LFB, CAL, and field sample. The IS response (peak height or peak area units) must be within 20% of the mean peak response of the IS in the CAL standards used to develop the calibration. If this criteria cannot be met, take remedial action. If there are interferences in field samples that affect the measurement of the internal standard, external standard calibration should be used (Section 10.3.2).

9.7 Assessing the Surrogate Analyte -- Calculate the amount of the surrogate analyte recovered in each LRB, LFB, FRB, CAL, and field sample (Section 10.0). If the surrogate recovery in blanks or calibration standards does not meet the criteria in Section 9.3.3., take remedial action. If the surrogate recovery in a field sample does not meet the criteria in Section 9.3.3., and data from LFBs shows the laboratory to be in control, reanalyze the sample.

9.8 If a water sample is contaminated with an analyte, verify that it is not a sampling error by analyzing a field reagent blank. The results of these analyses will help define contamination resulting from field sampling, storage and transportation

activities. If the field reagent blank shows unacceptable contamination, the analyst should identify and eliminate the contamination.

9.9 At least quarterly, replicates of laboratory fortified blanks should be evaluated to determine the precision of the laboratory measurements. Add these results to the on-going control charts to document data quality.

9.10 At least quarterly, analyze a quality control sample (QCS) from an external source. If measured analyte concentrations are not of acceptable accuracy, check the entire analytical procedure to locate and correct the problem source.

9.11 Sample matrix effects have not been observed when this method is used with distilled water, reagent water, drinking water, and ground water. Therefore, analysis of a laboratory fortified sample matrix (LFM) is not required.

9.12 Numerous other quality control measures are incorporated into other parts of this procedure, and serve to alert the analyst to potential problems.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Demonstration and documentation of acceptable initial calibration is required before any samples are analyzed. In addition, acceptable performance must be confirmed intermittently throughout analysis of samples by performing continuing calibration checks. These checks are required at the beginning of each work shift, but no less than every 12 hours. Additional periodic calibration checks are good laboratory practice. Since this method uses procedural standards, the analysis of the laboratory fortified blank, which is required in Section 9.5, may be used here as a calibration check sample.

10.2 Preparation of Calibration Standards

10.2.1 The number of calibration solutions (CALs) needed depends on the calibration range desired. A minimum of three CAL solutions is required to calibrate a range of a factor of 20 in concentration. For a factor of 50 use at least four standards, and for a factor of 100 at least five standards. One calibration standard should contain each analyte of concern at a concentration two to 10 times greater than the method detection limit (Tables 2 and 4) for that compound. The other CAL standards should contain each analyte of concern at concentrations that define the range of the sample analyte concentrations. When internal standard calibration is being used, every CAL solution contains the internal standard at same concentration (10 µg/L).

10.2.2 To prepare a calibration standard, add an appropriate volume of a primary dilution standard solution to an aliquot of reagent water in a volumetric container or sample syringe. The reagent water used should also contain the appropriate dechlorinating agent and/or HCl so as to match the field samples to be analyzed. Use a microsyringe and rapidly inject the alcoholic standard into the water. Remove the needle as quickly as possible after injection. Accurate calibration standards can be prepared by injecting 20 µL of the primary dilution standards to 25 mL or more of reagent water using the syringe described in Section 6.4.3. Aqueous standards are not stable in volumetric container and should be discarded after one hour unless transferred to sample bottle and sealed immediately as described in Section 8.1.2.

10.3 Calibration

10.3.1 External standard calibration -- Starting with the standard of lowest concentration, analyze each calibration standard according to Section 11.0 and tabulate peak height or area response versus the concentration in the standard. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to concentration (calibration factor) is a constant over the working range (<10% relative standard deviation), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

10.3.2 Internal standard calibration -- The organohalides recommended as internal standards are: 1-chloro-2-fluorobenze or 2-bromo-1-chloropropane and fluorobenzene. The internal standard is added to the sample just before purging. Check the validity of the internal standard response factors daily by analyzing a calibration standard.

Note: Since the calculated concentrations can be strongly biased by inaccurate detector response measurements for the internal standard or by coelution of an unknown with the internal standard, it is required that the area measurement of the internal standard of each sample be within ±3 standard deviations of those obtained from calibration standards, or ±20% of the mean response obtained from calibration standards, whichever is greater. If they do not, then internal standards can not be used.

10.3.3 Following analysis, tabulate peak height or area responses against concentration for each compound and the internal standard. Calculate the response factor (RF) for each compound using the following equation:

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

where:

A_s = Response for the analyte to be measured
A_{is} = Response for the internal standard
C_{is} = Concentration of the internal standard (µg/L)
C_s = Concentration of the analyte to be measured (µg/L)

If RF value over the working range is constant (<10% RSD), the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response versus analyte ratios, A_s/A_{is} vs. C_s/C_{is}.

10.3.4 The working calibration curve or calibration factor must be verified by the measurement of one or more calibration standards. This must be done at least once each work shift, but no less than once every 12 hours. Additional periodic calibration checks are good laboratory practice. It is highly recommended that an additional calibration check be performed at the end of any cycle of continuous instrument operation, so that each set of field samples is bracketed by calibration check standards. It is also recommended that more that one concentration of continuing calibration standard be analyzed, in order to evaluate the accuracy of the calibration at more than one point. If the response for any analyte varies from the predicted response by more than ±20%, the test must be repeated using a fresh calibration standard. If the results still do not agree, generate a new calibration curve. Any field samples analyzed since the last acceptable calibration check should be considered suspect, and should be reanalyzed if they are available.

10.4 Calibration for Vinyl Chloride Using a Certified Gaseous Mixture (Optional)

10.4.1 Fill the purging device with 5.0 mL of reagent water or aqueous calibration standard, and add internal standards.

10.4.2 Start to purge the aqueous mixture (Section 7.2.6). Inject a known volume (between 100 and 2000 µL) of the calibration gas (at room temperature) directly into the purging device with a gas tight syringe. Slowly inject the gaseous sample through the aqueous sample inlet needle. After completion, inject 2 mL of clean room air to sweep the gases from the inlet needle into the purging device. Inject the gaseous standard before five min of the 11 minutes purge time have elapsed.

10.4.3 Determine the aqueous equivalent concentration of vinyl chloride standard injected in µg/L, according to the following equation:

$$S = 0.51\ (C)\ (V)$$

where:

S = Aqueous equivalent concentration of vinyl chloride standardin µg/L;
C = Concentration of gaseous standard in ppm (v/v);

V = Volume of standard injected in milliliter

11.0 PROCEDURE

11.1 Initial Conditions

11.1.1 Recommended chromatographic conditions are summarized in Section 6.3. Other columns or GC conditions may be used if the requirements of Section 9.3 are met.

11.1.2 Calibrate the system daily as described in Section 10.0.

11.1.3 Adjust the purge gas (nitrogen or helium) flow rate to 40 mL/min. Attach the trap inlet to the purging device and open the syringe valve on the purging device.

11.2 Sample Introduction and Purging

11.2.1 To generate accurate data, samples and calibration standards must be analyzed under identical conditions. Remove the plungers from two 5 mL syringes and attach a closed syringe valve to each. Allow the sample to come to room temperature, open the sample (or standard) bottle, and carefully pour the sample into one of the syringe barrels to just short of overflowing. Replace the syringe plunger, invert the syringe, and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Add 10 µL of the internal calibration standard to the sample through the syringe valve. Close the valve. Fill the second syringe in an identical manner from the same sample bottle. Reserve this second syringe for a reanalysis if necessary.

11.2.2 Attach the sample syringe valve to the syringe valve on the purging device. Be sure that the trap is cooler than 25°C, then open the sample syringe valve and inject the sample into the purging chamber. Close both valves and initiate purging. Purge the sample for 11.0 ± 0.1 minute at ambient temperature.

Note: Ambient room temperature must be relatively constant. If it varies by more than 10°C during an analysis day, or between calibration and sample analysis, precision and accuracy of some analytes will be affected.

11.3 Sample Desorption

-- After the 11-minute purge, couple the trap to the chromatograph by switching the purge and trap system to the desorb mode, initiate the temperature program sequence of the gas chromatograph and start data acquisition. Introduce the trapped materials to the GC column by rapidly heating the trap to 180°C while backflushing the trap with an appropriate inert gas flow for 4.0 ± 0.1 minute. While the extracted sample is being introduced into the gas chromatograph, empty the purging device using the sample syringe and wash the chamber with two 5 mL flushes of reagent water.

11.4 Trap Reconditioning -- After desorbing the sample for four min, recondition the trap by returning the purge and trap system to the purge mode. Maintain the trap temperature at 180°C. After approximately seven minutes, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Identify each analyte in the sample chromatogram by comparing the retention time of the suspect peak to retention times generated by the calibration standards, the LFB and other fortified quality control samples. If the retention time of the suspect peak agrees within ±3 standard deviations of the retention times of those generated by known standards (Tables 1 and 3) then the identification may be considered as positive. If the suspect peak falls outside this range or coelutes with other compounds (Tables 1 and 3), then the sample should be reanalyzed. When applicable, determine the relative response of the alternate detector to the analyte. The relative response should agree to within 20% of the relative response determined from standards.

12.2 Xylenes and other structural isomers can be explicitly identified only if they have sufficiently different GC retention times. Acceptable resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

12.3 When both detectors respond to an analyte, quantitation is usually performed on the detector which exhibits the greater response. However, in cases where greater specificity or precision would result, the analyst may choose the alternate detector. Do not extrapolate beyond the calibration range established in Section 10.0. If peak response exceeds the highest calibration standard, a duplicate sample must be diluted and reanalyzed. Use only the multi-point calibration data obtained in Section 10.0 for all calculations. Do not use the daily calibration verification standard to quantitate method analyte in samples.

12.4 Determine the concentration of the unknowns when external standards are used, by using the calibration curve or by comparing the peak height or area of the unknowns to the peak height or area of the standards as follows:

Concentration of unknown (µg/L) = (Peak height sample/Peak height standard) x Concentration of standard (µg/L).

12.5 Calculate analyte and surrogate concentrations when internal standards are used with the equation in Section 10.3.3.

12.6 Calculations should utilize all available digits of precision, but final reported concentrations should be rounded to an appropriate number of significant figures(one digit of uncertainty). Experience indicates that three significant figures may be used for concentrations above 99 µg/L, two significant figures for

concentrations between 1-99 µg/L, and 1 significant figure for lower concentrations.

12.7 Calculate the total trihalomethane concentrations by summing the four individual trihalomethane concentrations in µg/L.

13.0 METHOD PERFORMANCE

13.1 This method was tested in a single laboratory using reagent water fortified at 10 µg/L (1). Single laboratory precision and accuracy data for each detector are presented for the method analytes in Tables 2 and 4.

13.2 Method detection limits for these analytes have been calculated from data collected by fortifying reagent water at 0.1 µg/L.[1] These data are presented in Tables 2 and 4.

13.3 Method detection limits were calculated using the formula:

$$MDL = S\ t_{(n-1,\ 1-alpha\ =\ 0.99)}$$

where:

$t_{(n-1,1-alpha\ =\ 0.99)}$ = Student's t value for the 99% confidence level with n-1 degrees of freedom,

n = number of replicates

S = the standard deviation of the replicate analyses.

14.0 POLLUTION PREVENTION

14.1 No solvents are utilized in this method except the extremely small volumes of methanol needed to make calibration standards. The only other chemicals used in this method are the neat materials in preparing standards and sample preservatives. All are used in extremely small amounts and pose no threat to the environment.

15.0 WASTE MANAGEMENT

15.1 There are no waste management issues involved with this method. Due to the nature of this method, the discarded samples are chemically less contaminated than when they were collected.

16.0 REFERENCES

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17.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

TABLE 1. RETENTION TIMES FOR VOLATILE ORGANIC COMPOUNDS ON PHOTOIONIZATION DETECTOR (PID) AND ELECTROLYTIC CONDUCTIVITY DETECTOR (ELCD) FOR COLUMN 1

		Retention Time (min)[a]	
	Analyte[b]	PID	ELCD
1	Dichlorodifluoromethane	–[c]	8.47
2	Chloromethane	–	9.47
3	Vinyl Chloride	9.88	9.93
4	Bromomethane	–	11.95
5	Chloroethane	–	12.37
6	Trichlorofluoromethane	–	13.49
7	1,1-Dichloroethene	6.14	16.18
8	Methylene Chloride	–	18.39
9	trans-1,2-Dichloroethene	19.30	19.33
10	1,1-Dichloroethane	–	20.99
11	2,2-Dichloropropane	–	22.88
12	cis-1,2-Dichloroethene	23.11	23.14
13	Chloroform	–	23.64
14	Bromochloromethane	–	24.16
15	1,1,1-Trichloroethane	–	24.77
16	1,1-Dichloropropane	25.21	25.24
17	Carbon Tetrachloride	–	25.47
18	Benzene	26.10	–
19	1,2-Dichloroethane	–	26.27
20	Trichloroethene	27.99	28.02
21	1,2-Dichloropropane	–	28.66
22	Bromodichloromethane	–	29.43
23	Dibromomethane	–	29.59
24	cis-1,3-Dichloropropene	31.38	31.41
25	Toluene	31.95	–
26	trans-1,3-Dichloropropene	33.01	33.04
27	1,1,2-Trichloroethane	–	33.21
28	Tetrachloroethene	33.88	33.90
29	1,3-Dichloropropane	–	34.00
30	Dibromochloromethane	–	34.73
31	1,2-Dibromoethane	–	35.34
32	Chlorobenzene	36.56	36.59
33	Ethylbenzene	36.72	–
34	1,1,1,2-Tetrachloroethane	–	36.80

TABLE 1. RETENTION TIMES FOR VOLATILE ORGANIC COMPOUNDS ON PHOTOIONIZATION DETECTOR (PID) AND ELECTROLYTIC CONDUCTIVITY DETECTOR (ELCD) FOR COLUMN 1

	Analyte[b]	Retention Time (min)[a] PID	ELCD
35	m-Xylene	36.98	–
36	p-Xylene	36.98	–
37	o-Xylene	38.39	–
38	Styrene	38.57	–
39	Isopropylbenzene	39.58	–
40	Bromoform	–	39.75
41	1,1,2,2-Tetrachloroethane	–	40.35
42	1,2,3-Trichloropropane	–	40.81
43	n-Propylbenzene	40.87	–
44	Bromobenzene	40.99	41.03
45	1,3,5-Trmethylbenzene	41.41	–
46	2-Chlorotoluene	41.41	41.45
47	4-Chlorotoluene	41.60	41.63
48	tert-Butylbenzene	42.71	
49	1,2,4-Trimethylbenzene	42.92	–
50	sec-Butylbenzene	43.31	–
51	p-Isopropyltoluene	43.81	–
52	1,3-Dichlorobenzene	44.08	44.11
53	1,4-Dichlorobenzene	44.43	44.47
54	n-Butylbenzene	45.20	–
55	1,2-Dichlorobenzene	45.71	45.74
56	1,2-Dibromo-3-Chloropropane	–	48.57
57	1,2,4-Trichlorobenzene	51.43	51.46
58	Hexachlorobutadiene	51.92	51.96
59	Napthalene	52.38	–
60	1,2,3-Trichlorobenzene	53.34	53.37
Internal Standards			
	Fluorobenzene	26.84	–
	2-Bromo-1-chloropropane[d]	–	33.08

[a]Column and analytical conditions are described in Section 6.3.
[b]Number refers to peaks in Figure 502.2-1.
[c]Dash inidicates detector does not respond.
[d]Interferes with trans-1,3-dichloropropene and 1,1,2-trichloroethane on the column. Use with care.

TABLE 2. SINGLE LABORATORY ACCURACY, PRECISION, AND METHOD DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS IN REAGENT WATER FOR COLUMN 1[a]

Analyte	Photoionization Detector			Electrolytic Conductivity Detector		
	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)
Benzene	99	1.2	0.01	–[b]	–	–
Bromobenzene	99	1.7	0.01	97	2.7	0.03
Bromochloromethane	–	–	–	96	3.0	0.01
Bromodichloromethane	–	–	–	97	2.9	0.02
Bromoform	–	–	–	106	5.2	1.6
Bromomethane	–	–	–	97	3.8	1.1
n-Butylbenzene	100	4.4	0.02	–	–	–
sec-Butylbenzene	97	2.7	0.02	–	–	–
tert-Butylbenzene	98	2.3	0.06	–	–	–
Carbon tetrachloride	–	–	–	92	3.6	0.01
Chlorobenzene	100	1.0	0.01	103	3.6	0.01
Chloroethane	–	–	–	96	3.9	0.1
Chloroform	–	–	–	98	2.5	0.02
Chloromethane	–	–	–	96	9.2	0.03
2-Chlorotoluene	N.D.[c]	N.D.	N.D.	97	2.7	0.01
4-Chlorotoluene	101	1.0	0.02	97	3.2	0.01
1,2-Dibromo-3-chloropropane	–	–	–	86	11.3	3.0
Dibromochloromethane	–	–	–	102	3.3	0.3
1,2-Dibromoethane	–	–	–	97	2.8	0.8
Dibromomethane	–	–	–	109	6.7	2.2
1,2-Dichlorobenzene	102	2.1	0.05	100	1.5	0.02
1,3-Dichlorobenzene	104	1.6	0.02	106	4.0	0.02
1,4-Dichlorobenzene	103	2.1	0.01	98	2.3	0.01
Dichlorodifluoromethane	–	–	–	89	6.6	0.05
1,1-Dichloroethane	–	–	–	100	5.7	0.07
1,2-Dichloroethane	–	–	–	100	3.8	0.03
1,1-Dichloroethene	100	2.4	N.D.	103	2.8	0.07
cis-1,2,-Dichloroethene	N.D.	N.D.	0.02	105	3.3	0.01
trans-1,2-Dichloroethene	93	4.0	0.05	99	3.7	0.06
1,2-Dichloropropane	–	–	–	103	3.7	0.01
1,3-Dichloropropane	–	–	–	100	3.4	0.03

TABLE 2. SINGLE LABORATORY ACCURACY, PRECISION, AND METHOD DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS IN REAGENT WATER FOR COLUMN 1[a]

Analyte	Photoionization Detector			Electrolytic Conductivity Detector		
	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)
2,2-Dichloropropane	–	–	–	105	3.4	0.05
1,1-Dichloropropene	103	3.5	0.02	103	3.3	0.02
Ethylbenzene	101	1.4	0.01	–	–	–
Hexachlorobutadiene	99	9.5	0.06	98	8.3	0.02
Isopropylbenzene	98	0.9	0.05	–	–	–
p-Isopropyltoluene	98	2.4	0.01	–	–	–
Methylene chloride	–	–	–	97	2.9	0.02
Napthalene	102	6.2	0.06	–	–	–
n-Propylbenzene	103	2.0	0.01	–	–	–
Styrene	104	1.3	0.01	–	–	–
1,1,1,2-Tetrachloroethane	–	–	–	99	2.3	0.01
1,1,2,2-Tetrachloroethane	–	–	–	99	6.8	0.01
Tetrachloroethene	101	1.8	0.05	97	2.5	0.04
Toluene	99	0.8	0.01	–	–	–
1,2,3-Trichlorobenzene	106	1.8	N.D.	98	3.1	0.03
1,2,4-Trichlorobenzene	104	2.2	0.02	102	2.1	0.03
1,1,1-Trichloroethane	–	–	–	104	3.3	0.03
1,1,2-Trichloroethane	–	–	–	109	5.6	N.D.
Trichloroethene	100	0.78	0.02	96	3.6	0.01
Trichlorofluoromethane	–	–	–	96	3.5	0.03
1,2,3-Trichloropropane	–	–	–	99	2.3	0.4
1,2,4-Trimethylbenzene	99	1.2	0.05	–	–	–
1,3,5-Trimethylbenzene	101	1.4	0.01	–	–	–
Vinyl chloride	109	5.0	0.02	95	5.9	0.04
o-Xylene	99	0.8	0.02	–	–	–
m-Xylene	100	1.4	0.01	–	–	–
p-Xylene	99	0.9	0.01	–	–	–

[a]Recoveries and relative standard deviations were determined from seven samples fortified at 10 µg/L of each analyte. Recoveries were determined by internal standard method. Internal standards were: Fluorobenzene for PID, 2-Bromo-1-chloropropane for ELCD.
[b]Detector does not respond.
[c]N.D. = not determined.

TABLE 3. RETENTION TIMES FOR VOLATILE ORGANIC COMPOUNDS ON PHOTOIONIZATION DETECTOR (PID) AND ELECTROLYTIC CONDUCTIVITY DETECTOR (ELCD) FOR COLUMN 2

	Analyte[b]	PID		ELCD	
		RT (min)[a]	RSD	RT (min)[a]	RSD
1	Dichlorodifluoromethane	–[c]		7.36	0.06
2	Chloromethane	–		8.09	0.06
3	Vinyl Chloride	8.57	0.06	8.58	0.08
4	Bromomethane	–		10.39	0.06
5	Chloroethane	–		10.74	0.05
6	Trichlorofluoromethane	–		11.85	0.07
7	1,1-Dichloroethene	14.46	0.08	14.47	0.07
8	Methylene Chloride	–		16.46	0.04
9	trans-1,2-Dichloroethene	17.61	0.02	17.62	0.03
10	1,1-Dichloroethane	–		19.25	0.03
11	2,2-Dichloropropane	–		21.36	0.03
12	cis-1,2-Dichloroethene	21.52	0.02	21.52	0.02
13	Chloroform	–		22.08	0.02
14	Bromochloromethane	–		22.69	0.02
15	1,1,1-Trichloroethane	–		23.53	0.02
16	1,1-Dichloropropane	24.07	0.01	24.08	0.02
17	Carbon Tetrachloride	–		24.47	0.02
18	1,2-Dichloroethane	–		24.95	0.01
19	Benzene	25.06	0.01	–	
20	Trichloroethene	27.99	0.01	27.15	0.01
21	1,2-Dichloropropane	–		27.73	0.01
22	Bromodichloromethane	–		28.57	0.02
23	Dibromomethane	–		28.79	0.01
24	cis-1,3-Dichloropropene	30.40	0.01	30.41	0.02
25	Toluene	31.58	0.01	–	
26	trans-1,3-Dichloropropene	32.11	0.01	32.13	0.01
27	1,1,2-Trichloroethane	–		32.69	0.01
28	1,3-Dichloropropane	–		33.57	0.01
29	Tetrachloroethene	33.85	0.01	33.86	0.01
30	Dibromochloromethane	–		34.58	0.01
31	1,2-Dibromoethane	–		35.29	0.01
32	Chlorobenzene	36.76	0.01	36.87	0.01
33	1,1,1,2-Tetrachloroethane	–		36.87	0.01
34	Ethylbenzene	36.92	0.01	–	
35	m-Xylene	37.19	0.01	–	
36	p-Xylene	37.19	0.01	–	
37	o-Xylene	38.77	0.01	–	
38	Styrene	38.90	0.01	–	
39	Isopropylbenzene	40.04	0.01	–	
40	Bromoform	–		40.19	0.01

TABLE 3. RETENTION TIMES FOR VOLATILE ORGANIC COMPOUNDS ON PHOTOIONIZATION DETECTOR (PID) AND ELECTROLYTIC CONDUCTIVITY DETECTOR (ELCD) FOR COLUMN 2

	Analyte[b]	PID		ELCD	
		RT (min)[a]	RSD	RT (min)[a]	RSD
43	n-Propylbenzene	41.51	0.01	–	
44	Bromobenzene	41.73	0.01	41.75	0.01
45	1,3,5-Trmethylbenzene	42.08	0.01	–	
46	2-Chlorotoluene	42.20	0.01	42.21	0.01
47	4-Chlorotoluene	42.36	0.01	42.36	0.01
48	tert-Butylbenzene	43.40	0.01	–	
49	1,2,4-Trimethylbenzene	43.55	0.01	–	
50	sec-Butylbenzene	44.19	0.01	–	
51	p-Isopropyltoluene	44.69	0.01	–	
52	1,3-Dichlorobenzene	45.08	0.01	45.09	0.01
53	1,4-Dichlorobenzene	45.48	0.01	45.48	0.01
54	n-Butylbenzene	46.22	0.01	–	
55	1,2-Dichlorobenzene	46.88	0.01	46.89	0.01
56	1,2-Dibromo-3-Chloropropane		–	49.84	0.01
57	1,2,4-Trichlorobenzene	53.26	0.01	53.26	0.01
58	Hexachlorobutadiene	53.86	0.01	53.87	0.01
59	Napthalene	54.45	0.01	–	
60	1,2,3-Trichlorobenzene	55.54	0.01	55.54	0.01
Internal Standards					
	1-Chloro-2-Fluorobenzene	37.55	0.01	37.56	0.01

[a]Column and analytical conditions are described in Section 6.3.4.
[b]Number refers to peaks in Figure 502.2-2.
[c]Dash inidicates detector does not respond.

TABLE 4. SINGLE LABORATORY ACCURACY, PRECISION, AND METHOD DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS IN REAGENT WATER FOR COLUMN 2[a]

Analyte	Photoionization Detector			Electrolytic Conductivity Detector		
	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)
Benzene	97	1.6	0.01	–[b]	–	–
Bromobenzene	98	1.1	0.04	96	3.2	0.14
Bromochloromethane	–	–	–	95	2.5	0.01
Bromodichloromethane	–	–	–	96	2.6	0.10
Bromoform	–	–	–	98	4.0	0.09
Bromomethane	–	–	–	97	2.4	0.19
n-Butylbenzene	95	2.4	0.03	–	–	–
sec-Butylbenzene	96	2.1	0.03	–	–	–
tert-Butylbenzene	98	2.1	0.06	–	–	–
Carbon tetrachloride	–	–	–	97	2.4	0.02
Chlorobenzene	98	1.5	0.02	98	2.2	N.D.[c]
Chloroethane	–	–	–	97	3.2	0.13
Chloroform	–	–	–	92	4.2	0.01
Chloromethane	–	–	–	98	2.3	0.10
2-Chlorotoluene	94	3.1	0.03	99	2.3	0.04
4-Chlorotoluene	97	1.6	0.02	97	2.3	0.07
1,2-Dibromo-3-chloropropane	–	–	–	97	2.2	0.20
Dibromochloromethane	–	–	–	99	2.0	0.05
1,2-Dibromoethane	–	–	–	99	2.8	0.17
Dibromomethane	–	–	–	98	3.5	0.10
1,2-Dichlorobenzene	97	1.4	0.03	98	2.0	0.04
1,3-Dichlorobenzene	97	1.6	0.02	97	2.2	0.07
1,4-Dichlorobenzene	97	1.5	0.03	97	2.2	0.04
Dichlorodifluoromethane	–	–	–	96	3.2	0.29
1,1-Dichloroethane	–	–	–	97	2.3	0.03
1,2-Dichloroethane	–	–	–	98	1.8	0.03
1,1-Dichloroethene	96	2.2	0.10	97	2.3	0.04
cis-1,2,-Dichloroethene	97	1.7	0.03	96	3.3	0.05
trans-1,2-Dichloroethene	97	1.8	0.03	98	1.5	0.05
1,2-Dichloropropane	–	–	–	98	1.8	0.03
1,3-Dichloropropane	–	–	–	100	1.3	0.02

TABLE 4. SINGLE LABORATORY ACCURACY, PRECISION, AND METHOD DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS IN REAGENT WATER FOR COLUMN 2[a]

Analyte	Photoionization Detector			Electrolytic Conductivity Detector		
	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)	Average Recovery (µg/L)	Rel. Std. Deviation (%)	MDL (µg/L)
2,2-Dichloropropane	–	–	–	95	14.2	N.D.
1,1-Dichloropropene	103	3.5	0.02	103	3.3	0.02
cis-1,3-Dichloropropene	101	1.4	0.01	–	–	–
trans-1,3-Dichloropropene	99	9.5	0.06	98	8.3	0.02
Ethylbenzene	98	0.9	0.05	–	–	–
Hexachlorobutadiene	98	2.4	0.01	–	–	–
Isopropylbenzene	–	–	–	97	2.9	0.02
p-Isopropyltoluene	102	6.2	0.06	–	–	–
Methylene chloride	103	2.0	0.01	–	–	–
Napthalene	104	1.3	0.01	–	–	–
n-Propylbenzene	–	–	–	99	2.3	0.01
Styrene	–	–	–	99	6.8	0.01
1,1,1,2-Tetrachloroethane	101	1.8	0.05	97	2.5	0.04
1,1,2,2-Tetrachloroethane	99	0.8	0.01	–	–	–
Tetrachloroethene	106	1.8	N.D.	98	3.1	0.03
Toluene	104	2.2	0.02	102	2.1	0.03
1,2,3-Trichlorobenzene	–	–	–	104	3.3	0.03
1,2,4-Trichlorobenzene	–	–	–	109	5.6	N.D.
1,1,1-Trichloroethane	100	0.78	0.02	96	3.6	0.01
1,1,2-Trichloroethane	–	–	–	96	3.5	0.03
Trichloroethene	–	–	–	99	2.3	0.4
Trichlorofluoromethane	99	1.2	0.05	–	–	–
1,2,3-Trichloropropane	101	1.4	0.01	–	–	–
1,2,4-Trimethylbenzene	109	5.0	0.02	95	5.9	0.04
1,3,5-Trimethylbenzene	99	0.8	0.02	–	–	–
Vinyl chloride	100	1.4	0.01	–	–	–
o-Xylene	99	0.9	0.01	–	–	–
m-Xylene						
p-Xylene						

[a]Recoveries and relative standard deviations were determined from seven samples fortified at 10 µg/L of each analyte. Recoveries were determined by external standard method.
[b]Detector does not respond.
[c]N.D. = not determined.

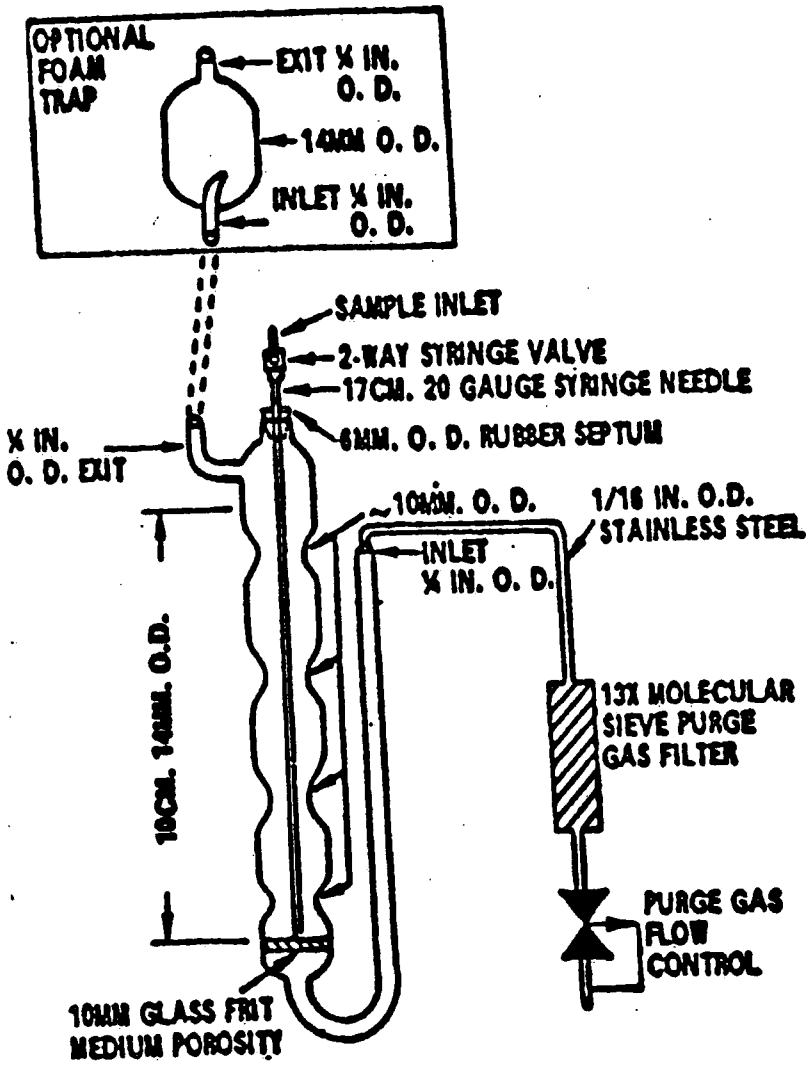

FIGURE 1. PURGING DEVICE

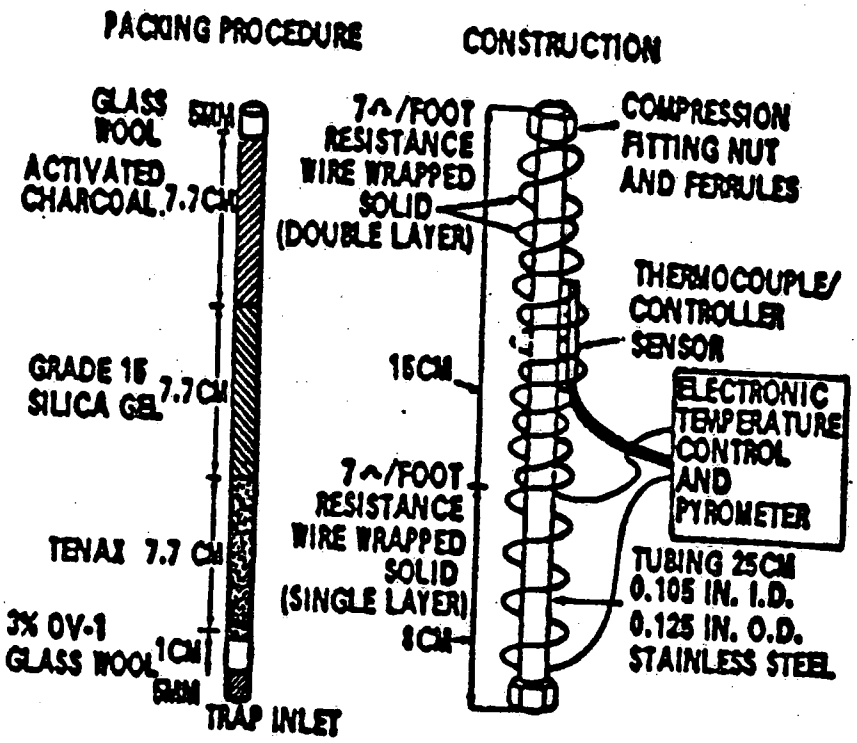

FIGURE 2. TRAP PACKINGS AND CONSTRUCTION TO INCLUDE DESORB CAPABILITY

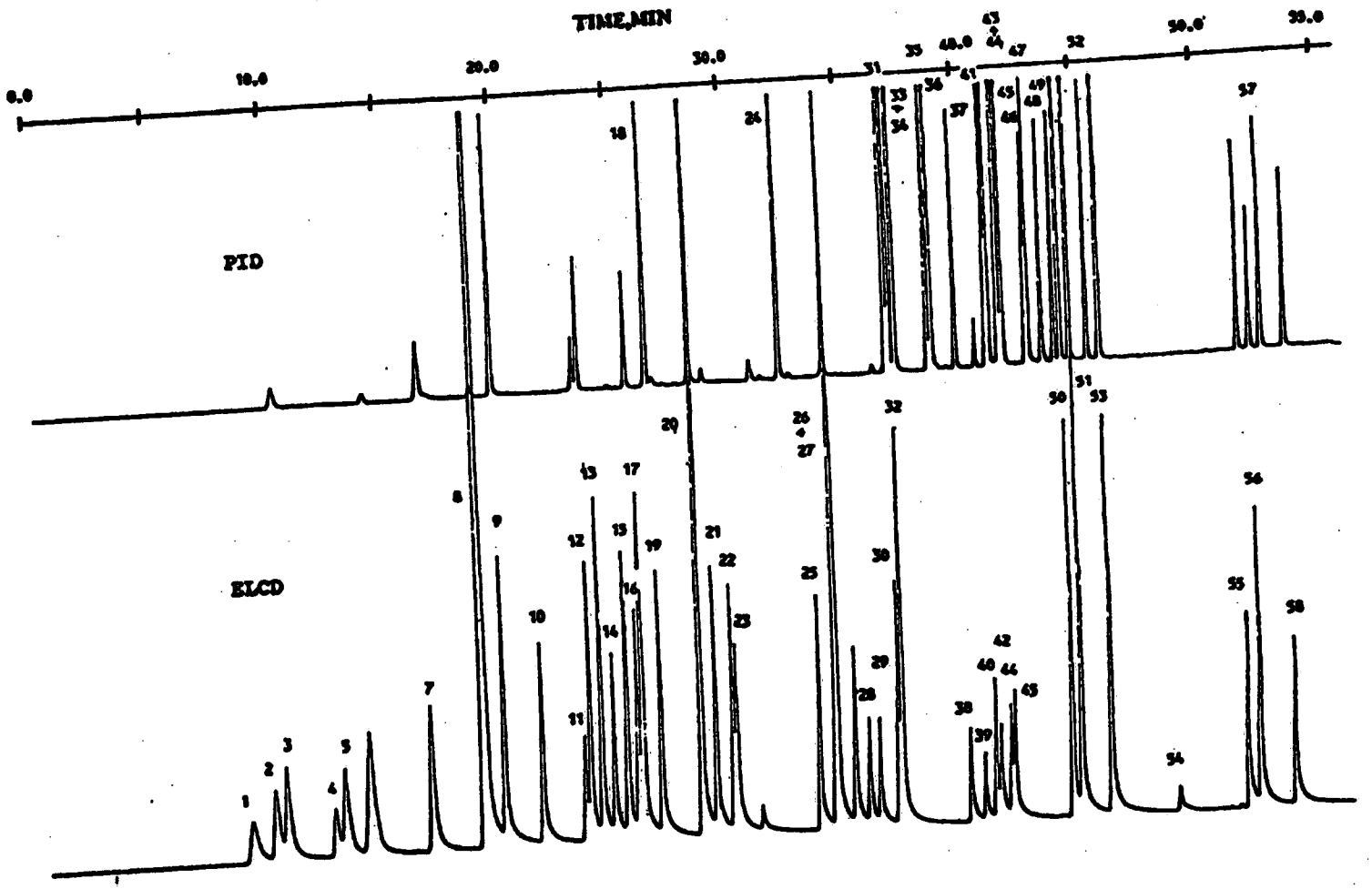

FIGURE 3. DUAL CHROMATOGRAM OF ORGANIC COMPOUNDS FOR COLUMN 1

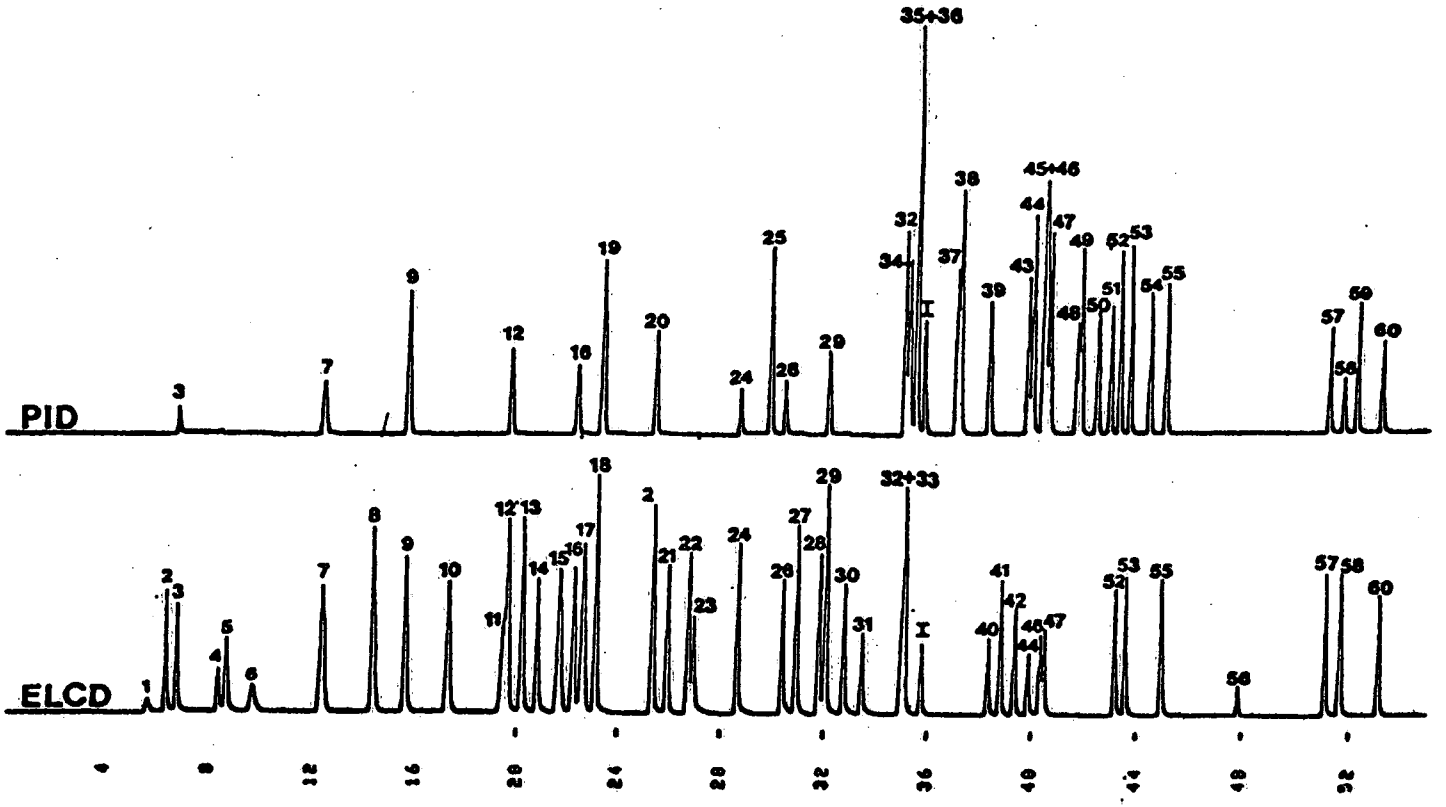

FIGURE 4. DUAL CHROMATOGRAM OF ORGANIC COMPOUNDS FOR COLUMN 2

REFERENCE 25

METHOD 524.2

MEASUREMENT OF PURGEABLE ORGANIC COMPOUNDS IN WATER BY CAPILLARY COLUMN GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Revision 4.1

Edited by J.W. Munch (1995)

A. Alford-Stevens, J.W. Eichelberger, W.L. Budde - Method 524, Rev. 1.0 (1983)

R.W. Slater, Jr. - Revision 2.0 (1986)

J.W. Eichelberger, and W.L. Budde - Revision 3.0 (1989)

J.W. Eichelberger, J.W. Munch, and T.A. Bellar - Revision 4.0 (1992)

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METHOD 524.2

MEASUREMENT OF PURGEABLE ORGANIC COMPOUNDS IN WATER BY CAPILLARY COLUMN GAS CHROMATOGRAPHY/MASS SPECTROMETRY

1.0 SCOPE AND APPLICATION

1.1 This is a general purpose method for the identification and simultaneous measurement of purgeable volatile organic compounds in surface water, ground water, and drinking water in any stage of treatment[1,2]. The method is applicable to a wide range of organic compounds, including the four trihalomethane disinfection by-products, that have sufficiently high volatility and low water solubility to be removed from water samples with purge and trap procedures. The following compounds can be determined by this method.

Analyte	Chemical Abstract Services Registry Number
Acetone*	67-64-1
Acrylonitrile*	107-13-1
Allyl Chloride*	107-05-1
Benzene	71-43-2
Bromobenzene	108-86-1
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform	75-25-2
Bromomethane	74-83-9
2-Butanone*	78-93-3
n-Butylbenzene	104-51-8
sec-Butylbenzene	135-98-8
tert-Butylbenzene	98-06-6
Carbon Disulfide*	75-15-0
Carbon Tetrachloride	56-23-5
Chloroacetonitrile*	107-14-2
Chlorobenzene	108-90-7
1-Chlorobutane*	109-69-3
Chloroethane	75-00-3
Chloroform	67-66-3
Chloromethane	74-87-3
2-Chlorotoluene	95-49-8
4-Chlorotoluene	106-43-4
Dibromochloromethane	124-48-1
1,2-Dibromo-3-Chloropropane	96-12-8
1,2-Dibromoethane	106-93-4
Dibromomethane	74-95-3
1,2-Dichlorobenzene	95-50-1

Analyte	Chemical Abstract Services Registry Number
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
trans-1,4-Dichloro-2-Butene*	110-57-6
Dichlorodifluoromethane	75-71-8
1,1-Dichloroethane	75-34-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethene	75-35-4
cis-1,2-Dichloroethene	156-59-2
trans-1,2-Dichloroethene	156-60-5
1,2-Dichloropropane	78-87-5
1,3-Dichloropropane	142-28-9
2,2-Dichloropropane	590-20-7
1,1-Dichloropropene	563-58-6
1,1-Dichloropropanone*	513-88-2
cis-1,3-Dichloropropene	10061-01-5
trans-1,3-Dichloropropene	10061-02-6
Diethyl Ether*	60-29-7
Ethylbenzene	100-41-4
Ethyl Methacrylate*	97-63-2
Hexachlorobutadiene	87-68-3
Hexachloroethane*	67-72-1
2-Hexanone*	591-78-6
Isopropylbenzene	98-82-8
4-Isopropyltoluene	99-87-6
Methacrylonitrile*	126-98-7
Methylacrylate*	96-33-3
Methylene Chloride	75-09-2
Methyl Iodide*	74-88-4
Methylmethacrylate*	80-62-6
4-Methyl-2-Pentanone*	108-10-1
Methyl-t-butyl Ether*	1634-04-4
Naphthalene	91-20-3
Nitrobenzene*	98-95-3
2-Nitropropane*	79-46-9
Pentachloroethane*	76-01-7
Propionitrile*	107-12-0
n-Propylbenzene	103-65-1
Styrene	100-42-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethene	127-18-4
Tetrahydrofuran*	109-99-9
Toluene	108-88-3
1,2,3-Trichlorobenzene	87-61-6

Analyte	Chemical Abstract Services Registry Number
1,2,4-Trichlorobenzene	120-82-1
1,1,1-Trichloroethane	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethene	79-01-6
Trichlorofluoromethane	75-69-4
1,2,3-Trichloropropane	96-18-4
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Vinyl Chloride	75-01-4
o-Xylene	95-47-6
m-Xylene	108-38-3
p-Xylene	106-42-3

*New compound in Revision 4.0.

1.2 Method detection limits (MDLs)[3] are compound, instrument and especially matrix dependent and vary from approximately 0.02-1.6 µg/L. The applicable concentration range of this method is primarily column and matrix dependent, and is approximately 0.02-200 µg/L when a wide-bore thick-film capillary column is used. Narrow-bore thin-film columns may have a capacity which limits the range to about 0.02-20 µg/L. Volatile water soluble, polar compounds which have relatively low purging efficiencies can be determined using this method. Such compounds may be more susceptible to matrix effects, and the quality of the data may be adversely influenced.

1.3 Analytes that are not separated chromatographically, but which have different mass spectra and noninterfering quantitation ions (Table 1), can be identified and measured in the same calibration mixture or water sample as long as their concentrations are somewhat similar (Section 11.6.2). Analytes that have very similar mass spectra cannot be individually identified and measured in the same calibration mixture or water sample unless they have different retention times (Section 11.6.3). Coeluting compounds with very similar mass spectra, typically many structural isomers, must be reported as an isomeric group or pair. Two of the three isomeric xylenes and two of the three dichlorobenzenes are examples of structural isomers that may not be resolved on the capillary column, and if not, must be reported as isomeric pairs. The more water soluble compounds (>2% solubility) and compounds with boiling points above 200°C are purged from the water matrix with lower efficiencies. These analytes may be more susceptible to matrix effects.

2.0 SUMMARY OF METHOD

2.1 Volatile organic compounds and surrogates with low water solubility are extracted (purged) from the sample matrix by bubbling an inert gas through the aqueous sample. Purged sample components are trapped in a tube

containing suitable sorbent materials. When purging is complete, the sorbent tube is heated and backflushed with helium to desorb the trapped sample components into a capillary gas chromatography (GC) column interfaced to a mass spectrometer (MS). The column is temperature programmed to facilitate the separation of the method analytes which are then detected with the MS. Compounds eluting from the GC column are identified by comparing their measured mass spectra and retention times to reference spectra and retention times in a data base. Reference spectra and retention times for analytes are obtained by the measurement of calibration standards under the same conditions used for samples. Analytes are quantitated using procedural standard calibration (Section 3.14). The concentration of each identified component is measured by relating the MS response of the quantitation ion produced by that compound to the MS response of the quantitation ion produced by a compound that is used as an internal standard. Surrogate analytes, whose concentrations are known in every sample, are measured with the same internal standard calibration procedure.

3.0 DEFINITIONS

3.1 Internal Standard (IS) -- A pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of other method analytes and surrogates that are components of the same sample or solution. The internal standard must be an analyte that is not a sample component.

3.2 Surrogate Analyte (SA) -- A pure analyte(s), which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amount(s) before extraction or other processing and is measured with the same procedures used to measure other sample components. The purpose of the SA is to monitor method performance with each sample.

3.3 Laboratory Duplicates (LD1 and LD2) -- Two aliquots of the same sample taken in the laboratory and analyzed separately with identical procedures. Analyses of LD1 and LD2 indicates precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.

3.4 Field Duplicates (FD1 and FD2) -- Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of FD1 and FD2 give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.

3.5 Laboratory Reagent Blank (LRB) -- An aliquot of reagent water or other blank matrix that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, internal standards, and surrogates that are used with other samples. The LRB is used to determine if method analytes or other

interferences are present in the laboratory environment, the reagents, or the apparatus.

3.6 Field Reagent Blank (FRB) -- An aliquot of reagent water or other blank matrix that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.

3.7 Laboratory Performance Check Solution (LPC) -- A solution of one or more compounds (analytes, surrogates, internal standard, or other test compounds) used to evaluate the performance of the instrument system with respect to a defined set of method criteria.

3.8 Laboratory Fortified Blank (LFB) -- An aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements.

3.9 Laboratory Fortified Sample Matrix (LFM) -- An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.

3.10 Stock Standard Solution -- A concentrated solution containing one or more method analytes prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source.

3.11 Primary Dilution Standard Solution (PDS) -- A solution of several analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.12 Calibration Standard (CAL) -- A solution prepared from the primary dilution standard solution or stock standard solutions and the internal standards and surrogate analytes. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.

3.13 Quality Control Sample (QCS) -- A solution of method analytes of known concentrations which is used to fortify an aliquot of LRB or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check laboratory performance with externally prepared test materials.

3.14 Procedural Standard Calibration -- A calibration method where aqueous calibration standards are prepared and processed (e.g., purged,extracted, and/or derivatized) in exactly the same manner as a sample. All steps in the process from addition of sampling preservatives through instrumental analyses are included in the calibration. Using procedural standard calibration compensates for any inefficiencies in the processing procedure.

4.0 INTERFERENCES

4.1 During analysis, major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The use of Teflon tubing, Teflon thread sealants, or flow controllers with rubber components in the purging device should be avoided since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of laboratory reagent blanks provide information about the presence of contaminants. When potential interfering peaks are noted in laboratory reagent blanks, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter. Subtracting blank values from sample results is not permitted.

4.2 Interfering contamination may occur when a sample containing low concentrations of volatile organic compounds is analyzed immediately after a sample containing relatively high concentrations of volatile organic compounds. A preventive technique is between-sample rinsing of the purging apparatus and sample syringes with two portions of reagent water. After analysis of a sample containing high concentrations of volatile organic compounds, one or more laboratory reagent blanks should be analyzed to check for cross-contamination.

4.3 Special precautions must be taken to determine methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of methylene chloride, otherwise random background levels will result. Since methylene chloride will permeate Teflon tubing, all GC carrier gas lines and purge gas plumbing should be constructed of stainless steel or copper tubing. Laboratory worker's clothing should be cleaned frequently since clothing previously exposed to methylene chloride fumes during common liquid/liquid extraction procedures can contribute to sample contamination.

4.4 Traces of ketones, methylene chloride, and some other organic solvents can be present even in the highest purity methanol. This is another potential source of contamination, and should be assessed before standards are prepared in the methanol.

5.0 SAFETY

5.1 The toxicity or carcinogenicity of chemicals used in this method has not been precisely defined; each chemical should be treated as a potential health hazard, and exposure to these chemicals should be minimized. Each laboratory is

responsible for maintaining awareness of OSHA regulations regarding safe handling of chemicals used in this method. Additional references to laboratory safety are available[4-6] for the information of the analyst.

5.2 The following method analytes have been tentatively classified as known or suspected human or mammalian carcinogens: benzene, carbon tetrachloride, 1,4-dichlorobenzene, 1,2-dichlorethane, hexachlorobutadiene, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, chloroform, 1,2-dibromoethane,tetrachloroethene, trichloroethene, and vinyl chloride. Pure standard materials and stock standard solutions of these compounds should be handled in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

6.0 EQUIPMENT AND SUPPLIES (All specifications are suggested. Catalog numbers are included for illustration only.)

6.1 Sample Containers -- 40-120 mL screw cap vials each equipped with a Teflon faced silicone septum. Prior to use, wash vials and septa with detergent and rinse with tap and distilled water. Allow the vials and septa to air dry at room temperature, place in a 105°C oven for one hour, then remove and allow to cool in an area known to be free of organics.

6.2 Purge and Trap System -- The purge and trap system consists of three separate pieces of equipment: purging device, trap, and desorber. Systems are commercially available from several sources that meet all of the following specifications.

6.2.1 The all glass purging device (Figure 1) should be designed to accept 25-mL samples with a water column at least 5 cm deep. A smaller (5 mL) purging device is recommended if the GC/MS system has adequate sensitivity to obtain the method detection limits required. Gaseous volumes above the sample must be kept to a minimum (<15 mL) to eliminate dead volume effects. A glass frit should be installed at the base of the sample chamber so the purge gas passes through the water column as finely divided bubbles with a diameter of <3 mm at the origin. Needle spargers may be used, however, the purge gas must be introduced at a point about 5 mm from the base of the water column. The use of a moisture control device is recommended to prohibit much of the trapped water vapor from entering the GC/MS and eventually causing instrumental problems.

6.2.2 The trap (Figure 2) must be at least 25 cm long and have an inside diameter of at least 0.105 in. Starting from the inlet, the trap should contain 1.0 cm of methyl silicone coated packing and the following amounts of adsorbents: ⅓ of 2,6-diphenylene oxide polymer, ⅓ of silica gel, and ⅓ of coconut charcoal. If it is not necessary to determine dichlorodifluoromethane, the charcoal can be eliminated and the polymer increased to fill ⅔ of the trap. Before initial use, the trap

should be conditioned overnight at 180°C by backflushing with an inert gas flow of at least 20 mL/min. Vent the trap effluent to the room, not to the analytical column. Prior to daily use, the trap should be conditioned for 10 minutes at 180°C with backflushing. The trap may be vented to the analytical column during daily conditioning; however, the column must be run through the temperature program prior to analysis of samples. The use of alternative sorbents is acceptable provided the data acquired meets all quality control criteria described in Section 9.0, and provided the purge and desorption procedures specified in Section 11.0 of the method are not changed. Specifically, the purging time, the purge gas flow rate, and the desorption time may not be changed. Since many of the potential alternate sorbents may be thermally stable above 180°C, alternate traps may be desorbed and baked out at higher temperatures than those described in Section 11.0. If higher temperatures are used, the analyst should monitor the data for possible analyte and/or trap decomposition.

6.2.3 The use of the methyl silicone coated packing is recommended, but not mandatory. The packing serves a dual purpose of protecting the Tenax adsorbant from aerosols, and also of insuring that the Tenax is fully enclosed within the heated zone of the trap thus eliminating potential cold spots. Alternatively, silanized glass wool may be used as a spacer at the trap inlet.

6.2.4 The desorber (Figure 2) must be capable of rapidly heating the trap to 180°C either prior to or at the beginning of the flow of desorption gas. The polymer section of the trap should not be heated higher than 200°C or the life expectancy of the trap will decrease. Trap failure is characterized by a pressure drop in excess of 3 lb/in^2 across the trap during purging or by poor bromoform sensitivities. The desorber design illustrated in Figure 2 meets these criteria.

6.3 Gas Chromatography/Mass Spectrometer/Data System (GC/MS/DS)

6.3.1 The GC must be capable of temperature programming and should be equipped with variable-constant differential flow controllers so that the column flow rate will remain constant throughout desorption and temperature program operation. If the column oven is to be cooled to 10°C or lower, a subambient oven controller will likely be required. If syringe injections of 4-bromofluorobenzene (BFB) will be used, a split/splitless injection port is required.

6.3.2 Capillary GC Columns -- Any gas chromatography column that meets the performance specifications of this method may be used (Section 10.2.4.1). Separations of the calibration mixture must be equivalent or better than those described in this method. Four useful columns have been evaluated, and observed compound retention times for these columns are listed in Table 2.

6.3.2.1 Column 1 - 60 m x 0.75 mm ID VOCOL (Supelco, Inc.) glass wide-bore capillary with a 1.5 µm film thickness.

Column 2 - 30 m x 0.53 mm ID DB-624 (J&W Scien-tific, Inc.) fused silica capillary with a 3 µm film thickness.

Column 3 - 30 m x 0.32 mm ID DB-5 (J&W Scientific, Inc.) fused silica capillary with a 1 µm film thickness.

Column 4 - 75 m x 0.53 mm id DB-624 (J&W Scien-tific, Inc.) fused silica capillary with a 3 µm film thickness.

6.3.3 Interfaces between the GC and MS -- The interface used depends on the column selected and the gas flow rate.

6.3.3.1 The wide-bore Columns 1, 2, and 4 have the capacity to accept the standard gas flows from the trap during thermal desorption, and chromatography can begin with the onset of thermal desorption. Depending on the pumping capacity of the MS, an additional interface between the end of the column and the MS may be required. An open split interface[7] or an all-glass jet separator is an acceptable interface. Any interface can be used if the performance specifications described in this method (Sections 9.0 and 10.0) can be achieved. The end of the transfer line after the interface, or the end of the analytical column if no interface is used, should be placed within a few mm of the MS ion source.

6.3.3.2 When narrow-bore Column 3 is used, a cryogenic interface placed just in front of the column inlet is suggested. This interface condenses the desorbed sample components in a narrow band on an uncoated fused silica precolumn using liquid nitrogen cooling. When all analytes have been desorbed from the trap, the interface is rapidly heated to transfer them to the analytical column. The end of the analytical column should be placed within a few mm of the MS ion source. A potential problem with this interface is blockage of the interface by frozen water from the trap. This condition will result in a major loss in sensitivity and chromatographic resolution.

6.3.4 The mass spectrometer must be capable of electron ionization at a nominal electron energy of 70 eV. The spectrometer must be capable of scanning from 35-260 amu with a complete scan cycle time (including scan overhead) of two seconds or less. (Scan cycle time = Total MS data acquisition time in seconds divided by number of scans in the chromatogram.) The spectrometer must produce a mass spectrum that meets all criteria in Table 3 when 25 ng or less of 4-bromofluorobenzene (BFB) is introduced into the GC. An average

spectrum across the BFB GC peak may be used to test instrument performance.

6.3.5 An interfaced data system is required to acquire, store, reduce, and output mass spectral data. The computer software should have the capability of processing stored GC/MS data by recognizing a GC peak within any given retention time window, comparing the mass spectra from the GC peak with spectral data in a user-created data base, and generating a list of tentatively identified compounds with their retention times and scan numbers. The software must allow integration of the ion abundance of any specific ion between specified time or scan number limits. The software should also allow calculation of response factors as defined in Section 10.2.6 (or construction of a linear or second order regression calibration curve), calculation of response factor statistics (mean and standard deviation), and calculation of concentrations of analytes using either the calibration curve or the equation in Section 12.0.

6.4 Syringe and Syringe Valves

6.4.1 Two 5 mL or 25 mL glass hypodermic syringes with Luer-Lok tip (depending on sample volume used).

6.4.2 Three two-way syringe valves with Luer ends.

6.4.3 Micro Syringes -- 10 µL and 100 µL.

6.4.4 Syringes -- 0.5 mL, 1.0 mL, and 5 mL, gas tight with shut-off valve.

6.5 Miscellaneous

6.5.1 Standard Solution Storage Containers -- 15 mL bottles with Teflon lined screw caps.

7.0 REAGENTS AND STANDARDS

7.1 Trap Packing Materials

7.1.1 2,6-Diphenylene oxide polymer, 60/80 mesh, chromatographic grade (Tenax GC or equivalent).

7.1.2 Methyl Silicone Packing (Optional) -- OV-1 (3%) on Chromosorb W, 60/80 mesh, or equivalent.

7.1.3 Silica Gel -- 35/60 mesh, Davison, Grade 15 or equivalent.

7.1.4 Coconut Charcoal -- Prepare from Barnebey Cheney, CA-580-26 lot #M-2649 (or equivalent) by crushing through 26 mesh screen.

7.2 Reagents

7.2.1 Methanol -- Demonstrated to be free of analytes.

7.2.2 Reagent Water -- Prepare reagent water by passing tap water through a filter bed containing about 0.5 kg of activated carbon, by using a water purification system, or by boiling distilled water for 15 minutes followed by a one-hour purge with inert gas while the water temperature is held at 90°C. Store in clean, narrow-mouth bottles with Teflon lined septa and screw caps.

7.2.3 Hydrochloric acid (1+1) -- Carefully add measured volume of conc. HCl to equal volume of reagent water.

7.2.4 Vinyl Chloride -- Certified mixtures of vinyl chloride in nitrogen and pure vinyl chloride are available from several sources (for example, Matheson, Ideal Gas Products, and Scott Gases).

7.2.5 Ascorbic Acid, ACS Reagent Grade, Granular.

7.2.6 Sodium Thiosulfate, ACS Reagent Grade, Granular.

7.3 Stock Standard Solutions -- These solutions may be purchased as certified solutions or prepared from pure standard materials using the following procedures. One of these solutions is required for every analyte of concern, every surrogate, and the internal standard. A useful working concentration is about 1-5 mg/mL.

7.3.1 Place about 9.8 mL of methanol into a 10 mL ground-glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 minutes or until all alcohol-wetted surfaces have dried and weigh to the nearest 0.1 mg.

7.3.2 If the analyte is a liquid at room temperature, use a 100 µL syringe and immediately add two or more drops of reference standard to the flask. Be sure that the reference standard falls directly into the alcohol without contacting the neck of the flask. If the analyte is a gas at room temperature, fill a 5 mL valved gas-tight syringe with the standard to the 5.0 mL mark, lower the needle to 5 mm above the methanol meniscus, and slowly inject the standard into the neck area of the flask. The gas will rapidly dissolve in the methanol.

7.3.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in µg/µL from the net gain in weight. When compound purity is certified at 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard.

7.3.4 Store stock standard solutions in 15 mL bottles equipped with Teflon lined screw caps. Methanol solutions of acrylonitrile, methyl iodide, and methyl acrylate are stable for only one week at 4°C. Methanol solutions prepared from other liquid analytes are stable for at least four weeks when stored at 4°C. Methanol solutions prepared from gaseous analytes are not stable for more than 1 week when stored at <0°C; at room temperature, they must be discarded after one day.

7.4 Primary Dilution Standards (PDS) -- Use stock standard solutions to prepare primary dilution standard solutions that contain all the analytes of concern in methanol or other suitable solvent. The primary dilution standards should be prepared at concentrations that can be easily diluted to prepare aqueous calibration solutions that will bracket the working concentration range. Store the primary dilution standard solutions with minimal headspace and check frequently for signs of deterioration or evaporation, especially just before preparing calibration solutions. Storage times described for stock standard solutions in Section 7.3.4 also apply to primary dilution standard solutions.

7.5 Fortification Solutions for Internal Standard and Surrogates

7.5.1 A solution containing the internal standard and the surrogate compounds is required to prepare laboratory reagent blanks (also used as a laboratory performance check solution), and to fortify each sample. Prepare a fortification solution containing fluorobenzene (internal standard), 1,2-dichlorobenzene-d_4 (surrogate), and BFB (surrogate) in methanol at concentrations of 5 µg/mL of each (any appropriate concentration is acceptable). A 5 µL aliquot of this solution added to a 25 mL water sample volume gives concentrations of 1 µg/L of each. A 5 µL aliquot of this solution added to a 5 mL water sample volume gives a concentration of 5 µg/L of each. Additional internal standards and surrogate analytes are optional. Additional surrogate compounds should be similar in physical and chemical characteristics to the analytes of concern.

7.6 Preparation of Laboratory Reagent Blank (LRB) -- Fill a 25 mL (or 5 mL) syringe with reagent water and adjust to the mark (no air bubbles). Inject an appropriate volume of the fortification solution containing the internal standard and surrogates through the Luer Lok valve into the reagent water. Transfer the LRB to the purging device. See Section 11.1.2.

7.7 Preparation of Laboratory Fortified Blank -- Prepare this exactly like a calibration standard (Section 7.8). This is a calibration standard that is treated as a sample.

7.8 Preparation of Calibration Standards (CAL)

7.8.1 The number of CALs needed depends on the calibration range desired. A minimum of three CAL solutions is required to calibrate a range of a factor of 20 in concentration. For a factor of 50, use at least four standards, and for a factor of 100 at least five standards. One calibration standard should contain each analyte of concern at a concentration of two to 10 times the method detection limit (Tables 4, 5, and 7) for that compound. The other CAL standards should contain each analyte of concern at concentrations that define the range of the method. Every CAL solution contains the internal standard and the surrogate compounds at the same concentration (5 µg/L suggested for a 5 mL sample; 1 µg/L for a 25 mL sample).

7.8.2 To prepare a calibration standard, add an appropriate volume of a primary dilution standard containing all analytes of concern to an aliquot of acidified (pH 2) reagent water in a volumetric flask. Also add an appropriate volume of internal standard and surrogate compound solution from Section 7.5.1. Use a microsyringe and rapidly inject the methanol solutions into the expanded area of the filled volumetric flask. Remove the needle as quickly as possible after injection. Mix by inverting the flask three times only. Discard the contents contained in the neck of the flask. Aqueous standards are not stable in a volumetric flask and should be discarded after one hour unless transferred to a sample bottle and sealed immediately. Alternately, aqueous calibration standards may be prepared in a gas tight, 5 mL or 25 mL syringe.

Note: If unacidified samples are being analyzed for THMs only, calibration standards should be prepared without acid.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

8.1 Sample Collection and Dechlorination

8.1.1 Collect all samples in duplicate. If samples, such as finished drinking water, are suspected to contain residual chlorine, add about 25 mg of ascorbic acid per 40 mL of sample to the sample bottle before filling. If analytes that are gases at room temperature (such as vinyl chloride), or analytes in Table 7 are not to be determined, sodium thiosulfate is recommended to reduce the residual chlorine. Three milligrams of sodium thiosulfate should be added for each 40 mL of water sample.

Note: If the residual chlorine is likely to be present >5 mg/L, a determination of the amount of the chlorine may be necessary. Diethyl-p-phenylenediamine (DPD) test kits are commercially available to determine residual chlorine in the field. Add an additional 25 mg of

ascorbic acid or 3 mg of sodium thiosulfate per each 5 mg/L of residual chlorine.

8.1.2 When sampling from a water tap, open the tap and allow the system to flush until the water temperature has stabilized (usually about 10 minutes). Adjust the flow to about 500 mL/min. and collect duplicate samples containing the desired dechlorinating agent from the flowing stream.

8.1.3 When sampling from an open body of water, partially fill a 1 q wide-mouth bottle or 1 L beaker with sample from a representative area. Fill duplicate sample bottles containing the desired dechlorinating agent with sample from the larger container.

8.1.4 Fill sample bottles to overflowing, but take care not to flush out the rapidly dissolving dechlorinating agent. No air bubbles should pass through the sample as the bottle is filled, or be trapped in the sample when the bottle is sealed.

8.2 Sample Preservation

8.2.1 Adjust the pH of all samples to <2 <u>at the time of collection</u>, but after dechlorination, by carefully adding two drops of 1:1 HCl for each 40 mL of sample. Seal the sample bottles, Teflon face down, and mix for one minute. Exceptions to the acidification requirement are detailed in Sections 8.2.2 and 8.2.3.

Note: Do not mix the ascorbic acid or sodium thiosulfate with the HCl in the sample bottle prior to sampling.

8.2.2 When sampling for THM analysis only, acidification may be omitted if sodium thiosulfate is used to dechlorinate the sample. This exception to acidification does not apply if ascorbic acid is used for dechlorination.

8.2.3 If a sample foams vigorously when HCl is added, discard that sample. Collect a set of duplicate samples but do not acidify them. These samples must be flagged as "not acidified" and must be stored at 4°C or below. These samples must be analyzed within 24 hours of collection time if they are to be analyzed for any compounds other than THMs.

8.2.4 The samples must be chilled to about 4°C when collected and maintained at that temperature until analysis. Field samples that will not be received at the laboratory on the day of collection must be packaged for shipment with sufficient ice to ensure that they will arrive at the laboratory with a substantial amount of ice remaining in the cooler.

8.2 Sample Storage

8.2.1 Store samples at ≤4°C until analysis. The sample storage area must be free of organic solvent vapors and direct or intense light.

8.2.2 Analyze all samples within 14 days of collection. Samples not analyzed within this period must be discarded and replaced.

8.3 Field Reagent Blanks (FRB)

8.3.1 Duplicate FRBs must be handled along with each sample set, which is composed of the samples collected from the same general sample site at approximately the same time. At the laboratory, fill field blank sample bottles with reagent water and sample preservatives, seal, and ship to the sampling site along with empty sample bottles and back to the laboratory with filled sample bottles. Wherever a set of samples is shipped and stored, it is accompanied by appropriate blanks. FRBs must remain hermetically sealed until analysis.

8.3.2 Use the same procedures used for samples to add ascorbic acid and HCl to blanks (Section 8.1.1). The same batch of ascorbic acid and HCl should be used for the field reagent blanks as for the field samples.

9.0 QUALITY CONTROL

9.1 Quality control (QC) requirements are the initial demonstration of laboratory capability followed by regular analyses of laboratory reagent blanks, field reagent blanks, and laboratory fortified blanks. A MDL for each analyte must also be determined. Each laboratory must maintain records to document the quality of the data generated. Additional quality control practices are recommended.

9.2 Initial demonstration of low system background. Before any samples are analyzed, it must be demonstrated that a laboratory reagent blank (LRB) is reasonably free of contamination that would prevent the determination of any analyte of concern. Sources of background contamination are glassware, purge gas, sorbents, reagent water, and equipment. Background contamination must be reduced to an acceptable level before proceeding with the next section. In general, background from method analytes should be below the method detection limit.

9.3 Initial demonstration of laboratory accuracy and precision. Analyze four to seven replicates of a laboratory fortified blank containing each analyte of concern at a concentration in the range of 2-5 µg/L depending upon the calibration range of the instrumentation.

9.3.1 Prepare each replicate by adding an appropriate aliquot of a quality control sample to reagent water. It is recommended that a QCS from a source different than the calibration standards be used for this set of LFBs, since it will serve as a check to verify the accuracy of the standards used to generate the calibration curve. This is particularly useful

if the laboratory is using the method for the first time, and has no historical data base for standards. Prepare each replicate by adding an appropriate aliquot of a quality control sample to reagent water. Also add the appropriate amounts of internal standard and surrogates. If it is expected that field samples will contain a dechlorinating agent and HCl, then add these to the LFBs in the same amounts proscribed in Section 8.1.1. If only THMs are to be determined and field samples do not contain HCl, then do not acidify LFBs. Analyze each replicate according to the procedures described in Section 11.0.

9.3.2 Calculate the measured concentration of each analyte in each replicate, the mean concentration of each analyte in all replicates, and mean accuracy (as mean percentage of true value) for each analyte, and the precision (as relative standard deviation, RSD) of the measurements for each analyte.

9.3.3 Some analytes, particularly early eluting gases and late eluting higher molecular weight compounds, will be measured with less accuracy and precision than other analytes. However, the accuracy and precision for all analytes must fall within the limits expressed below. If these criteria are not met for an analyte of interest, take remedial action and repeat the measurements for that analyte until satisfactory performance is achieved. For each analyte, the mean accuracy must be 80-120% (i.e., an accuracy of ±20%). The precision of the recovery (accuracy) for each analyte must be <20%. These criteria are different than the ±30% response factor criteria specified in Section 10.3.5. The criteria differ, because the measurements in Section 9.3.3 as part of the initial demonstration of capability are meant to be more stringent than the continuing calibration measurements in Section 10.3.5.

9.3.4 To determine the MDL, analyze a minimum of seven LFBs prepared at a low concentration. MDLs in Table 5 were calculated from samples fortified from 0.1-0.5 µg/L, which can be used as a guide, or use calibration data to estimate a concentration for each analyte that will yield a peak with a three to five signal to noise response. Analyze the seven replicates as described in Section 11.0, and on a schedule that results in the analyses being conducted over several days. Calculate the mean accuracy and standard deviation for each analyte. Calculate the MDL using the equation in Section 13.0.

9.3.5 Develop and maintain a system of control charts to plot the precision and accuracy of analyte and surrogate measurements as a function of time. Charting surrogate recoveries is an especially valuable activity because surrogates are present in every sample and the analytical results will form a significant record of data quality.

9.4 Monitor the integrated areas of the quantitation ions of the internal standards and surrogates (Table 1) in all samples, continuing calibration checks, and

blanks. These should remain reasonably constant over time. An abrupt change may indicate a matrix effect or an instrument problem. If a cryogenic interface is utilized, it may indicate an inefficient transfer from the trap to the column. These samples must be reanalyzed or a laboratory fortified duplicate sample analyzed to test for matrix effect. A more gradual drift of more than 50% in any area is indicative of a loss in sensitivity, and the problem must be found and corrected.

9.5 Laboratory Reagent Blanks (LRB) -- With each batch of samples processed as a group within a work shift, analyze a LRB to determine the background system contamination.

9.6 Assessing Laboratory Performance -- Use the procedures and criteria in Sections 10.3.4 and 10.3.5 to evaluate the accuracy of the measurement of the laboratory fortified blank (LFB), which must be analyzed with each batch of samples that is processed as a group within a work shift. If more than 20 samples are in a work shift batch, analyze one LFB per 20 samples. Prepare the LFB with the concentration of each analyte that was used in the Section 9.3.3 analysis. If the acceptable accuracy for this measurement (±30%) is not achieved, the problem must be solved before additional samples may be reliably analyzed. Acceptance criteria for the IS and surrogate given in Section 10.3.4 also applies to this LFB.

Since the calibration check sample in Section 10.3.5 and the LFB are made the same way and since procedural standards are used, the sample analyzed here may also be used as a calibration check in Section 10.3.5. Add the results of the LFB analysis to the control charts to document data quality.

9.7 If a water sample is contaminated with an analyte, verify that it is not a sampling error by analyzing a field reagent blank. The results of these analyses will help define contamination resulting from field sampling, storage and transportation activities. If the field reagent blank shows unacceptable contamination, the analyst should identify and eliminate the contamination.

9.8 At least quarterly, replicate LFB data should be evaluated to determine the precision of the laboratory measurements. Add these results to the ongoing control charts to document data quality.

9.9 At least quarterly, analyze a quality control sample (QCS) from an external source. If measured analyte concentrations are not of acceptable accuracy, check the entire analytical procedure to locate and correct the problem source.

9.10 Sample matrix effects have not been observed when this method is used with distilled water, reagent water, drinking water, or ground water. Therefore, analysis of a laboratory fortified sample matrix (LFM) is not required unless the criteria in Section 9.4 are not met. If matrix effects are observed or suspected to be causing low recoveries, analyze a laboratory fortified matrix

sample for that matrix. The sample results should be flagged and the LFM results should be reported with them.

9.11 Numerous other quality control measures are incorporated into other parts of this procedure, and serve to alert the analyst to potential problems.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Demonstration and documentation of acceptable initial calibration is required before any samples are analyzed. In addition, acceptable performance must be confirmed intermittently throughout analysis of samples by performing continuing calibration checks. These checks are required at the beginning of each work shift, but no less than every 12 hours. Additional periodic calibration checks are good laboratory practice. It is highly recommended that an additional calibration check be performed at the end of any cycle of continuous instrument operation, so that each set of field samples is bracketed by calibration check standards.

Note: Since this method uses procedural standards, the analysis of the laboratory fortified blank, which is required in Sect. 9.6, may be used here as a calibration check sample.

10.2 Initial Calibration

10.2.1 Calibrate the mass and abundance scales of the MS with calibration compounds and procedures prescribed by the manufacturer with any modifications necessary to meet the requirements in Section 10.2.2.

10.2.2 Introduce into the GC (either by purging a laboratory reagent blank or making a syringe injection) 25 ng or less of BFB and acquire mass spectra for m/z 35-260 at 70 eV (nominal). Use the purging procedure and/or GC conditions given in Section 11.0. If the spectrum does not meet all criteria in Table 3, the MS must be returned and adjusted to meet all criteria before proceeding with calibration. An average spectrum across the GC peak may be used to evaluate the performance of the system.

10.2.3 Purge a medium CAL solution, (e.g., 10-20 µg/L) using the procedure given in Section 11.0.

10.2.4 Performance criteria for calibration standards. Examine the stored GC/MS data with the data system software. Figures 3 and 4 shown acceptable total ion chromatograms.

10.2.4.1 GC performance -- Good column performance will produce symmetrical peaks with minimum tailing for most compounds. If peaks are unusually broad, or if there is poor resolution between peaks, the wrong

column has been selected or remedial action is probably necessary (Section 10.3.6).

10.2.4.2 MS sensitivity -- The GC/MS/DS peak identification software should be able to recognize a GC peak in the appropriate retention time window for each of the compounds in calibration solution, and make correct tentative identifications. If fewer than 99% of the compounds are recognized, system maintenance is required. See Section 10.3.6.

10.2.5 If all performance criteria are met, purge an aliquot of each of the other CAL solutions using the same GC/MS conditions.

10.2.6 Calculate a response factor (RF) for each analyte and isomer pair for each CAL solution using the internal standard fluorobenzene. Table 1 contains suggested quantitation ions for all compounds. This calculation is supported in acceptable GC/MS data system software (Section 6.3.5), and many other software programs. RF is a unitless number, but units used to express quantities of analyte and internal standard must be equivalent.

$$RF = \frac{(A_x)\ (Q_{is})}{(A_{is})\ (Q_x)}$$

where: A_x = integrated abundance of the quantitation ion of the analyte
A_{is} = integrated abundance of the quantitation ion of the internal standard
Q_x = quantity of analyte purged in nanograms or concentration units
Q_{is} = quantity of internal standard purged in ng or concentration units

10.2.6.1 For each analyte and surrogate, calculate the mean RF from analyses of CAL solutions. Calculate the standard deviation (SD) and the relative standard deviation (RSD) from each mean: RSD = 100 (SD/M). If the RSD of any analyte or surrogate mean RF exceeds 20%, either analyze additional aliquots of appropriate CAL solutions to obtain an acceptable RSD of RFs over the entire concentration range, or take action to improve GC/MS performance Section 10.3.6). Surrogate compounds are present at the same concentration on every sample, calibration standard, and all types of blanks.

10.2.7 As an alternative to calculating mean response factors and applying the RSD test, use the GC/MS data system software or other available

software to generate a linear or second order regression calibration curve, by plotting A_x/A_{is} vs. Q_x.

10.3 Continuing Calibration Check -- Verify the MS tune and initial calibration at the beginning of each 12-hour work shift during which analyses are performed using the following procedure. Additional periodic calibration checks are good laboratory practice. It is highly recommended that an additional calibration check be performed at the end of any cycle of continuous instrument operation, so that each set of field samples is bracketed by calibration check standards.

10.3.1 Introduce into the GC (either by purging a laboratory reagent blank or making a syringe injection) 25 ng or less of BFB and acquire a mass spectrum that includes data for m/z 35-260. If the spectrum does not meet all criteria (Table 3), the MS must be returned and adjusted to meet all criteria before proceeding with the continuing calibration check.

10.3.2 Purge a CAL solution and analyze with the same conditions used during the initial calibration. Selection of the concentration level of the calibration check standard should be varied so that the calibration is verified at more than one point over the course of several days.

10.3.3 Demonstrate acceptable performance for the criteria shown in Section 10.2.4.

10.3.4 Determine that the absolute areas of the quantitation ions of the internal standard and surrogates have not decreased by more than 30% from the areas measured in the most recent continuing calibration check, or by more than 50% from the areas measured during initial calibration. If these areas have decreased by more than these amounts, adjustments must be made to restore system sensitivity. These adjustments may require cleaning of the MS ion source, or other maintenance as indicated in Section 10.3.6, and recalibration. Control charts are useful aids in documenting system sensitivity changes.

10.3.5 Calculate the RF for each analyte of concern and surrogate compound from the data measured in the continuing calibration check. The RF for each analyte and surrogate must be within 30% of the mean value measured in the initial calibration. Alternatively, if a linear or second order regression is used, the concentration measured using the calibration curve must be within 30% of the true value of the concentration in the calibration solution. If these conditions do not exist, remedial action must be taken which may require recalibration. All data from field samples obtained after the last successful calibration check standard, should be considered suspect. After remedial action has been taken, duplicate samples should be analyzed if they are available.

10.3.6 Some possible remedial actions. Major maintenance such as cleaning an ion source, cleaning quadrupole rods, etc. require returning to the initial calibration step.

10.3.6.1 Check and adjust GC and/or MS operating conditions; check the MS resolution, and calibrate the mass scale.

10.3.6.2 Clean or replace the splitless injection liner; silanize a new injection liner. This applies only if the injection liner is an integral part of the system.

10.3.6.3 Flush the GC column with solvent according to manufacturer's instructions.

10.3.6.4 Break off a short portion (about 1 meter) of the column from the end near the injector; or replace GC column. This action will cause a slight change in retention times. Analyst may need to redefine retention windows.

10.3.6.5 Prepare fresh CAL solutions, and repeat the initial calibration step.

10.3.6.6 Clean the MS ion source and rods (if a quadrupole).

10.3.6.7 Replace any components that allow analytes to come into contact with hot metal surfaces.

10.3.6.8 Replace the MS electron multiplier, or any other faulty components.

10.3.6.9 Replace the trap, especially when only a few compounds fail the criteria in Section 10.3.5 while the majority are determined successfully. Also check for gas leaks in the purge and trap unit as well as the rest of the analytical system.

10.4 Optional calibration for vinyl chloride using a certified gaseous mixture of vinyl chloride in nitrogen can be accomplished by the following steps.

10.4.1 Fill the purging device with 25.0 mL (or 5 mL) of reagent water or aqueous calibration standard.

10.4.2 Start to purge the aqueous mixture. Inject a known volume (between 100 µL and 2000 µL) of the calibration gas (at room temperature) directly into the purging device with a gas tight syringe. Slowly inject the gaseous sample through a septum seal at the top of the purging device at 2000 µL/min. If the injection of the standard is made through the aqueous sample inlet port, flush the dead volume with several mL

of room air or carrier gas. Inject the gaseous standard before five minutes of the 11-minute purge time have elapsed.

10.4.3 Determine the aqueous equivalent concentration of vinyl chloride standard, in µg/L, injected with the equation:

$$S = 0.102\ (C)\ (V)$$

where S = Aqueous equivalent concentration of vinyl chloride standard in µg/L
C = Concentration of gaseous standard in mg/L (v/v)
V = Volume of standard injected in mL

11.0 PROCEDURE

11.1 Sample Introduction and Purging

11.1.1 This method is designed for a 25 mL or 5 mL sample volume, but a smaller (5 mL) sample volume is recommended if the GC/MS system has adequate sensitivity to achieve the required method detection limits. Adjust the helium purge gas flow rate to 40 mL/min. Attach the trap inlet to the purging device and open the syringe valve on the purging device.

11.1.2 Remove the plungers from two 25 mL (or 5 mL depending on sample size) syringes and attach a closed syringe valve to each. Warm the sample to room temperature, open the sample bottle, and carefully pour the sample into one of the syringe barrels to just short of overflowing. Replace the syringe plunger, invert the syringe, and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 25 mL (or 5 mL). To all samples, blanks, and calibration standards, add 5 µL (or an appropriate volume) of the fortification solution containing the internal standard and the surrogates to the sample through the syringe valve. Close the valve. Fill the second syringe in an identical manner from the same sample bottle. Reserve this second syringe for a reanalysis if necessary.

11.1.3 Attach the sample syringe valve to the syringe valve on the purging device. Be sure that the trap is cooler than 25°C, then open the sample syringe valve and inject the sample into the purging chamber. Close both valves and initiate purging. Purge the sample for 11 minutes at ambient temperature.

11.1.4 Standards and samples must be analyzed in exactly the same manner. Room temperature must be reasonably constant, and changes in excess of 10°F will adversely affect the accuracy and precision of the method.

11.2 Sample Desorption

11.2.1 Non-Cryogenic Interface -- After the 11-minute purge, place the purge and trap system in the desorb mode and preheat the trap to 180°C without a flow of desorption gas. Then simultaneously start the flow of desorption gas at a flow rate suitable for the column being used (optimum desorb flow rate is 15 mL/min.) for about four minutes, begin the GC temperature program, and start data acquisition.

11.2.2 Cryogenic Interface -- After the 11-minute purge, place the purge and trap system in the desorb mode, make sure the cryogenic interface is a -150°C or lower, and rapidly heat the trap to 180°C while backflushing with an inert gas at 4 mL/min. for about five minutes. At the end of the five minutes desorption cycle, rapidly heat the cryogenic trap to 250°C, and simultaneously begin the temperature program of the gas chromatograph, and start data acquisition.

11.2.3 While the trapped components are being introduced into the gas chromatograph (or cryogenic interface), empty the purging device using the sample syringe and wash the chamber with two 25 mL flushes of reagent water. After the purging device has been emptied, leave syringe valve open to allow the purge gas to vent through the sample introduction needle.

11.3 Gas Chromatography/mass Spectrometry -- Acquire and store data over the nominal mass range 35-260 with a total cycle time (including scan overhead time) of two seconds or less. If water, methanol, or carbon dioxide cause a background problem, start at 47 or 48 m/z. If ketones are to be determined, data must be acquired starting at m/z 43. Cycle time must be adjusted to measure five or more spectra during the elution of each GC peak. Suggested temperature programs are provided below. Alternative temperature programs can be used.

11.3.1 Single ramp linear temperature program for wide-bore Columns 1 and 2 with a jet separator. Adjust the helium carrier gas flow rate to within the capacity of the separator, or about 15 mL/min. The column temperature is reduced 10°C and held for five minutes from the beginning of desorption, then programmed to 160°C at 6°C/min., and held until all components have eluted.

11.3.2 Multi-ramp temperature program for wide-bore Column 2 with the open split interface. Adjust the helium carrier gas flow rate to about 4.6 mL/min. The column temperature is reduced to 10°C and held for six minutes from the beginning of desorption, then heated to 70°C at 10°/min., heated to 120°C at 5°/min., heated to 180° at 8°/min., and held at 180° until all compounds have eluted.

11.3.3 Single ramp linear temperature program for narrow-bore Column 3 with a cryogenic interface. Adjust the helium carrier gas flow rate to about 4 mL/min. The column temperature is reduced to 10°C and held for five minutes from the beginning of vaporization from the cryogenic trap, programmed at 6°/min. for 10 minutes, then 15°/min. for five minutes to 145°C, and held until all components have eluted.

11.3.4 Multi-ramp temperature program for wide-bore Column 4 with the open split interface. Adjust the helium carrier gas flow rate to about 7.0 mL/min. The column temperature is -10°C and held for six minutes. from beginning of desorption, then heated to 100°C at 10°C/min., heated to 200°C at 5°C/min. and held at 200°C for eight minutes or until all compounds of interest had eluted.

11.4 Trap Reconditioning -- After desorbing the sample for four minutes, recondition the trap by returning the purge and trap system to the purge mode. Wait 15 seconds, then close the syringe valve on the purging device to begin gas flow through the trap. Maintain the trap temperature at 180°C. Maintain the moisture control module, if utilized, at 90°C to remove residual water. After approximately seven minutes, turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When the trap is cool, the next sample can be analyzed.

11.5 Termination of Data Acquisition -- When all the sample components have eluted from the GC, terminate MS data acquisition. Use appropriate data output software to display full range mass spectra and appropriate plots of ion abundance as a function of time. If any ion abundance exceeds the system working range, dilute the sample aliquot in the second syringe with reagent water and analyze the diluted aliquot.

11.6 Identification of Analytes -- Identify a sample component by comparison of its mass spectrum (after background subtraction) to a reference spectrum in the user-created data base. The GC retention time of the sample component should be within three standard deviations of the mean retention time of the compound in the calibration mixture.

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

11.6.2 Identification requires expert judgment when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When GC peaks obviously

represent more than one sample component (i.e., broadened peak with shoulder(s) or valley between two or more maxima), appropriate analyte spectra and background spectra can be selected by examining plots of characteristic ions for tentatively identified components. When analytes coelute (i.e., only one GC peak is apparent), the identification criteria can be met but each analyte spectrum will contain extraneous ions contributed by the coeluting compound. Because purgeable organic compounds are relatively small molecules and produce comparatively simple mass spectra, this is not a significant problem for most method analytes.

11.6.3 Structural isomers that produce very similar mass spectra can be explicitly identified only if they have sufficiently different GC retention times. Acceptable resolution is achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks. Otherwise, structural isomers are identified as isomeric pairs. Two of the three isomeric xylenes and two of the three dichlorobenzenes are examples of structural isomers that may not be resolved on the capillary columns. If unresolved, these groups of isomers must be reported as isomeric pairs.

11.6.4 Methylene chloride, acetone, carbon disulfide, and other background components appear in variable quantities in laboratory and field reagent blanks, and generally cannot be accurately measured. Subtraction of the concentration in the blank from the concentration in the sample is not acceptable because the concentration of the background in the blank is highly variable.

12.0 DATA ANALYSIS AND CALCULATIONS

12.1 Complete chromatographic resolution is not necessary for accurate and precise measurements of analyte concentrations if unique ions with adequate intensities are available for quantitation. If the response for any analyte exceeds the linear range of the calibration established in Section 10.0, obtain and dilute a duplicate a duplicate sample. Do not extrapolate beyond the calibration range.

12.1.1 Calculate analyte and surrogate concentrations, using the multi-point calibration established in Section 10.0. Do not use the daily calibration verification data to quantitate analytes in samples.

$$C_x = \frac{(A_x)\ (Q_{is})\ 1000}{(A_{is})\ RF\ V}$$

where: C_x = concentration of analyte or surrogate in µg/L in the water sample
A_x = integrated abundance of the quantitation ion of the analyte in the sample
A_{is} = integrated abundance of the quantitation ion of the internal standard in the sample
Q_{is} = total quantity (in micrograms) of internal standard added to the water sample
V = original water sample volume in mL
RF = mean response factor of analyte from the initial calibration

12.1.2 Alternatively, use the GC/MS system software or other available proven software to compute the concentrations of the analytes and surrogates from the linear or second order regression curve established in Section 10.0. Do not use the daily calibration verification data to quantitate analytes in samples.

12.1.3 Calculations should utilize all available digits of precision, but final reported concentrations should be rounded to an appropriate number of significant figures (one digit of uncertainty). Experience indicates that three significant figures may be used for concentrations above 99 µg/L, two significant figures for concentrations between 1-99 µg/L, and one significant figure for lower concentrations.

12.1.4 Calculate the total trihalomethane concentration by summing the four individual trihalomethane concentrations.

13.0 METHOD PERFORMANCE

13.1 Single laboratory accuracy and precision data were obtained for the method analytes using laboratory fortified blanks with analytes at concentrations between 0.1 and 5 µg/L. Results were obtained using the four columns specified (Section 6.3.2.1) and the open split or jet separator (Section 6.3.3.1), or the cryogenic interface (Sect. 6.3.3.2). These data are shown in Tables 4-8.

13.2 With these data, method detection limits were calculated using the formula[3]:

$$MDL = S\ t_{(n-1,\ 1-alpha\ =\ 0.99)}$$

where:

$t_{(n-1,1-alpha\ =\ 0.99)}$ = Student's t value for the 99% confidence level with n-1 degrees of freedom
n = number of replicates

S = the standard deviation of the replicate analyses

14.0 POLLUTION PREVENTION

14.1 No solvents are utilized in this method except the extremely small volumes of methanol needed to make calibration standards. The only other chemicals used in this method are the neat materials in preparing standards and sample preservatives. All are used in extremely small amounts and pose no threat to the environment.

15.0 WASTE MANAGEMENT

15.1 There are no waste management issues involved with this method. Due to the nature of this method, the discarded samples are chemically less contaminated than when they were collected.

16.0 REFERENCES

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5. "OSHA Safety and Health Standards, General Industry", (29CFR1910), Occupational Safety and Health Administration, OSHA 2206, (Revised, January 1976).

6. "Safety in Academic Chemistry Laboratories", American Chemical Society Publication, Committee on Chemical Safety, 3rd Edition, 1979.

7. R.F. Arrendale, R.F. Severson, and O.T. Chortyk. "Open Split Interface for Capillary Gas Chromatography/Mass Spectrometry", Anal. Chem. 1984, 56, 1533.

8. J.J. Flesch, P.S. Fair. "The Analysis of Cyanogen Chloride in Drinking Water", Proceedings of Water Quality Technology Conference, American Water Works Association, St. Louis, MO., November 14-16, 1988.

17.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

TABLE 1. MOLECULAR WEIGHTS AND QUANTITATION IONS FOR METHOD ANALYTES

Compound	MW[a]	Primary Quantitation Ion	Secondary Quantitation Ions
Internal Standard			
Fluorobenzene	96	96	77
Surrogates			
4-Bromofluorobenzene	174	95	174, 176
1,2-Dichlorobenzene-d4	150	152	115, 150
Target Analytes			
Acetone	58	43	58
Acrylonitrile	53	52	53
Allyl Chloride	76	76	49
Benzene	78	78	77
Bromobenzene	156	156	77, 158
Bromochloromethane	128	128	49, 130
Bromodichloromethane	162	83	85, 127
Bromoform	250	173	175, 252
Bromomethane	94	94	96
2-Butanone	72	43	57, 72
n-Butylbenzene	134	91	134
sec-Butylbenzene	134	105	134
tert-Butylbenzene	134	119	91
Caron Disulfide	76	76	--
Carbon Tetrachloride	152	117	119
Chloroacetonitrile	75	48	75
Chlorobenzene	112	112	77, 114
1-Chlorobutane	92	56	49
Chloroethane	64	64	66
Chloroform	118	83	85
Chloromethane	50	50	52
2-Chlorotoluene	126	91	126
4-Chlorotoluene	126	91	126
Dibromochloromethane	206	129	127
1,2-Dibromo-3-Chloropropane	234	75	155, 157
1,2-Dibromoethane	186	107	109, 188
Dibromomethane	172	93	95, 174
1,2-Dichlorobenzene	146	146	111, 148

TABLE 1. MOLECULAR WEIGHTS AND QUANTITATION IONS FOR METHOD ANALYTES

Compound	MW[a]	Primary Quantitation Ion	Secondary Quantitation Ions
1,3-Dichlorobenzene	146	146	111, 148
1,4-Dichlorobenzene	146	146	111, 148
trans-1,4-Dichloro-2-Butene	124	53	88, 75
Dichlorodifluoromethane	120	85	87
1,1-Dichloroethane	98	63	65, 83
1,2-Dichloroethane	98	62	98
1,1-Dichloroethene	96	96	61, 63
cis-1,2-Dichloroethene	96	96	61, 98
trans-1,2-Dichloroethene	96	96	61, 98
1,2-Dichloropropane	112	63	112
1,3-Dichloropropane	112	76	78
2,2-Dichloropropane	112	77	97
1,1-Dichloropropene	110	75	110, 77
1,1-Dichloropropanone*	126	43	83
cis-1,3-Dichloropropene	110	75	110
trans-1,3-Dichloropropene	110	75	110
Diethyl Ether	74	59	45, 73
Ethylbenzene	106	91	106
Ethyl Methacrylate	114	69	99
Hexachlorobutadiene	258	225	260
Hexachloroethane	234	117	119, 201
2-Hexanone	100	43	58
Isopropylbenzene	120	105	120
4-Isopropyltoluene	134	119	134, 91
Methacrylonitrile	67	67	52
Methyl Acrylate	86	55	85
Methylene Chloride	84	84	86, 49
Methyl Iodide	142	142	127
Methylmethacrylate	100	69	99
4-Methyl-2-Pentanone	100	43	58, 85
Methyl-t-butyl Ether	88	73	57
Naphthalene	128	128	--
Nitrobenzene	123	51	77
2-Nitropropane	89	46	--
Pentachloroethane	200	117	119, 167
Propionitrile	55	54	--
n-Propylbenzene	120	91	120
Styrene	104	104	78
1,1,1,2-Tetrachloroethane	166	131	133, 119
1,1,2,2-Tetrachloroethane	166	83	131, 85
Tetrachloroethene	164	166	168, 129

TABLE 1. MOLECULAR WEIGHTS AND QUANTITATION IONS FOR METHOD ANALYTES

Compound	MW[a]	Primary Quantitation Ion	Secondary Quantitation Ions
Tetrahydrofuran	72	71	72, 42
Toluene	92	92	91
1,2,3-Trichlorobenzene	180	180	182
1,2,4-Trichlorobenzene	180	180	182
1,1,1-Trichloroethane	132	97	99, 61
1,1,2-Trichloroethane	132	83	97, 85
Trichloroethene	130	95	130, 132
Trichlorofluoromethane	136	101	103
1,2,3-Trichloropropane	146	75	77
1,2,4-Trimethylbenzene	120	105	120
1,3,5-Trimethylbenzene	120	105	120
Vinyl Chloride	62	62	64
o-Xylene	106	106	91
m-Xylene	106	106	91
p-Xylene	106	106	91

[a]Monoisotopic molecular weight calculated from the atomic masses of the isotopes with the smallest masses.

TABLE 2. CHROMATOGRAPHIC RETENTION TIMES FOR METHOD ANALYTES ON THREE COLUMNS WITH FOUR SET OF CONDITIONS[a]

Compound	Col. 1[b]	Retention Col. 2[b]	Time Col. 2[c]	(min:sec) Col. 3[d]	Col. 4[e]
Internal Standard					
Fluorobenzene	8:49	6:27	14:06	8:03	22:00
Surrogates					
4-Bromofluorobenzene	18:38	15:43	23:38		31:21
1,2-Dichlorobenzene-d4	22:16	19:08	27:25		35:51
Target Analytes					
Acetone					16:14
Acrylonitrile					17:49
Allyl Chloride					16:58
Benzene	8:14	5:40	13:30	7:25	21:32
Bromobenzene	18:57	15:52	24:00	16:25	31:52
Bromochloromethane	6:44	4:23	12:22	5:38	20:20
Bromodichloromethane	10:35	8:29	15:48	9:20	23:36
Bromoform	17:56	14:53	22:46	15:42	30:32
Bromomethane	2:01	0:58	4:48	1:17	12:26
2-Butanone					19:41
n-Butylbenzene	22:13	19:29	27:32	17:57	35:41
sec-Butylbenzene	20:47	18:05	26:08	17:28	34:04
tert-Butylbenzene	20:17	17:34	25:36	17:19	33:26
Caron Disulfide					16:30
Carbon Tetrachloride	7:37	5:16	13:10	7:25	21:11
Chloroacetonitrile					23:51
Chlorobenzene	15:46	13:01	20:40	14:20	28:26
1-Chlorobutane					21:00
Chloroethane	2:05	1:01		1:27	
Chloroform	6:24	4:48	12:36	5:33	20:27
Chloromethane	1:38	0:44	3:24	0:58	9:11
2-Chlorotoluene	19:20	16:25	24:32	16:44	32:21
4-Chlorotoluene	19:30	16:43	24:46	16:49	32:38
Cyanogen Chloride[8]				1:03	
Dibromochloromethane	14:23	11:51	19:12	12:48	26:57
1,2-Dibromo-3-Chloropropane	24:32	21:05		18:02	38:20
1,2-Dibromoethane	14:44	11:50	19:24	13:36	27:19
Dibromomethane	10:39	7:56	15:26	9:05	23:22
1,2-Dichlorobenzene	22:31	19:10	27:26	17:47	35:55

TABLE 2. CHROMATOGRAPHIC RETENTION TIMES FOR METHOD ANALYTES ON THREE COLUMNS WITH FOUR SET OF CONDITIONS[a]

Compound	Retention Time (min:sec) Col. 1[b]	Col. 2[b]	Col. 2[c]	Col. 3[d]	Col. 4[e]
1,3-Dichlorobenzene	21:13	18:08	26:22	17:28	34:31
1,4-Dichlorobenzene	21:33	18:23	26:36	17:38	34:45
trans-1,4-Dichloro-2-Butene					31:44
Dichlorodifluoromethane	1:33	0:42	3:08	0:53	7:16
1,1-Dichloroethane	4:51	2:56	10:48	4:02	18:46
1,2-Dichloroethane	8:24	5:50	13:38	7:00	21:31
1,1-Dichloroethene	2:53	1:34	7:50	2:20	16:01
cis-1,2-Dichloroethene	6:11	3:54	11:56	5:04	19:53
trans-1,2-Dichloroethene	3:59	2:22	9:54	3:32	17:54
1,2-Dichloropropane	10:05	7:40	15:12	8:56	23:08
1,3-Dichloropropane	14:02	11:19	18:42	12:29	26:23
2,2-Dichloropropane	6:01	3:48	11:52	5:19	19:54
1,1-Dichloropropanone					24:52
1,1-Dichloropropene	7:49	5:17	13:06	7:10	21:08
cis-1,3-Dichloropropene	11:58		16:42		24:24
trans-1,3-Dichloropropene	13:46		17:54		25:33
Diethyl Ether					15:31
Ethylbenzene	15:59	13:23	21:00	14:44	28:37
Ethyl Methacrylate					25:35
Hexachlorobutadiene	26:59	23:41	32:04	19:14	42:03
Hexachloroethane					36:45
Hexanone					26:23
Isopropylbenzene	18:04	15:28	23:18	16:25	30:52
4-Isopropyltoluene	21:12	18:31	26:30	17:38	34:27
Methacrylonitrile					20:15
Methyl Acrylate					20:02
Methylene Chloride	3:36	2:04	9:16	2:40	17:18
Methyl Iodide					16:21
Methylmethacrylate					23:08
4-Methyl-2-Pentanone					24:38
Methyl-t-butyl Ether					17:56
Naphthalene	27:10	23:31	32:12	19:04	42:29
Nitrobenzene					39:02
2-Nitropropane					23:58
Pentachloroethane					33:33
Propionitrile					19:58
n-Propylbenzene	19:04	16:25	24:20	16:49	32:00
Styrene	17:19	14:36	22:24	15:47	29:57
1,1,1,2-Tetrachloroethane	15:56	13:20	20:52	14:44	28:35
1,1,2,2-Tetrachloroethane	18:43	16:21	24:04	15:47	31:35
Tetrachloroethene	13:44	11:09	18:36	13:12	26:27

TABLE 2. CHROMATOGRAPHIC RETENTION TIMES FOR METHOD ANALYTES ON THREE COLUMNS WITH FOUR SET OF CONDITIONS[a]

Compound	Col. 1[b]	Retention Col. 2[b]	Time Col. 2[c]	(min:sec) Col. 3[d]	Col. 4[e]
Tetrahydrofuran					20:26
Toluene	12:26	10:00	17:24	11:31	25:13
1,2,3-Trichlorobenzene	27:47	24:11	32:58	19:14	43:31
1,2,4-Trichlorobenzene	26:33	23:05	31:30	18:50	41:26
1,1,1-Trichloroethane	7:16	4:50	12:50	6:46	20:51
1,1,2-Trichloroethane	13:25	11:03	18:18	11:59	25:59
Trichloroethene	9:35	7:16	14:48	9:01	22:42
Trichlorofluoromethane	2:16	1:11	6:12	1:46	14:18
1,2,3-Trichloropropane	19:01	16:14	24:08	16:16	31:47
1,2,4-Trimethylbenzene	20:20	17:42	31:30	17:19	33:33
1,3,5-Trimethylbenzene	19:28	16:54	24:50	16:59	32:26
Vinyl Chloride	1:43	0:47	3:56	1:02	10:22
o-Xylene	17:07	14:31	22:16	15:47	29:56
m-Xylene	16:10	13:41	21:22	15:18	28:53
p-Xylene	16:07	13:41	21:18	15:18	28:53

[a]Columns 1-4 are those given in Sectioin 6.3.2.1; retention times were measured from the beginning of thermal desorption from the trap (Columns 1-2, and 4) or from the beginning of thermal release from the cryogenic interface (Column 3).
[b]GC conditions given in Section 11.3.1.
[c]GC conditions given in Section 11.3.2.
[d]GC conditions given in Section 11.3.3.
[e]GC conditions given in Section 11.3.4.

TABLE 3. ION ABUNDANCE CRITERIA FOR 4-BROMOFLUOROBENZENE (BFB)

Mass (M/z)	Relative Abundance Criteria
50	15-40% of Mass 95
75	30-80% of Mass 95
95	Base Peak, 100% Relative Abundance
96	5-9% of Mass 95
173	<2% of Mass 174
174	>50% of Mass 95
175	5-9% of Mass 174
176	>95% but <101% of Mass 174
177	5-9% of Mass 176

TABLE 4. ACCURACY AND PRECISION DATA FROM 16-31 DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 1[a]

Compound	True Conc. Range (µg/L)	Mean Accuracy (% of True Value)	Rel. Std. Dev. (%)	Method Det. Limit[b] (µg/L)
Benzene	0.1-10	97	5.7	0.04
Bromobenzene	0.1-10	100	5.5	0.03
Bromochloromethane	0.5-10	90	6.4	0.04
Bromodichloromethane	0.1-10	95	6.1	0.08
Bromoform	0.5-10	101	6.3	0.12
Bromomethane	0.5-10	95	8.2	0.11
n-Butylbenzene	0.5-10	100	7.6	0.11
sec-Butylbenzene	0.5-10	100	7.6	0.13
tert-Butylbenzene	0.5-10	102	7.3	0.14
Carbon Tetrachloride	0.5-10	84	8.8	0.21
Chlorobenzene	0.1-10	98	5.9	0.04
Chloroethane	0.5-10	89	9.0	0.10
Chloroform	0.5-10	90	6.1	0.03
Chloromethane	0.5-10	93	8.9	0.13
2-Chlorotoluene	0.1-10	90	6.2	0.04
4-Chlorotoluene	0.1-10	99	8.3	0.06
Dibromochloromethane	0.1-10	92	7.0	0.05
1,2-Dibromo-3-Chloropropane	0.5-10	83	19.9	0.26
1,2-Dibromoethane	0.5-10	102	3.9	0.06
Dibromomethane	0.5-10	100	5.6	0.24
1,2-Dichlorobenzene	0.1-10	93	6.2	0.03
1,3-Dichlorobenzene	0.5-10	99	6.9	0.12
1,4-Dichlorobenzene	0.2-20	103	6.4	0.03
Dichlorodifluoromethane	0.5-10	90	7.7	0.10
1,1-Dichloroethane	0.5-10	96	5.3	0.04
1,2-Dichloroethane	0.1-10	95	5.4	0.06
1,1-Dichloroethene	0.1-10	94	6.7	0.12
cis-1,2-Dichloroethene	0.5-10	101	6.7	0.12
trans-1,2-Dichloroethene	0.1-10	93	5.6	0.06
1,2-Dichloropropane	0.1-10	97	6.1	0.04
1,3-Dichloropropane	0.1-10	96	6.0	0.04
2,2-Dichloropropane	0.5-10	86	16.9	0.35
1,1-Dichloropropene	0.5-10	98	8.9	0.10
cis-1,2-Dichloropropene				
trans-1,2-Dichloropropene				
Ethylbenzene	0.1-10	99	8.6	0.06
Hexachlorobutadiene	0.5-10	100	6.8	0.11
Isopropylbenzene	0.5-10	101	7.6	0.15
4-Isopropyltoluene	0.1-10	99	6.7	0.12

TABLE 4. ACCURACY AND PRECISION DATA FROM 16-31 DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 1[a]

Compound	True Conc. Range (µg/L)	Mean Accuracy (% of True Value)	Rel. Std. Dev. (%)	Method Det. Limit[b] (µg/L)
Methylene Chloride	0.1-10	95	5.3	0.03
Naphthalene	0.1-100	104	8.2	0.04
n-Propylbenzene	0.1-10	100	5.8	0.04
Styrene	0.1-100	102	7.2	0.04
1,1,1,2-Tetrachloroethane	0.5-10	90	6.8	0.05
1,1,2,2-Tetrachloroethane	0.1-10	91	6.3	0.04
Tetrachloroethene	0.5-10	89	6.8	0.14
Toluene	0.5-10	102	8.0	0.11
1,2,3-Trichlorobenzene	0.5-10	109	8.6	0.03
1,2,4-Trichlorobenzene	0.5-10	108	8.3	0.04
1,1,1-Trichloroethane	0.5-10	98	8.1	0.08
1,1,2-Trichloroethane	0.5-10	104	7.3	0.10
Trichloroethene	0.5-10	90	7.3	0.19
Trichlorofluoromethane	0.5-10	89	8.1	0.08
1,2,3-Trichloropropane	0.5-10	108	14.4	0.32
1,2,4-Trimethylbenzene	0.5-10	99	8.1	0.13
1,3,5-Trimethylbenzene	0.5-10	92	7.4	0.05
Vinyl Chloride	0.5-10	98	6.7	0.17
o-Xylene	0.1-31	103	7.2	0.11
m-Xylene	0.1-10	97	6.5	0.05
p-Xylene	0.5-10	104	7.7	0.13

[a]Data obtained by using Column 1 with a jet separator interface and a quadrupole mass spectrometer (Section 11.3.1) with analytes divided among three solutions.
[b]Replicate samples at the lowest concentration listed in Column 2 of this table were analyzed. These results were used to calculate MDLs.

TABLE 5. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING THE CRYOGENIC TRAPPING OPTION AND A NARROW-BORE CAPILLARY COLUMN 3[a]

Compound	True Conc. (µg/L)	Mean Accuracy (% of True Value)	Rel. Std. Dev. (%)	Method Det. Limit (µg/L)
Benzene	0.1	99	6.2	0.03
Bromobenzene	0.5	97	7.4	0.11
Bromochloromethane	0.5	97	5.8	0.07
Bromodichloromethane	0.1	100	4.6	0.03
Bromoform	0.1	99	5.4	0.20
Bromomethane	0.1	99	7.1	0.06
n-Butylbenzene	0.5	94	6.0	0.03
sec-Butylbenzene	0.5	90	7.1	0.12
tert-Butylbenzene	0.5	90	2.5	0.33
Carbon Tetrachloride	0.1	92	6.8	0.08
Chlorobenzene	0.1	91	5.8	0.03
Chloroethane	0.1	100	5.8	0.02
Chloroform	0.1	95	3.2	0.02
Chloromethane	0.1	99	4.7	0.05
2-Chlorotoluene	0.1	99	4.6	0.05
4-Chlorotoluene	0.1	96	7.0	0.05
Cyanogen Chloride[b]		92	10.6	0.30
Dibromochloromethane	0.1	99	5.6	0.07
1,2-Dibromo-3-Chloropropane	0.1	92	10.0	0.05
1,2-Dibromoethane	0.1	97	5.6	0.02
Dibromomethane	0.1	93	6.9	0.03
1,2-Dichlorobenzene	0.1	97	3.5	0.05
1,3-Dichlorobenzene	0.1	99	6.0	0.05
1,4-Dichlorobenzene	0.1	93	5.7	0.04
Dichlorodifluoromethane	0.1	99	8.8	0.11
1,1-Dichloroethane	0.1	98	6.2	0.03
1,2-Dichloroethane	0.1	100	6.3	0.02
1,1-Dichloroethene	0.1	95	9.0	0.05
cis-1,2-Dichloroethene	0.1	100	3.7	0.06
trans-1,2-Dichloroethene	0.1	98	7.2	0.03
1,2-Dichloropropane	0.1	96	6.0	0.02
1,3-Dichloropropane	0.1	99	5.8	0.04
2,2-Dichloropropane	0.1	99	4.9	0.05
1,1-Dichloropropene	0.1	98	7.4	0.02
cis-1,2-Dichloropropene				
trans-1,2-Dichloropropene				
Ethylbenzene	0.1	99	5.2	0.03
Hexachlorobutadiene	0.1	100	6.7	0.04

TABLE 5. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING THE CRYOGENIC TRAPPING OPTION AND A NARROW-BORE CAPILLARY COLUMN 3[a]

Compound	True Conc. (µg/L)	Mean Accuracy (% of True Value)	Rel. Std. Dev. (%)	Method Det. Limit (µg/L)
Isopropylbenzene	0.5	98	6.4	0.10
4-Isopropyltoluene	0.5	87	13.0	0.26
Methylene Chloride	0.5	97	13.0	0.09
Naphthalene	0.1	98	7.2	0.04
n-Propylbenzene	0.1	99	6.6	0.06
Styrene	0.1	96	19.0	0.06
1,1,1,2-Tetrachloroethane	0.1	100	4.7	0.04
1,1,2,2-Tetrachloroethane	0.1	100	12.0	0.20
Tetrachloroethene	0.1	96	5.0	0.05
Toluene	0.1	100	5.9	0.08
1,2,3-Trichlorobenzene	0.1	98	8.9	0.04
1,2,4-Trichlorobenzene	0.1	91	16.0	0.20
1,1,1-Trichloroethane	0.1	100	4.0	0.04
1,1,2-Trichloroethane	0.1	98	4.9	0.03
Trichloroethene	0.1	96	2.0	0.02
Trichlorofluoromethane	0.1	97	4.6	0.07
1,2,3-Trichloropropane	0.1	96	6.5	0.03
1,2,4-Trimethylbenzene	0.1	96	6.5	0.04
1,3,5-Trimethylbenzene	0.1	99	4.2	0.02
Vinyl Chloride	0.1	96	0.2	0.04
o-Xylene	0.1	94	7.5	0.06
m-Xylene	0.1	94	4.6	0.03
p-Xylene	0.1	97	6.1	0.06

[a]Data obtained by using Column 3 with a cryogenic interface and a quadrupole mass spectrometer (Section 11.3.3).
[b]Reference 8.

TABLE 6. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 2[a]

Compound	No.[b]	Mean Accuracy (% of True Value, 2 µg/L Conc.)	RSD (%)	Mean Accuracy (% of True Value, 0.2 µg/L Conc.)	RSD (%)
Internal Standard					
Fluorobenzene	1	–	–	–	–
Surrogates					
4-Bromofluorobenze	2	98	1.8	96	1.3
1,2-Dichlorobenzene-d_4	3	97	3.2	95	1.7
Target Analytes					
Benzene	37	97	4.4	113	1.8
Bromobenzene	38	102	3.0	101	1.9
Bromochloromethane	4	99	5.2	102	2.9
Bromodichloromethane	5	96	1.8	100	1.8
Bromoform	6	89	2.4	90	2.2
Bromomethane	7	55	27.	52	6.7
n-Butylbenzene	39	89	4.8	87	2.3
sec-Butylbenzene	40	102	3.5	100	2.8
tert-Butylbenzene	41	101	4.5	100	2.9
Carbon Tetrachloride	8	84	3.2	92	2.6
Chlorobenzene	42	104	3.1	103	1.6
Chloroethane[c]					
Chloroform	9	97	2.0	95	2.1
Chloromethane	10	110	5.0	[d]	
2-Chlorotoluene	43	91	2.4	108	3.1
4-Chlorotoluene	44	89	2.0	108	4.4
Dibromochloromethane	11	95	2.7	100	3.0
1,2-Dibromo-3-Chloropropane[c]					
1,2-Dibromoethane[c]					
Dibromomethane	13	99	2.1	95	2.2
1,2-Dichlorobenzene	45	93	2.7	94	5.1
1,3-Dichlorobenzene	46	100	4.0	87	2.3
1,4-Dichlorobenzene	47	98	4.1	94	2.8
Dichlorodifluoromethane	14	38	25.	[d]	
1,1-Dichloroethane	15	97	2.3	85	3.6
1,2-Dichloroethane	16	102	3.8	100	2.1

TABLE 6. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 2[a]

Compound	No.[b]	Mean Accuracy (% of True Value, 2 µg/L Conc.)	RSD (%)	Mean Accuracy (% of True Value, 0.2 µg/L Conc.)	RSD (%)
1,1-Dichloroethene	17	90	2.2	87	3.8
cis-1,2-Dichloroethene	18	100	3.4	89	2.9
trans-1,2-Dichloroethene	19	92	2.1	85	2.3
1,2-Dichloropropane	20	102	2.2	103	2.9
1,3-Dichloropropane	21	92	3.7	93	3.2
2,2-Dichloropropane[c]					
1,1-Dichloropropene[c]					
cis-1,2-Dichloropropene[c]					
trans-1,2-Dichloropropene	25	96	1.7	99	2.1
Ethylbenzene	48	96	9.1	100	4.0
Hexachlorobutadiene	26	91	5.3	88	2.4
Isopropylbenzene	49	103	3.2	101	2.1
4-Isopropyltoluene	50	95	3.6	95	3.1
Methylene Chloride	27	[c]		[c]	
Naphthalene	51	93	7.6	78	8.3
n-Propylbenzene	52	102	4.9	97	2.1
Styrene	53	95	4.4	104	3.1
1,1,1,2-Tetrachloroethane	28	99	2.7	95	3.8
1,1,2,2-Tetrachloroethane	29	101	4.6	84	3.6
Tetrachloroethene	30	97	4.5	92	3.3
Toluene	54	105	2.8	126	1.7
1,2,3-Trichlorobenzene	55	90	5.7	78	2.9
1,2,4-Trichlorobenzene	56	92	5.2	83	5.9
1,1,1-Trichloroethane	31	94	3.9	94	2.5
1,1,2-Trichloroethane	32	107	3.4	109	2.8
Trichloroethene	33	99	2.9	106	2.5
Trichlorofluoromethane	34	81	4.6	48	13.
1,2,3-Trichloropropane	35	97	3.9	91	2.8
1,2,4-Trimethylbenzene	57	93	3.1	106	2.2
1,3,5-Trimethylbenzene	58	88	2.4	97	3.2
Vinyl Chloride	36	104	3.5	115	14.

TABLE 6. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF THE METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 2[a]

Compound	No.[b]	Mean Accuracy (% of True Value, 2 µg/L Conc.)	RSD (%)	Mean Accuracy (% of True Value, 0.2 µg/L Conc.)	RSD (%)
o-Xylene	59	97	1.8	98	1.7
m-Xylene	60	[f]		[f]	
p-Xylene	61	98	2.3	103	1.4

[a]Data obtained using Column 2 with the open split interface and an ion trap mass spectrometer (Section 11.3.2) with all method analytes in the same reagent water solution.
[b]Designation in Figures 1 and 2.
[c]Not measured; authentic standards were not available.
[d]Not found at 0.2 µg/L.
[e]Not measured; methylene chloride was in the laboratory reagent blank.
[f]m-xylene coelutes with and cannot be distinguished from its isomer p-xylene, No 61.

TABLE 7. ACCURACY AND PRECISION DATA FROM SEVEN DETERMINATIONS OF METHOD ANALYTES IN REAGENT WATER USING WIDE-BORE CAPILLARY COLUMN 4[a]

Compound	True Conc. (µg/L)	Mean Conc. Detected (µg/L)	Rel. Std. Dev. (%)	Method Detect. Limit (µg/L)
Acetone	1.0	1.6	5.7	0.28
Acrylonitrile	1.0	0.81	8.7	0.22
Allyl Chloride	1.0	0.90	4.7	0.13
2-Butanone	2.0	2.7	5.6	0.48
Carbon Disulfide	0.20	0.19	15	0.093
Chloroacetonitrile	1.0	0.83	4.7	0.12
1-Chlorobutane	1.0	0.87	6.6	0.18
trans-Dichloro-2-Butene	1.0	1.3	8.7	0.36
1,1-Dichloropropanone	5.0	4.2	7.7	1.0
cis-1,3-Dichloropropene	0.20	0.20	3.1	0.020
trans-1,3-Dichloropropene	0.10	0.11	14	0.048
Diethyl Ether	1.0	0.92	9.5	0.28
Ethyl Methacrylate	0.20	0.23	3.9	0.028
Hexachloroethane	0.20	0.18	10	0.057
2-Hexanone	1.0	1.1	12	0.39
Methacrylonitrile	1.0	0.92	4.2	0.12
Methylacrylate	1.0	1.2	12	0.45
Methyl Iodide	0.20	0.19	3.1	0.019
Methylmethacrylate	1.0	1.0	13	0.43
4-Methyl-2-Pentanone	0.40	0.56	9.7	0.090
Methyl-tert-Butylether	0.40	0.52	5.6	1.2
Nitrobenzene	2.0	2.1	18	0.16
2-Nitrobenzene	1.0	0.83	6.2	0.14
Pentachloroethane	0.20	0.23	20	0.14
Propionitrile	1.0	0.87	5.3	1.6
Tetrahydrofuran	5.0	3.9	13	

[a]Data obtained using Column 4 with the open split interface and an ion trap mass spectrometer.

TABLE 8. ACCURACY AND PRECISION FROM FOUR DETERMINATIONS OF METHOD ANALYTES IN THREE WATER MATRICES FORTIFIED AT 20 µG/L*

Compound	Reagent Water			Raw Water			Tap Water		
	Mean (µg/L)	Dev. (%)	(% of True Value)	Mean (µg/L)	Dev. (%)	(% of True Value)	Mean (µg/L)	Dev. (%)	(% of True Value)
Acetone	19	12%	95%	21	3.7%	105%	22	8.2%	110%
Acrylonitrile	20	4.7%	100%	22	3.4%	110%	21	1.3%	105%
Allyl Chloride	20	5.1%	100%	20	2.8%	100%	19	3.5%	95%
2-Butanone	17	11%	85%	19	7.3%	95%	17	5.6%	85%
Carbon Disulfide	19	6.4%	95%	18	2.5%	90%	18	3.0%	90%
Chloroacetonitrile	20	4.1%	100%	23	4.7%	115%	23	1.3%	115%
1-Chlorobutane	18	6.4%	90%	19	2.2%	95%	17	2.2%	85%
t-1,2-Dichloro-2-Butene	19	4.1%	95%	22	2.9%	110%	21	0.90%	105%
1,1-Dichloropropanone	20	5.6%	100%	22	6.4%	110%	21	7.7%	105%
Diethyl Ether	18	6.7%	90%	22	3.4%	110%	22	2.6%	110%
Ethyl Methacrylate	20	3.7%	100%	23	2.6%	115%	22	1.8%	110%
Hexachloroethane	20	6.1%	100%	21	2.5%	105%	21	2.0%	105%
2-Hexanone	19	6.3%	95%	21	3.8%	105%	21	4.0%	105%
Methacrylonitrile	20	3.4%	100%	23	2.9%	115%	22	2.0%	110%
Methylacrylate	20	3.7%	100%	22	3.1%	110%	21	2.1%	105%

TABLE 8. ACCURACY AND PRECISION FROM FOUR DETERMINATIONS OF METHOD ANALYTES IN THREE WATER MATRICES FORTIFIED AT 20 µG/L[a]

	Reagent Water			Raw Water			Tap Water		
Compound	Mean (µg/L)	Dev. (%)	(% of True Value)	Mean (µg/L)	Dev. (%)	(% of True Value)	Mean (µg/L)	Dev. (%)	(% of True Value)
Methyl Iodide	20	4.4%	100%	19	3.8%	95%	19	3.0%	95%
Methylmethacrylate	20	3.7%	100%	23	3.3%	115%	23	2.7%	115%
4-Methyl-2-Pentanone	19	8.7%	95%	21	5.5%	105%	22	7.2%	110%
Methyl-tert-Butylether	19	3.5%	95%	22	2.5%	110%	22	3.6%	110%
Nitrobenzene	20	5.4%	100%	22	4.8%	110%	21	2.4%	105%
2-Nitropropane	20	6.1%	100%	23	5.1%	115%	22	3.2%	110%
Pentachloroethane	19	5.2%	95%	21	2.6%	105%	22	1.7%	110%
Propionitrile	20	4.5%	100%	23	3.9%	115%	23	2.4%	115%
Tetrahydrofuran	20	2.8%	100%	24	3.2%	120%	21	2.9%	105%

[a]Data obtained using Column 4 with the open-split interface and an ion trap mass spectrometer with all Table 8 analyses in the same reagent water solution.[1]

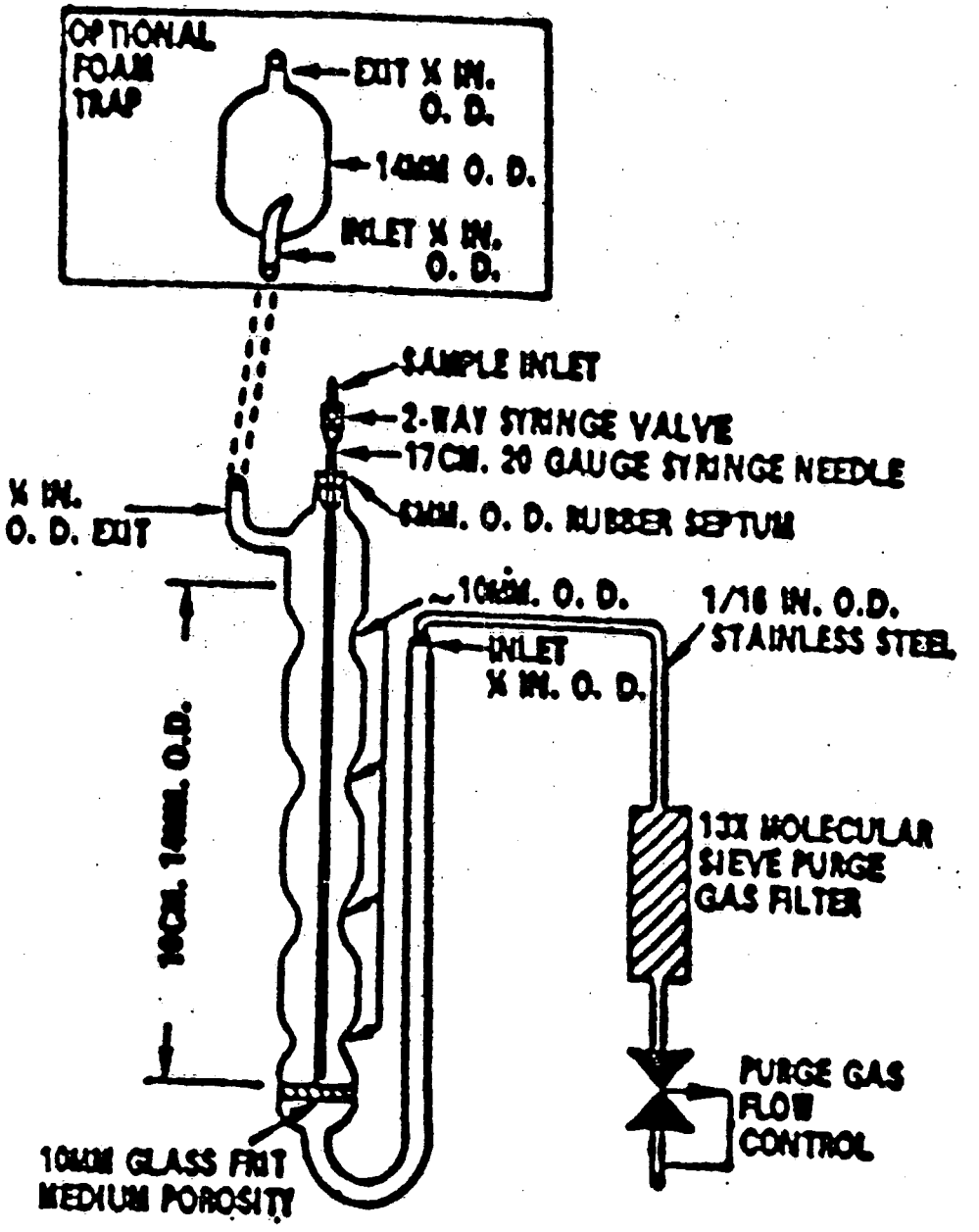

FIGURE 1. PURGING DEVICE

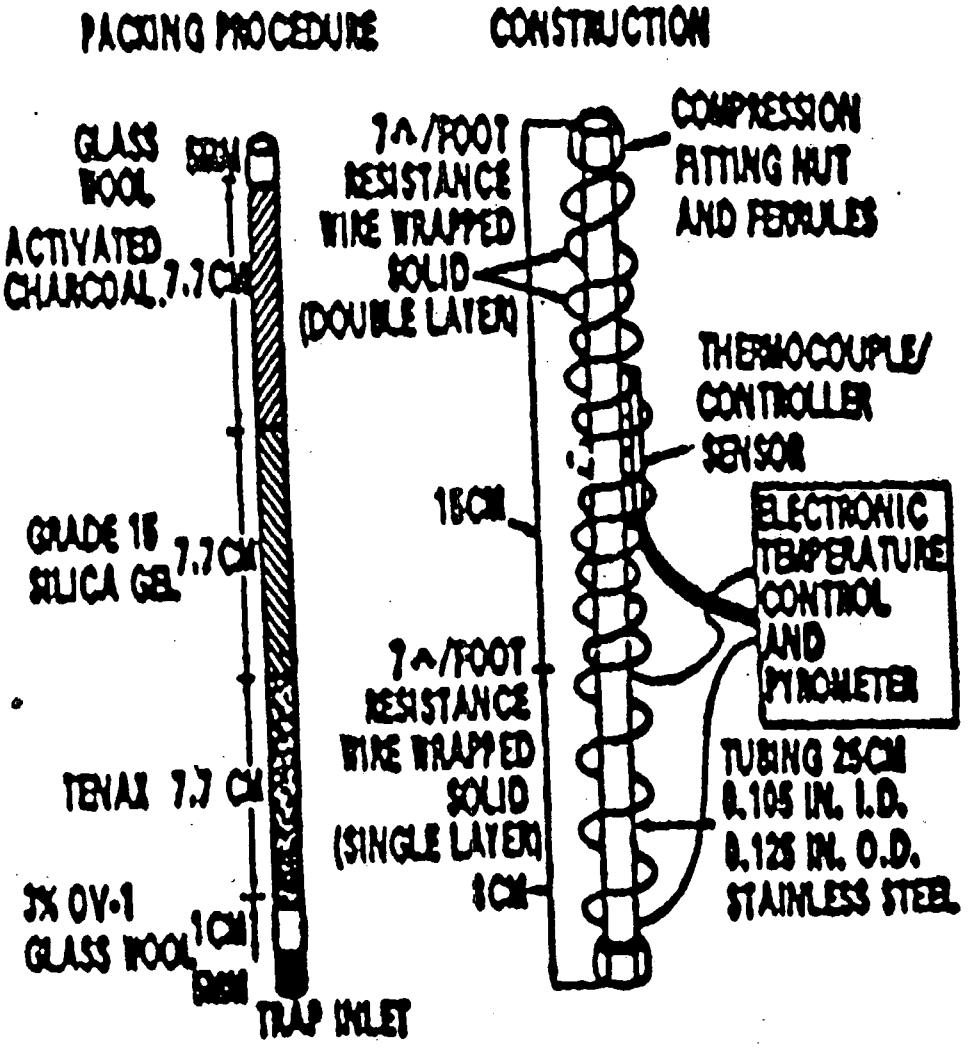

FIGURE 2. TRAP PACKINGS AND CONSTRUCTION TO INCLUDE DESORB CAPABILITY

FIGURE 3. NORMALIZED TOTAL ION CURRENT CHROMATOGRAM FROM A VOLATILE COMPOUND CALIBRATION MIXTURE CONTAINING 25 ng (5 ug/L) OF MOST COMPOUNDS. THE COMPOUND IDENTIFICATION NUMBERS ARE GIVEN IN TABLE 6.

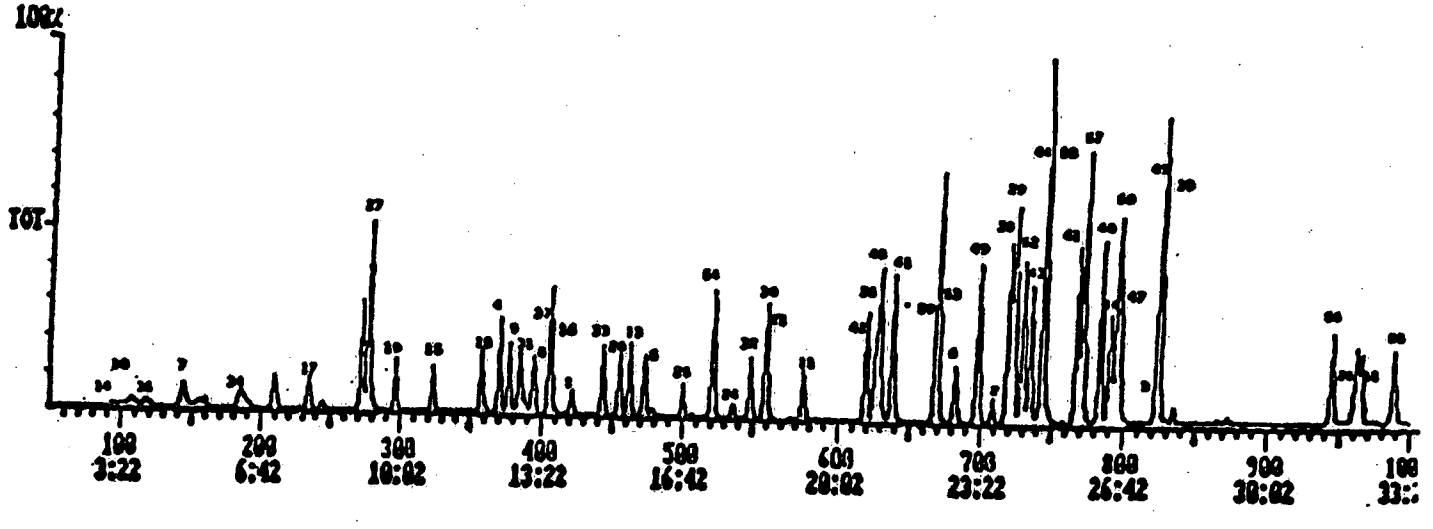

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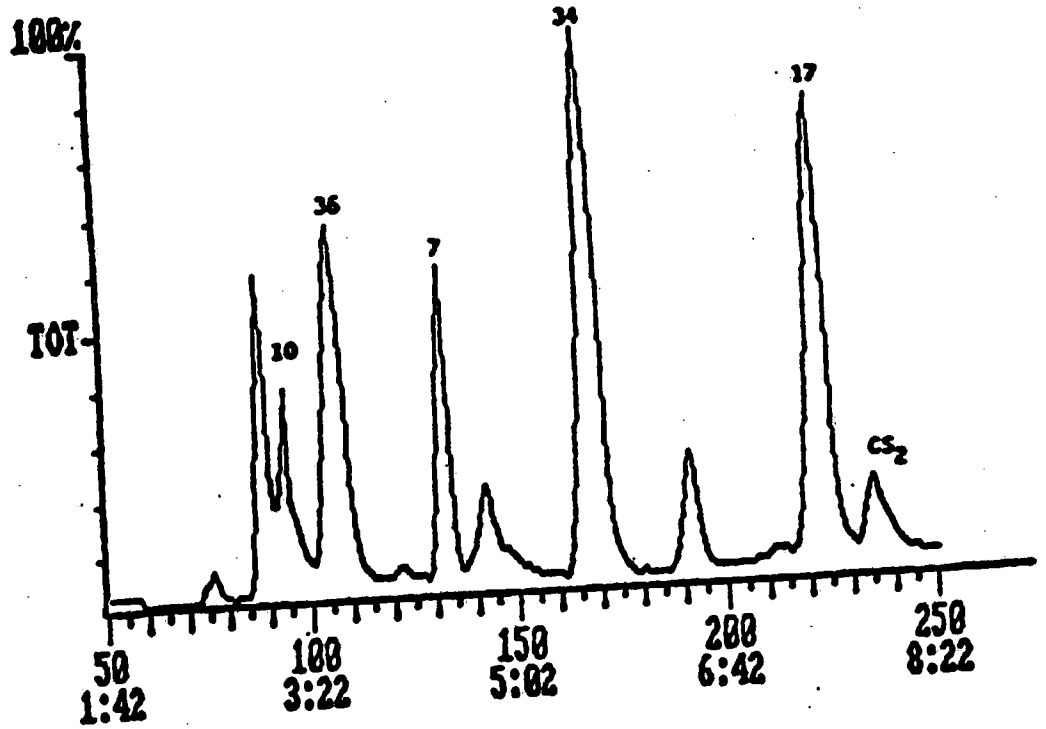
FIGURE 4. AMPLIFIED FIRST EIGHT MINUTES OF A TOTAL ION CURRENT CHROMATOGRAM FROM A VOLATILE COMPOUND CALIBRATION MIXTURE CONTAINING 25 ng (5 µg/L) OF EACH COMPONENT. THE COMPOUND IDENTIFICATION NUMBERS ARE GIVEN IN TABLE 6.



REFERENCE 26

United States Environmental Protection Agency

Office of Solid Waste and Emergency Response

OSWER Document 540-F-05-008
EPA Publication 9240.1-50FS
January 2006

EPA

Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (SOM01.1)

Office of Superfund Remediation and Technology Innovation (OSRTI)
Analytical Services Branch (ASB) (5102G)

Quick Reference Fact Sheet

Under the legislative authority granted to the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPA develops standardized analytical methods for the measurement of various pollutants in environmental samples from known or suspected hazardous waste sites. Among the pollutants that are of concern to the EPA at such sites are a series of volatile, semivolatile, pesticide, and Aroclor compounds that are analyzed using gas chromatography coupled with mass spectrometry (GC/MS) and gas chromatography with an electron capture detector (GC/ECD). The Analytical Services Branch (ASB) of the Office of Superfund Remediation and Technology Innovation (OSRTI) offers an analytical service that provides data from the analysis of water and soil/sediment samples for organic compounds for use in the Superfund decision-making process. Through a series of standardized procedures and a strict chain-of-custody, the organic analytical service produces data of known and documented quality. This service is available through the Superfund Contract Laboratory Program (CLP).

DESCRIPTION OF SERVICES

This new organic analytical service provides a technical and contractual framework for laboratories to apply EPA/CLP analytical methods for the isolation, detection, and quantitative measurement of 52 volatile, 67 semivolatile, 21 pesticide, and 9 Aroclor target compounds in water and soil/sediment environmental samples. The CLP provides the methods to be used and the specific technical, reporting, and contractual requirements, including Quality Assurance (QA), Quality Control (QC), and Standard Operating Procedures (SOPs), by which EPA evaluates the data. This service uses GC/MS and GC/ECD methods to analyze the target compounds.

Three data delivery turnarounds are available to CLP customers: 7-day, 14-day, and 21-day turnaround after laboratory receipt of the last sample in the set. In addition, there are 48-hour (for trace volatiles and volatiles) and 72-hour (for semivolatiles, pesticides, and Aroclors) preliminary data submission options available. Changes to the organic method include the separation of pesticide and Aroclor methods, the inclusion of Selected Ion Monitoring (SIM) analysis, and the incorporation of the Staged Electronic Data Deliverable (SEDD) requirement for Electronic Data Deliverables (EDDs) in Extensible Markup Language (XML) format. Options under this service include a closed system purge-and-trap method for low-level volatile soil analysis and methanol preservation for medium-level volatile soil analysis. In addition, data users may request modifications to the SOW that may include, but are not limited to, additional compounds, sample matrices other than soil/sediment or water, lower quantitation limits, and other requirements to enhance method performance.

DATA USES

This analytical service provides data which EPA uses for a variety of purposes, such as determining the nature and extent of contamination at a hazardous waste site, assessing priorities for response based on risks to human health and the environment, determining appropriate cleanup actions, and determining when remedial actions are complete. The data may be used in all stages in the investigation of a hazardous waste site including, but not limited to: site inspections; Hazard Ranking System (HRS) scoring; remedial investigations/Feasibility Studies (FSs); remedial design; treatability studies; and removal actions. In addition, this service provides data that will be available for use in Superfund enforcement/litigation activities.

TARGET COMPOUNDS

Table 1 lists the compounds for which this service is applicable and the corresponding quantitation limits. Specific quantitation limits are highly matrix-dependent.

Table 1. Target Compound List (TCL) and Contract Required Quantitation Limits (CRQLs) for SOM01.1*

	Quantitation Limits				
	Trace Water by SIM (µg/L)	Trace Water (µg/L)	Low Water (µg/L)	Low Soil (µg/kg)	Med. Soil (µg/kg)
VOLATILES					
1. Dichlorodifluoromethane		0.50	5.0	5.0	250
2. Chloromethane		0.50	5.0	5.0	250
3. Vinyl Chloride		0.50	5.0	5.0	250
4. Bromomethane		0.50	5.0	5.0	250
5. Chloroethane		0.50	5.0	5.0	250
6. Trichlorofluoromethane		0.50	5.0	5.0	250
7. 1,1-Dicholoroethene		0.50	5.0	5.0	250
8. 1,1,2-Trichloro-1,2,2-trifluoroethane		0.50	5.0	5.0	250
9. Acetone		5.0	10	10	500
10. Carbon Disulfide		0.50	5.0	5.0	250
11. Methyl acetate		0.50	5.0	5.0	250
12. Methylene chloride		0.50	5.0	5.0	250
13. trans-1,2-Dichloroethene		0.50	5.0	5.0	250
14. Methyl tert-butyl ether		0.50	5.0	5.0	250
15. 1,1-Dichloroethane		0.50	5.0	5.0	250
16. cis-1,2-Dichloroethene		0.50	5.0	5.0	250
17. 2-Butanone		5.0	10	10	500
18. Bromochloromethane		0.50	5.0	5.0	250
19. Chloroform		0.50	5.0	5.0	250
20. 1,1,1-Trichloroethane		0.50	5.0	5.0	250
21. Cyclohexane		0.50	5.0	5.0	250
22. Carbon tetrachloride		0.50	5.0	5.0	250
23. Benzene		0.50	5.0	5.0	250
24. 1,2-Dichloroethane		0.50	5.0	5.0	250
25. 1,4-Dioxane	2.0	20	100	100	5000
26. Trichloroethene		0.50	5.0	5.0	250
27. Methylcyclohexane		0.50	5.0	5.0	250
28. 1,2-Dichloropropane		0.50	5.0	5.0	250
29. Bromodichloromethane		0.50	5.0	5.0	250
30. cis-1,3-Dichloropropene		0.50	5.0	5.0	250
31. 4-Methyl-2-pentanone		5.0	10	10	500
32. Toluene		0.50	5.0	5.0	250
33. trans-1,3-Dichloropropene		0.50	5.0	5.0	250
34. 1,1,2-Trichloroethane		0.50	5.0	5.0	250
35. Tetrachloroethene		0.50	5.0	5.0	250
36. 2-Hexanone		5.0	10	10	500
37. Dibromochloromethane		0.50	5.0	5.0	250
38. 1,2-Dibromoethane	0.050	0.50	5.0	5.0	250
39. Chlorobenzene		0.50	5.0	5.0	250

	Quantitation Limits				
	Trace Water by SIM (µg/L)	Trace Water (µg/L)	Low Water (µg/L)	Low Soil (µg/kg)	Med. Soil (µg/kg)
VOLATILES (CON'T)					
40. Ethylbenzene		0.50	5.0	5.0	250
41. o-Xylene		0.50	5.0	5.0	250
42. m. p-Xylene		0.50	5.0	5.0	250
43. Styrene		0.50	5.0	5.0	250
44. Bromoform		0.50	5.0	5.0	250
45. Isopropylbenzene		0.50	5.0	5.0	250
46. 1,1,2,2-Tetrachloroethane		0.50	5.0	5.0	250
47. 1,3-Dichlorobenzene		0.50	5.0	5.0	250
48. 1,4-Dichlorobenzene		0.50	5.0	5.0	250
49. 1,2-Dichlorobenzene		0.50	5.0	5.0	250
50. 1,2-Dibromo-3-chloropropane	0.050	0.50	5.0	5.0	250
51. 1,2,4-Trichlorobenzene		0.50	5.0	5.0	250
52. 1,2,3-Trichlorobenzene		0.50	5.0	5.0	250

	Low Water by SIM (µg/L)	Low Water (µg/L)	Low Soil by SIM (µg/kg)	Low Soil (µg/kg)	Med. Soil (µg/kg)
SEMIVOLATILES					
53. Benzaldehyde		5.0		170	5000
54. Phenol		5.0		170	5000
55. bis-(2-chloroethyl) ether		5.0		170	5000
56. 2-Chlorophenol		5.0		170	5000
57. 2-Methylphenol		5.0		170	5000
58. 2,2'-Oxybis (1-chloropropane)		5.0		170	5000
59. Acetophenone		5.0		170	5000
60. 4-Methylphenol		5.0		170	5000
61. N-Nitroso-di-n propylamine		5.0		170	5000
62. Hexachloroethane		5.0		170	5000
63. Nitrobenzene		5.0		170	5000
64. Isophorone		5.0		170	5000
65. 2-Nitrophenol		5.0		170	5000
66. 2,4-Dimethylphenol		5.0		170	5000
67. Bis (2-chloroethoxy) methane		5.0		170	5000
68. 2,4-Dichlorophenol		5.0		170	5000
69. Napthalene	0.10	5.0	3.3	170	5000
70. 4-Chloroaniline		5.0		170	5000
71. Hexachlorobutadiene		5.0		170	5000
72. Caprolactam		5.0		170	5000
73. 4-Chloro-3-methylphenol		5.0		170	5000
74. 2-Methylnapthalene	0.10	5.0	3.3	170	5000
75. Hexachlorocyclopentadiene		5.0		170	5000
76. 2,4,6-Trichlorophenol		5.0		170	5000
77. 2,4,5-Trichlorophenol		5.0		170	5000

* For volatiles, quantitation limits for medium soils are approximately 50 times the quantitation limits for low soils. For semivolatile medium soils, quantitation limits are approximately 50 times the quantitation limits for low soils.

Table 1. Target Compound List (TCL) and Contract Required Quantitation Limits (CRQLs) for SOM01.1* (Con't)

	Quantitation Limits				
	Low Water by SIM (µg/L)	Low Water (µg/L)	Low Soil by SIM (µg/kg)	Low Soil (µg/kg)	Med. Soil (µg/kg)
SEMIVOLATILES (CON'T)					
78. 1,1'-Biphenyl		5.0		170	5000
79. 2-Chloronaphthalene		5.0		170	5000
80. 2-Nitroaniline		10		330	10000
81. Dimethylphthalate		5.0		170	5000
82. 2,6-Dinitrotoluene		5.0		170	5000
83. Acenaphthylene	0.10	5.0	3.3	170	5000
84. 3-Nitroaniline		10		330	10000
85. Acenaphthene	0.10	5.0	3.3	170	5000
86. 2,4-Dinitrophenol		10		330	10000
87. 4-Nitrophenol		10		330	10000
88. Dibenzofuran		5.0		170	5000
89. 2,4-Dinitrotoluene		5.0		170	5000
90. Diethylphthalate		5.0		170	5000
91. Fluorene	0.10	5.0	3.3	170	5000
92. 4-Chlorophenyl phenyl ether		5.0		170	5000
93. 4-Nitroaniline		10		330	10000
94. 4,6-Dinitro-2-methylphenol		10		330	10000
95. N-Nitrosodiphenylamine		5.0		170	5000
96. 1,2,4,5-Tetrachlorobenzene		5.0		170	5000
97. 4-Bromophenyl phenyl ether		5.0		170	5000
98. Hexachlorobenzene		5.0		170	5000
99. Atrazine		5.0		170	5000
100. Pentachlorophenol	0.20	10	6.7	330	10000
101. Phenanthrene	0.10	5.0	3.3	170	5000
102. Anthracene	0.10	5.0	3.3	170	5000
103. Carbazole		5.0		170	5000
104. Di-n-butylphthalate		5.0		170	5000
105. Fluoranthene	0.10	5.0	3.3	170	5000
106. Pyrene	0.10	5.0	3.3	170	5000
107. Butylbenzylphthalate		5.0		170	5000
108. 3,3'-Dichlorobenzidine		5.0		170	5000
109. Benzo(a)anthracene	0.10	5.0	3.3	170	5000
110. Chrysene	0.10	5.0	3.3	170	5000
111. Bis(2-ethylhexyl)phthalate		5.0		170	5000
112. Di-n-octylphthalate		5.0		170	5000
113. Benzo(b)fluoroanthene	0.10	5.0	3.3	170	5000
114. Benzo(k)fluoroanthene	0.10	5.0	3.3	170	5000

	Quantitation Limits				
	Low Water by SIM (µg/L)	Low Water (µg/L)	Low Soil by SIM (µg/kg)	Low Soil (µg/kg)	Med. Soil (µg/kg)
SEMIVOLATILES (CON'T)					
115. Benzo(a)pyrene	0.10	5.0	3.3	170	5000
116. Indeno(1,2,3-cd)pyrene	0.10	5.0	3.3	170	5000
117. Dibenzo(a,h)anthracene	0.10	5.0	3.3	170	5000
118. Benzo(g,h,i)perylene	0.10	5.0	3.3	170	5000
119. 2,3,4,6-Tetrachlorophenol		5.0		170	5000
PESTICIDES	Water (µg/L)			Soil (µg/kg)	
120. alpha-BHC	0.050			1.7	
121. beta-BHC	0.050			1.7	
122. delta-BHC	0.050			1.7	
123. gamma-BHC (Lindane)	0.050			1.7	
124. Heptachlor	0.050			1.7	
125. Aldrin	0.050			1.7	
126. Heptachlor epoxide	0.050			1.7	
127. Endosulfan I	0.050			1.7	
128. Dieldrin	0.10			3.3	
129. 4,4'-DDE	0.10			3.3	
130. Endrin	0.10			3.3	
131. Endosulfan II	0.10			3.3	
132. 4-4'-DDD	0.10			3.3	
133. Endosulfan sulfate	0.10			3.3	
134. 4-4'-DDT	0.10			3.3	
135. Methoxychlor	0.50			17	
136. Endrin ketone	0.10			3.3	
137. Endrin aldehyde	0.10			3.3	
138. alpha-Chlordane	0.050			1.7	
139. gamma-Chlordane	0.050			1.7	
140. Toxaphene	5.0			170	
AROCLORS	Water (µg/L)			Soil (µg/kg)	
141. Aroclor-1016	1.0			33	
142. Aroclor-1221	1.0			33	
143. Aroclor-1232	1.0			33	
144. Aroclor-1242	1.0			33	
145. Aroclor-1248	1.0			33	
146. Aroclor-1254	1.0			33	
147. Aroclor-1260	1.0			33	
148. Aroclor-1262	1.0			33	
149. Aroclor-1268	1.0			33	

* For volatiles, quantitation limits for medium soils are approximately 50 times the quantitation limits for low soils. For semivolatile medium soils, quantitation limits are approximately 30 times the quantitation limits for low soils.

The TCL for this service was originally derived from the EPA Priority Pollutant List of 129 compounds. In the years since inception of the CLP, compounds have been added to and removed from the TCL, based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program. The SOM analytical service combines the previous OLM and OLC services into one method. For example, drinking water and ground water type samples may be analyzed using the Trace Volatiles method in SOM.

METHODS AND INSTRUMENTATION

For trace volatile water samples, 25 mL of water sample is added to a purge-and-trap device and purged with an inert gas at room temperature. For low/medium volatile water samples, 5 mL of water sample is added to a purge-and-trap device and purged with an inert gas at room temperature. Higher purge temperatures may be used for both trace and low/medium volatile analyses if all technical acceptance criteria is met for all standards, samples, and blanks. For low-level volatile soil samples, organic compounds are generally determined by analyzing approximately 5 g of sample in a closed-system purge-and-trap device at 40°C. For a medium-level soil sample, a soil sample of 5 g is collected, preserved, and/or extracted with methanol and an aliquot of methanol extract is added to 5 mL reagent water and purged at room temperature. For water and soil samples, the volatiles purged from the sample are trapped on a solid sorbent. The purged volatiles are subsequently desorbed by rapidly heating and backflushing with helium, and then introduced into a GC/MS system.

For semivolatile, pesticide, and Aroclor water samples, a 1 L aliquot of sample is extracted with methylene chloride using a continuous liquid-liquid extractor or separatory funnel (for pesticides and Aroclors only). For low-level semivolatile, pesticide, and Aroclor soil samples, a 30 g soil/sediment sample is extracted with methylene chloride/acetone using sonication, automated Soxhlet/Dean-Stark (SDS) extraction, or pressurized fluid extraction techniques. For medium-level semivolatile soil samples, a 1g aliquot is extracted with methylene chloride using the techniques mentioned above for low-level soil samples. For both water and soil samples, the extract is concentrated, subjected to fraction-specific cleanup procedures, and analyzed by GC/MS for semivolatiles or GC/ECD for pesticides and Aroclors. **Table 2** summarizes the methods and instruments used in this analytical service.

DATA DELIVERABLES

Data deliverables for this service include hardcopy data reporting forms and supporting raw data. In addition to the hardcopy deliverable, contract laboratories must also submit the same data electronically. The laboratory must submit data to EPA within 7, 14, or 21-days after laboratory receipt of the last sample in set [or preliminary data within 48 hours (for trace volatiles and volatiles) or 72 hours (for semivolatiles, pesticides, and Aroclors) after laboratory receipt of each sample. EPA then processes the data through an automated Data Assessment Tool (DAT). DAT provides EPA Regions with PC-compatible reports, spreadsheets, and electronic files within 24-48 hours from the receipt of the data for use in data validation. This automated tool also facilitates the transfer of analytical data into Regional databases. In addition to the Regional electronic reports, the CLP laboratories are provided with a data assessment report that documents the instances of noncompliance. The laboratory has 6 business days to reconcile defective data and resubmit the data to EPA. EPA then reviews the data for noncompliance and sends a final data assessment report to the CLP laboratory and the Region.

QUALITY ASSURANCE (QA)

The QA process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity. This process ensures that the data provided are of known and documented quality.

During the implementation of the data collection effort, QA activities ensure that the Quality Control (QC) system is functioning effectively and that the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data to determine its suitability to support enforcement or remedial decisions.

Each contract laboratory prepares a Quality Assurance Plan (QAP) with the objective of providing sound analytical chemical measurements. The QAP must specify the policies, organization, objectives, and functional guidelines, as well as the QA and QC activities designed to achieve the data quality requirements in the contract.

QUALITY CONTROL (QC)

The QC process includes those activities required during analytical data collection to produce data of known and documented quality. The analytical data acquired from QC procedures are used to estimate and evaluate the analytical results and to determine the necessity for, or the effect of, corrective action procedures. The QC procedures required for this analytical service are provided in **Table 3.**

Table 2. Methods and Instruments

Fraction	Water	Soil
Trace Volatiles	Purge-and-trap followed by GC/MS analysis	N/A
Volatiles	Purge-and-trap followed by GC/MS analysis	Purge-and-trap or closed-system purge-and-trap followed by GC/MS analysis
Semivolatiles	Continuous liquid-liquid extraction (CLLE) followed by GC/MS analysis	Sonication, automated SDS extraction, or pressurized fluid extraction followed by GC/MS analysis
Pesticides	CLLE or separatory funnel extraction followed by dual column GC/ECD analysis	Sonication, automated SDS extraction or pressurized fluid extraction followed by dual column GC/ECD analysis
Aroclors	CLLE or separatory funnel extraction followed by dual column GC/ECD analysis	Sonication, automated SDS extraction or pressurized fluid extraction followed by dual column GC/ECD analysis

Table 3. Quality Control (QC)

QC Operation	Frequency
Deuterated Monitoring Compounds (DMCs) (trace volatiles, volatiles, and semivolatiles)	Added to each sample, standard, and blank
Surrogates (pesticides and Aroclors)	Added to each sample, standard, and blank
Method Blanks (trace volatiles and volatiles)	Analyzed at least every 12 hours for each matrix and level
Method Blanks (semivolatiles, pesticides, and Aroclors)	Prepared with each group of 20 samples or less of same matrix and level, or each time samples are extracted by the same procedure
Instrument Blank (trace volatiles and volatiles)	Analyzed after a sample which contains compounds at concentrations greater than the calibration range
Instrument Blank (pesticides and Aroclors)	Every 12 hours on each GC column used for analysis
Storage Blanks (trace volatiles and volatiles)	Prepared and stored with each set of samples
GC/MS Mass Calibration and Ion Abundance Patterns (trace volatiles, volatiles, and semivolatiles)	Every 12 hours for each instrument used for analysis
GC Resolution Check (pesticides)	Prior to initial calibration, on each instrument used for analysis
Initial Calibration	Upon initial set up of each instrument, and each time continuing calibration fails to meet the acceptance criteria
Continuing Calibration	Every 12 hours for each instrument used for analysis
Internal Standards (trace volatiles, volatiles, and semivolatiles)	Added to each sample, standard, and blank
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	Once every 20 or fewer samples of same fraction, matrix, and level in a Sample Delivery Group (SDG)
Laboratory Control Samples (LCSs) (pesticides and Aroclors)	Once every 20 or fewer samples of same fraction, matrix, and level in an SDG
Method Detection Limit (MDL)	Determined annually, per matrix and level

PERFORMANCE MONITORING ACTIVITIES

Laboratory performance monitoring activities are provided primarily by ASB and the Regions to ensure that contract laboratories are producing data of the appropriate quality. EPA performs on-site laboratory audits, data package audits, GC/MS and/or GC/ECD tape audits, and evaluates laboratory performance through the use of blind Performance Evaluation (PE) samples.

CONTACTING EPA

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REFERENCE 27

PRE-CERCLIS SCREENING REPORT
SAN GERMAN SITE DISCOVERY INITIATIVE
SAN GERMAN, PUERTO RICO

EPA Contract No.: EP-W-05-048
Work Order No.: 20113.011.001.0023.00
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September 2006

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Prepared by:

Region 2 Site Assessment Team 2
Weston Solutions, Inc.
Edison, New Jersey 08837

NOTE: ORIGINAL PAGINATION IS USED WHEN CITING THIS REFERENCE IN THE HRS DOC RELIED FOR SAN GERMAN GROUNDWATER CONTAMINATION. (CVW)

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WESTON

Prepared by: _____ Date: 9/29/06
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Approved by: _____ Date: 9/29/06
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1.0 INTRODUCTION

Under the Authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the U.S. Environmental Protection Agency (EPA) has tasked the Weston Solutions, Inc. (Weston) Region 2 Site Assessment Team 2 (SAT 2) with conducting a Site Discovery Initiative within the municipality of San German, Puerto Rico. This initiative is being conducted to identify potential hazardous waste sites for placement into the Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS).

In order to complete this task, file searches were conducted at the offices of the Puerto Rico Environmental Quality Board (PREQB), first in the Land Pollution Control Area [Resource Conservation and Recovery Act (RCRA), Non-Hazardous Waste Division, and Hazardous Waste Division], and then in the Water Quality Area [Underground Injection (UIC), Underground Storage Tank (UST), Water Planning Area, and Non-Point Source Division]. A file search was also conducted at the offices of the Puerto Rico Industrial Development Company (PRIDCO). On 20 June 2006, SAT 2 conducted a baseline sampling event, during which samples were collected from five public supply wells (i.e., Lola Rodriguez de Tio I & II, Providencia I & II, and El Real) within the Puerto Rico Aqueduct and Sewer Authority's (PRASA's) San German system, as well as from the San German Water Filtration Plant. Samples were analyzed for Target Compound List (TCL) and Target Analyte List (TAL) parameters under the EPA Contract Laboratory Program (CLP). During the week of 17 July 2006, SAT 2 and EPA personnel conducted on-site reconnaissances at 44 sites, as well as interviews with San German residents and local authorities. Region 2 SAT 2 recorded the location of each site, as well as all of the public supply wells in San German, using the Global Positioning System (GPS). All sites, well locations, and other areas of concern were plotted on Geographical Information System (GIS)-based maps (see Appendices A & B).

Utilizing the framework for Pre-CERCLIS screenings outlined in EPA's Quick Reference Guidance "Improving Site Assessment: Pre-CERCLIS Screening Assessments" (EPA-540-F-98-039) dated October 1999, assessments were conducted for all sites previously identified in San German, PR through this effort, as well as additional sites identified during field survey reconnaissance efforts. Region 2 SAT 2 completed Pre-CERCLIS screening forms for each of the sites identified (see Appendix C).

2.0 BACKGROUND

San German is located in the southwestern portion of Puerto Rico. The site discovery project area is located in a mixed industrial/commercial/residential area of San German. The following industries were found in San German: canning; commercial printing; metal doors, frames, and moldings manufacturing; special dies and fixtures; switchboard apparatus; circuit boards; surgical and medical instruments; surgical appliances and supplies; pharmaceutical; flatware; automobile repair; and dry cleaning.

2.1 Drinking Water Supply

The municipality of San German obtains potable water from the San German Urbano water supply system, which is part of the PRASA Mayaguez region. The system is comprised of seven groundwater wells and the San German water filtration plant. The groundwater wells include Pozo Lola Rodriguez de Tio I, Pozo Lola Rodriguez de Tio II, Pozo Retiro, Pozo Real, Pozo Providencia I, Pozo Providencia II, and Pozo Sambolín. The San German Filtration Plant's principal water source is surface water obtained from Rio Hoconuco and Rio Cain. This system, as a whole, serves approximately 25,576 people in the San German area.

According to PRASA, the Lola Rodriguez de Tio I, Lola Rodriguez de Tio II, and Retiro wells were an interconnected system with approximately 800 connections. Water from the Lola wells was pumped to the Retiro well, where water from all three wells was treated with chlorine prior to distribution to the public. Due to the PCE contamination detected, the Retiro well was ordered closed by the Puerto Rico Department of Health (PRDOH) in February 2005. As of July 2006, the Lola Rodriguez I and II wells were not pumping for distribution due to mechanical issues. According to PRASA, the Sambolin well was reportedly closed due to the well water exhibiting a petroleum odor.

2.2 Historical Sample Results – San German Urbano Sysyem

Analytical results of groundwater samples collected by PRASA between 2002 and 2005 indicate contamination by tetrachloroethylene (PCE) and cis-1,2-dichloroethene (cis-1,2-DCE). Samples collected from Pozo Lola Rodriguez de Tio I, Pozo Lola Rodriguez de Tio II and Pozo Retiro in 2002, 2003, 2004, and 2005 exhibited detections above the Hazard Ranking System (HRS) Level I benchmark of 1.6 micrograms per liter (ug/L) or the federal maximum contaminant level (MCL) for PCE of 5 ug/L. The table below provides a summary of PCE exceedences:

Sample Detections of PCE In San German Urbano System (2002-2005)

Well	Date Sampled	Tetrachloroethylene (ug/L)
Pozo Lola Rodriguez de Tio I	1/23/02	**6.4**
Pozo Lola Rodriguez de Tio II	1/29/02	**6.2**
Pozo Lola Rodriguez de Tio I	7/23/02	**1.7**
Pozo Lola Rodriguez de Tio II	12/26/02	**4.2**
Pozo Lola Rodriguez de Tio I	12/26/02	**4.2**
Pozo Lola Rodriguez de Tio I	9/25/03	**3.4**
Pozo Lola Rodriguez de Tio I	10/23/03	**5.70**
Pozo Lola Rodriguez de Tio I	11/6/03	**3.2**
Pozo Retiro	5/12/04	**1.7**
Pozo Retiro	8/19/04	**3.1**
Pozo Lola Rodriguez de Tio I	8/19/04	**2.2**
Pozo Retiro	12/4/04	**5.0**
Pozo Retiro	3/11/05	**4.1**
Pozo Retiro	3/16/05	**4.0**
Pozo Retiro	7/10/05	**3.6**

Notes:
Concentrations expressed in micrograms per liter (ug/L)
Bold = exceedance of HRS Level I Benchmark of 1.6 ug/L
Shading incicates exceedance of MCL of 5 ug/L

A map summarizing all chlorinated solvent detections for wells in the San German Urbano system is presented in Appendix A (i.e., Figure 1). Aqueous samples were also collected from various distribution points (i.e., taps) within PRASA's San German system. Analytical results from these samples indicated the presence of PCE at concentrations up to 7.3 ug/L.

2.3 Hydrogeology

Based on available information, there are two groundwater flow regimes in the San German study area. In undeveloped areas, topsoil is believed to consist of organic soil, underlain by stiff silt with up to 35 percent sand and gravel. The silt is underlain by bedrock consisting of volcanic tuffaceous breccia and conglomerate and cemented limestone. Groundwater within the overburden is expected to flow from topographically high areas toward the Rio Guanajibo and then west/northwest along the river valley. There is also some vertical flow of groundwater down into the bedrock. In the bedrock formation, groundwater occurs in fracture and joint zones within the bedrock. Public supply wells are reportedly screened in the bedrock formation.

3.0 BASELINE ANALYTICAL RESULTS

On 20 June 2006, SAT 2 collected aqueous samples from five groundwater wells and the San German Water Filtration Plant. The groundwater wells include Pozo Lola Rodriguez de Tio I, Pozo Lola Rodriguez de Tio II, Pozo El Real, Pozo Providencia I, and Pozo Providencia II. Aqueous samples were not collected from Pozo Retiro or Pozo Sambolin since these wells were closed due to contamination (i.e., power disconnected and pumps removed). Samples were collected prior to treatment and analyzed for TCL and TAL parameters (including mercury) under CLP. A table summarizing all analytical results from the sampling event conducted on 20 June 2006 is presented in Appendix D.

3.1 Volatile Organic Compound Results

A review of analytical results indicated the presence of PCE was detected in Lola Rodriguez I at a concentration of 1.6 ug/L, which is the HRS Level I Benchmark. Other volatile organic compounds (VOCs) detected in this well include TCE (trichloroethene) at 0.54 ug/L, methyl tert-butyl ether at 0.41 ug/L estimated, and cis-DCE at 1.5 ug/L.

Several VOCs were also detected in Lola Rodriguez II, including PCE (0.14 ug/L estimated), methylene chloride (0.26 ug/L estimated), methylene chloride (0.26 ug/L estimated), bromochloromethane (0.17 ug/L estimated), chloroform (28 ug/L), dibromochloromethane (4.4 ug/L), and bromoform (0.33 ug/L estimated). Estimated concentrations were detected below Contract Required Quantitation Limits (CRQLs)

A review of analytical results indicates that VOCs were not detected samples collected from the El Real, Providencia I, and Providencia II wells nor the San German Water Filtration Plant.

3.2 Semivolatile Organic Compounds Results

Low levels of semivolatile organic compounds (SVOCs) were detected in the Lola Rodriguez de Tio I well. SVOCs detected included benzaldehyde (0.27 ug/L), phenol (0.31 ug/L), 2-chlorophenol (2.6 ug/L), and diethylphthalate (0.57 ug/L). Benzaldehyde (0.23 ug/L) was also detected in Providencia I. All SVOCs were detected at estimated concentrations below CRQLs.

3.3 Pesticide/PCB Results

Pesticides and polychlorinated byphenyls (PCBs) were not detected above detection limits in any of the samples collected.

3.4 Inorganic Results

One notable metals concentration included arsenic, which was detected at a concentration of 11.3 ug/L in the Providencia I well; this concentration is slightly above the MCL of 10 ug/L.

4.0 PRE-CERCLIS ASSESSMENTS

This section presents information for each of the 44 sites being considered for entry into CERCLIS. Each site discussion includes site latitudes/longitudes in decimal degrees, a site description, and a site determination/rationale. Appendix B (i.e., Figure 2) provides a Study Area Map which includes public supply well and industrial site locations. See Appendix C for Pre-CERCLIS Screening Assessment Checklist/Decision Forms for each site. Appendix E provides photographs of selected areas of concern taken by SAT 2 during the field survey reconnaissances.

4.1 ABANDONED GULF STATION (State Road 122)

4.1.1 Latitude/Longitude (decimal degrees): +18.083695917/-67.033055466

4.1.2 Site Description: During the week of 17 July 2006, an abandoned Gulf Station was observed on the western side of Route 122 (aka Road 119) just north of Rio Guanajibo. According to PREQB, the Puerto Rico Road Authority (Autoridad de Carreteras) took ownership of the property in November 2005. The property is reportedly part of the upcoming widening of Route 122. During the facility inspection, the building was observed to be dilapidated with car parts, broken glass, empty drums, and miscellaneous debris located throughout the building and property. An open overhang was observed on the south side of the building. This area was likely used for light mechanical purposes (oil changes) and for washing vehicles. There is a room in the rear of the building, believed to have been used for the storage of used oils. Empty drums and tires were observed near the rear of the building. Construction materials (likely for the widening of Route 122) were observed in the rear of the building. The status of underground storage tanks associated at the facility is unknown. No monitoring wells were observed during the facility inspection.

4.1.3 Site Determination/Rationale: Based on the observations made within the building and on the property during the facility inspection, and the site's proximity to the closed Retiro well (i.e., within 500 feet), the abandoned Gulf Station is recommended for further assessment under CERCLA.

4.2 ACORN CLEANERS (Route 122; Antongiorgie Building)

4.2.1 Latitude/Longitude (decimal degrees): +18.079554283 / -67.035714936

4.2.2 Site Description: Acorn Cleaners (Acorn) is located on the western side of Route 122 (just south of its intersection with Calle Luna) on the southern end of the Antongiorgie Building. Acorn has operated at this location since 1970. Prior to 1970, the land was utilized for agricultural purposes. Acorn currently provides dry cleaning and laundry services to its customers. Since beginning operations, Acorn has utilized a total of two dry cleaning machines; one from 1970 to 1991 and one from 1991 to present. From 1970 to 1991, the facility used approximately 5 to 6 drums of PCE per year. Since 1991, the facility has used approximately 1 drum of PCE per year. Filters are changed twice per year with used filters being picked up by a vendor in San Juan. Acorn was unable to provide documentation for the disposal of the filters. A cooling tower (and associated water tank) is located outside the southwest corner of the building. During the facility inspection, a drum of PCE was observed to be stored on the floor inside the building. The rear (i.e., western side) of the property consists of a paved parking lot. An aboveground diesel fuel tank is located in the southwest corner of this parking lot. Residential properties border the Acorns Cleaners to the south. There are no monitoring wells on

the site.

4.2.3 Site Determination/Rationale: Based on the Acorn's use of PCE since 1970 and the fact that a VOC groundwater plume which includes PCE exists in the area directly downgradient of the site, Acorn Cleaners is recommended for further assessment under CERCLA.

4.3 ALL STAR SERVICE STATION (Route 347; Km 2.4)

4.3.1 Latitude/Longitude (decimal degrees): +18.097284835 / -67.054136575

4.3.2 Site Description: The All Star Service Station facility is located at Route 347 and is currently used for gasoline distribution. According to a representative of PREQB, the facility was previously named "Coto Service Station." The facility was changed to All Star approximately 3 years ago (approximately in 2003). The facility is currently owned by Mr. Eduardo Ruiz. PREQB files indicate that the facility has two active 10,000-gallon gasoline tanks. Two 4,000-gallon gasoline tanks, one 10,000-gallon gasoline tank, and one 550-gallon used oil tank are listed in PREQB's database as "permanently out-of-use." The existence of a used oil tank indicates that light mechanical activities likely took place in the past. Monitoring wells (approximately 4) were observed on the property in the area of the gasoline USTs. The facility building was noted to be undergoing renovation.

4.3.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. In addition, the facility's USTs are regulated under PREQB's UST Program. Furthermore, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.4 AUTO PIEZAS LUGO (#3 Ramos Street)

4.4.1 Latitude/Longitude (decimal degrees): +18.083212907 / -67.041432092

4.4.2 Site Description: The Auto Piezas Lugo facility is located on #3 Ramos Street, which is a new address; the old address was Calle Javilla #49. The facility consists of an automobile parts store and an area where light mechanical operations (i.e., oil changes) take place. Auto Piezas Lugo personnel indicated that the current facility has been in operation for 22 years (since approximately 1984) and that the previous use was commercial; however, personnel could not specify the commercial use. The only waste generated by the facility consists of automotive waste oil. The waste is contained in drums within a three-foot-high concrete enclosure. No staining or evidence of spills was observed in this area.

4.4.3 Site Determination/Rationale: The facility was observed to be in good condition with good housekeeping. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.5 BAXTER HEALTHCARE CORP. – TRANSFUSION THERAPIES DIVISION (Road 122, Km 0.5)

4.5.1 Latitude/Longitude (decimal degrees): +18.087379192 / -67.026641360

4.5.2 Site Description: The Baxter Healthcare Transfusion Therapies Division (aka Baxter Biotech Fenwal Division) facility is located east of Route 122 and south of Route 2. The property is owned by PRIDCO, who leases the property to Baxter. The property was a vacant lot

until 1995, when Baxter occupied the facility. Baxter initiated manufacturing operations in 1996. Products include plasma cell devices and products used to separate platelets. The process includes a molding process where solvents are used to clean the molds. Solvents used as part of the process include isopropyl alcohol, methyl ethyl ketone (MEK) and cyclohexane. Waste solvents are stored in drums located within a chemical storage area located in the northeast portion of the property. Waste solvent disposal is regulated under a RCRA small-quantity generator permit (EPA ID No. PR000090613). The chemical storage area is utilized to store raw materials and hazardous waste (i.e., waste solvents). The facility holds air permits with PREQB for the emissions of solvents and diesel fuel for the emergency generator. Non-contact cooling water is used to cool chillers and compressors. Non contact cooling water and laundry water from the washing of gowns, is discharged to PRASA under an industrial wastewater permit. Prior to discharge, wastewater is pumped to a pre-treatment plant, where it is treated for pH neutralization prior to discharge to PRASA. Facility storm water is discharged under a National Pollutant Discharge Elimination System (NPDES) Multi-Sector Permit with EPA (Permit No. PRR05A825).

During the facility inspection, the chemical storage area was observed to be in good condition (i.e., evidence of staining spills) with materials stored on pallets and with secondary containment drains located beneath the materials. A review of Baxter's Spill Prevention Control and Countermeasure (SPCC) Plan indicates that there have not been any spills at the facility for three years prior to the preparation of the plan, which was dated 24 October 2005. Baxter personnel stated that they did not know of any spills since Baxter initiated activities on the site property. There are no monitoring wells, or septic tanks/fields on the facility. Currently 600 people work at the facility.

4.5.3 Site Determination/Rationale: During the facility inspection, all storage areas were observed to be in good condition with no apparent spills or discharges. Based on interviews with Baxter personnel and a review of documentation provided by Baxter, it appears that the facility is operating in accordance with applicable rules and regulations. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.6 BAYTEX INTERNATIONAL CORP. (El Retiro Industrial Park; Calle B)
4.6.1 Latitude/Longitude (decimal degrees): +18.077848477 / -67.029026170
4.6.2 Site Description: Baytex International Corp. (Baytex) is an inactive facility located at the corner of Calle A and Calle B, located within the Retiro Industrial Park. PRIDCO files indicate that Baytex was involved in the production of clothes and t-shirts at the facility between April 1998 and May 2000. The facility consists of one building. During the exterior facility inspection conducted by SAT 2 in July 2006, the building was noted to be abandoned, with overgrown vegetation noted in the area surrounding the building. A Baytex sign was still affixed to the side of the building. PRIDCO files indicate that the following companies operated within the site building prior to Baytex:

Company	Years	Product or Use
Northridge Knotting Mills	1956-1975	Woven Clothes
Fashions Knitwear, Inc.	1976-1979	Woven Clothes

Digital Equipment Corp. 1982-1992 Raw Material Warehouse

In addition to the Baytex building, Digital Equipment Corp. previously occupied several buildings within the Retiro Industrial Park. It should be noted that Digital Equipment Corp. is the source of a groundwater contamination plume at another San German facility. PRIDCO conducted a site inspection of the facility on 10 October 2000; subsequent to Baytex vacating the facility. The inspection concluded that there was no visible indication of adverse environmental impacts on the property.

4.6.3 Site Determination/Rationale: Based on the fact that Digital Equipment occupied the site building for 10 years, and the site's proximity to the Retiro well, which was recently closed due to VOC contamination, the former Baytex facility is recommended for further assessment under CERCLA.

4.7 CARIBE GE DISTRIBUTION COMPONENTS, INC. (Retiro Industrial Park; Calle B)

4.7.1 Latitude/Longitude (decimal degrees): **+18.075428221 / -67.026231407**

4.7.2 Site Description: The Caribe GE Distribution Components, Inc. (Caribe GE) facility consists of three buildings located on Calle B at the eastern end of the PRIDCO-owned Retiro Industrial Park. Current operations at the facility include the molding and stamping of circuit breakers. GE currently produces approximately 750,000 circuit breakers per week. A total of 650 employees currently work on site. Caribe GE began operations in Building #1 in 1969, where all operations (i.e., molding, assembly, packaging) were conducted within the building. Prior to Caribe GE occupying Building #1, the building was reportedly used for the manufacture of radio transformers. In 1984, Caribe GE started operations in Building #2 and assembly and packaging operations were transferred from Building #1 to Building #2; molding operations continued in Building #1. Prior to 1984, Building #2 reportedly was being used as a textile shop. In 2000, Caribe GE occupied Building #3 for use as a warehouse for the storage of raw materials and products. Prior to 2000, Building #3 was occupied by Digital Equipment Corp., who reportedly used the building for training purposes.

From 1980 through 1989, the facility generated spent halogenated solvents and ignitable wastes. Generation and storage of these wastes temporarily on site were authorized by a timely filing of a RCRA Part A application for interim status on 18 November 1980; thereafter, EPA assigned the facility identification number PRD091019924. The interim status authorization included the storage of RCRA hazardous waste codes F001, F017, and D001 ignitable wastes for more than a 90-day period in a temporary hazardous waste container storage area (HWCSA). Subsequently, process changes and solvent substitution programs initiated by Caribe GE resulted in only D001 ignitable wastes being stored. In July 1987, EPA notified Caribe GE of the need to either submit a RCRA Part B permit or close the HWCSA in accordance with interim status requirements. In August 1989, Caribe GE submitted a closure plan (for closure of the temporary HWCSA) to EPA and revised its Part A application, requesting reclassification as a generator instead of a storage facility subject to Part B requirements. Certification of final closure of the HWCSA was obtained in 1994.

In July 2000, prior to occupying Building #3, Caribe GE retained a consultant to conduct a Phase I Environmental Site Assessment (ESA). The Phase I ESA was performed in general accordance

with the specifications of the American Society of Testing and Materials (ASTM), Standard Practice E-1527-97. The Phase I ESA concluded that there was no evidence of recognized environmental conditions connected with the subject property; however, it was recommended that GE investigate asphalt-like stains in the building, and test for lead-based paint within the building.

A subsequent Phase II ESA was conducted in the area of Building #3 in July 2000. This investigation consisted of the following activities: soil samples collected in the area of transformers for PCB analysis; soil samples collected from areas around the site building for TAL Metals analysis; soil samples collected from a natural stormwater channel for total petroleum hydrocarbon (TPH) analysis; and a lead-based paint survey utilizing a portable X-Ray analyzer. Analytical results of the soil samples collected on the vicinity of the transformers did not indicate the presence of PCBs. None of the seven samples collected from areas around the site building indicated the presence of TAL metals above limits established by regulatory agencies. One of the seven soil samples collected from the natural stormwater channel indicated the presence of TPH at a concentration of 134 parts per million (ppm); slightly above the action limit of 100 ppm. The lead-based paint survey indicated that three areas showed lead concentrations above the 1 milligram per square centimeter (mg/cm^2) regulatory limit.

During the SAT 2 inspection of Building #1, several satellite drum storage areas of oil-soaked rags were observed. The rags are used to clean off the molding machines and when the drums are full, they are transferred to a staging area for disposal. Water from the floor cleaning within the building is transferred to an evaporator. Sediment generated from this process is removed by a disposal vendor. Caribe GE personnel indicated that this sediment is sometimes classified as hazardous.

During the SAT 2 inspection of Building #2, the assembly operations were observed. Part of the assembly process involves light soldering, where water is used for contact cooling purposes. This water is pumped to two evaporators located outside the eastern wall of Building #2.

Facility storm water is discharged under a NPDES Multi-Sector Permit with EPA (Permit No. PRR05A930). There are no monitoring wells, or septic tanks/fields on the facility.

During the facility inspection, the chemical storage area was observed to be in good condition (i.e., no staining or evidence of spills) with materials stored on pallets and with secondary containment drains located beneath the materials. A review of Caribe GE's SPCC Plan indicates that there have not been any spills at the facility. There are no monitoring wells, or septic tanks/fields on the facility. Currently 600 people work at the facility.

4.7.3 Site Determination/Rationale: During the facility inspection, all storage areas were observed to be in good condition with no apparent spills or discharges. Based on interviews with Caribe GE personnel and a review of documentation provided by Caribe GE, it appears that the facility is operating in accordance with applicable rules and regulations. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.8 CCL Insertco de Puerto Rico (Carr. 102, Km 33.3; Parque El Retiro)

4.8.1 Latitude/Longitude (decimal degrees): +18.076940888 / -67.027832126

4.8.2 Site Description: The CCL Insertco de Puerto Rico, Inc. facility (CCL) is located on Calle B in the Retiro Industrial Park. The property is owned by PRIDCO. CCL is currently involved in the processing of printing label inserts for the pharmaceutical industry. According to facility personnel, the company has operated in San German for 25 years; for an unknown period of time, CCL also operated in another Retiro Industrial Park parcel, located on Calle A. CCL has operated out of its current location for the past eight years. The current facility employs approximately 125 people. The facility consists of one building. According to facility personnel the following companies operated within the site building prior to CCL:

Company	Years
Southdale Knotting Mills	circa 1961
Digital Equipment Corp.	prior to 1998

In addition to the CCL Insertco building, Digital Equipment Corp. previously occupied several buildings within the Retiro Industrial Park. It should be noted that Digital Equipment Corp. is the source of a groundwater contamination plume at another San German facility, located approximately 1 mile northwest of CCL's current facility.

During the facility inspection, CCL's work areas and plate room were observed to be clean and well maintained with no floor drains. All equipment was noted to be modern and all supplies were stored on pallets. Wastes generated from the facility process include press cleaning solution and sludge ink. These materials are disposed of by a licensed waste-removal vendor. Sludge ink was noted to be stored outside in two plastic 600-gallon aboveground storage tanks. These tanks were located on grates and were surrounded by 6-inch curbing with a drain plug in place. The exterior facility inspection indicated the presence of a drum storage area near the receiving dock. This area consisted of a shed with a concrete floor and walls with a corrugated metal roof. No floor drains were noted in this area. Drums stored in this area included an isopropyl alcohol solvent mix "wash V-120," which is a cleaner for the facility presses. A small stream was also noted extending east to west along the northern facility border.

According to facility personnel, the facility does not discharge to the PRASA. In addition, the facility does not have any monitoring wells or septic tanks/fields. Facility personnel indicated that there is an UST on the facility; however, it is not in use and facility personnel did not know the capacity or previous contents of the tank.

4.8.3 Site Determination/Rationale: Based on the fact that Digital Equipment previously occupied the site building, and the site's proximity to the Retiro well, which was recently closed due to VOC contamination, the CCL Insertco facility is recommended for further assessment under CERCLA.

4.9 CEMEX (Road #2; Km 175.2)

4.9.1 Latitude/Longitude (decimal degrees): +18.082784588 / -67.019950033

4.9.2 Site Description: The Cemex Puerto Rico facility is located on Road #2 in San German. The facility has operated as a cement mixing facility since 1972. Gravel operations started in 1979. The facility formerly operated under the name of Hormigonera Mayaguezana. The facility changed to Cemex in 2006; no site operations are currently taking place due to ongoing renovations. According to on-site personnel, the facility used to have a maintenance shop, where light mechanical operations took place. Light mechanical activities no longer take place on the facility. According to on-site personnel, these operations were moved to a facility in Mayaguez. Approximated 25 people work on the site.

4.9.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. A review of the facility's SPCC Plan indicates that no spills have occurred at the facility. In addition, facility personnel stated that chlorinated solvents are not used at the facility. Based on a review of the above, the site is not recommended for placement into CERCLIS.

4.10 CORDIS, LLC / OMJ PHARMACEUTICAL, Inc. (Road #362; Km 0.5)

4.10.1 Latitude/Longirude (decimal degrees): +18.086981665 / -67.034404432

4.10.2 Site Description: The Cordis, LLC / OMJ Pharmaceutical, Inc. facility is located on Route 362 in a commercial/industrial area of San German. The property is owned by PRIDCO. According to OMJ, The property was previously occupied by IO Labs from 1993 to 1994; IO Labs changed its name to OMJ Pharmaceutical, Inc. in 1995. Coopervision PR reportedly occupied the facility for an unknown period of time prior to 1993. Current activities at Cordis include the coating and crimping of stents; OMJ currently manufactures a cream used by diabetics. The facility consists of eight buildings. OMJ's manufacturing operations take place in Building B-1; OMJ's shares a laboratory with Cordis in Building B-5. Cordis operates within the remaining five buildings (i.e., Buildings B-2, B-2A, B-3, B-6, B-7, and B-10). Currently 1,500 people work at the facility.

As of 2005, Cordis has assumed all environmental permitting activities for the facility, including the portion occupied by OMJ. Waste disposal for Cordis and OMJ are regulated under Cordis' RCRA large-quantity generator permit. Drums of waste generated by both facilities are stored in two hazardous waste storage areas (one for Cordis and one OMJ) located along the facility's northern border. A review of RCRA files indicate that Full RCRA Generator and accompanying RCRA Land Disposal Restrictions inspections were performed at IO Labs in 1993 and OMJ in 1995. During these inspections, the facility was found to be in full compliance with local and federal regulations.

The facility also has a permit with PRASA for the discharge of process wastewater. Wastewater is tested, then transferred for neutralization prior to discharge via Outfall #001. In addition, the facility has air permits for emissions associated with the coating modules and the facility's emergency generator. Emissions associated with the coating process include isopropyl alcohol, toluene, tetrahydrofuran, and particulates. Emissions associated with the emergency generator include diesel fuel and kerosene. Facility storm water is discharged under a NPDES permit with EPA.

During the facility inspection, the hazardous waste storage areas for Cordis and OMJ were observed along the facility's northern border. Cordis' hazardous waste storage area is located behind Building B-2; OMJ's hazardous waste storage area is located to the rear of Building B-3. These areas were noted to be in good condition (i.e., no staining or evidence of spills). In Cordis' hazardous waste storage area, drums were stored on pallets with secondary containment drains located immediately outside the area. OMJ's hazardous waste storage area did not have any materials. A review of Cordis' Contingency Plan (revised May 2005) indicated that four spills have occurred at the facility since 1995. Three of these spills involved kerosene and the remaining spill involved hydraulic oil from a garbage compactor. Cordis personnel stated that each of these spills were immediately contained and cleaned. There are no monitoring wells, septic tanks/fields or USTs on the facility.

4.10.3 Site Determination/Rationale: During the facility inspection, all storage areas were observed to be in good condition with no apparent spills or discharges. A review of on-site documentation provided by Cordis did not indicate that PCE or TCE is used or stored on site. Based on interviews with Cordis/OMJ personnel and a review of documentation provided by Cordis, it appears that the facility is currently operating in accordance with applicable rules and regulations. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS at this time.

4.11 ESCUELA LOLA RODRIGUEZ DE TIO (Calle Dr. Veve Final)

4.11.1 Latitude/Longitude (decimal degrees): +18.082432918 / -67.035932379

4.11.2 Site Description: The Escuela Lola Rodriguez de Tio facility is a high school located on Calle Dr. Veve Final in San German. According to facility personnel, the school previously stored chemicals associated with the chemistry laboratory. The facility also accepted chemicals from other area schools for disposal. Disposal of materials was performed by a licensed waste-removal vendor. The chemical laboratory was subsequently closed by police (date unknown) due to poor interior housekeeping. The facility no longer stores wastes.

EPA RCRA files indicate that in 1993, the facility registered under RCRA as a small-quantity generator of D001 wastes. This registration was under the name "Dept. of Education – Lola Rodriguez de Tio." The RCRA notification form indicated that the EPA ID number was solicited for a gasoline UST closure project. The PREQB UST database indicates that Escuela Lola Rodriguez de Tio has one 500-gallon UST listed as "Permanently Out of Use." The contents are not identified in the database; however, based on the facility's 1993 RCRA notification, the tank is believed to have contained gasoline.

4.11.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. No wastes are currently stored at the facility. A review of the facility's list of chemicals used (when the laboratory was active) indicated that most of the materials consisted of inorganic solids; PCE and TCE were not on the list of chemicals used by the facility. Furthermore, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.12 ESSO STANDARD OIL CO. – PR-CO-371 (Calle Luna #22)

4.12.1 Latitude/Longitude (decimal degrees): +18.082157332 / -67.048833072

4.12.2 Site Description: The Esso Standard Oil Co. (PR-CO-371) facility is located on Calle Luna #22 and is used for gasoline distribution and light mechanical operations, including oil changes. The owner of the property is Moises Rivera. The site contact stated that the property was previously occupied by Garaje Casiano. The facility consists of one building with two open bays located on the west side of the building. One bay is used for oil changes and the other bay is used as a car wash. An aboveground storage tank was observed in the rear of the facility building. This tank is used to store used oil. In addition, there is an area of the building used for the storage of drums containing transmission fluid. Two empty drums were observed in this area. Monitoring wells were observed on the property in the area of the gasoline USTs. Several drums of trap water, generated from a recent UST upgrade, were observed on the property. The water was awaiting analysis, and disposal is expected to take place once the contents are classified. Background information indicates that the facility has two active 10,000-gallon gasoline tanks. Four tanks (i.e., three gasoline and one used oil) are listed as "permanently out-of-use." The northwest portion of the property is rented by Mechanica El Jack. According to the site contact, this area is used for light mechanical purposes including tune ups, brakes, and changing spark plugs. There were no Mechanica El Jack personnel on the property during the facility inspection. A drainage swale was observed along the western property border. This swale extends north along the western property border, then meanders east along the northern property boundary.

4.12.3 Site Determination/Rationale: During the facility inspection, storage areas were observed to be in good condition with no apparent spills or discharges. The facility's USTs are regulated under PREQB's UST Program and the waste oils are regulated under the facility's RCRA small-quantity generator permit. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.13 ESSO STANDARD OIL CO. – PR-372 (Road 122; Km 1.0)

4.13.1 Latitude/Longitude (decimal degrees): +18.083648477 / -67.032659014

4.13.2 Site Description: The Esso Standard Oil Co. – PR CO-372 facility is located on the eastern side of Road 122 (aka Road 119) and is currently used for gasoline distribution and light mechanical purposes. The property is bordered to the west by Road #122, to the east by a wooded area, and to the south by an overgrown area leading to Rio Guanajibo. The facility is currently owned by Esso and has been operated by Mr. Mariano Ortiz Vargas since 2003. The property has been used as a gasoline service station since 1960. PREQB files indicate that the facility has two active 10,000-gallon gasoline tanks and one 4,000-gallon diesel fuel tank. Two 6,000-gallon gasoline tanks, one 4,000-gallon gasoline tank, and one 500-gallon used oil tank are listed as "permanently out-of-use." Monitoring wells were observed on the property in the area of the gasoline USTs. Activities conducted by Esso include gasoline distribution and light mechanical work (i.e., oil changes. In addition, Esso rents an area to the immediate rear (i.e., east) of the building to Garaje Pedro. Activities conducted by Garaje Pedro include repairing breaks and bearings, carburetors, and fuel injectors. The northeastern portion of the property is rented to Victor Auto Air, where repair of automobile air conditioning systems take place. A freon-recycling unit was observed in this area.

4.13.3 Site Determination/Rationale: During the facility inspection, an aboveground waste oil tank was observed along the eastern property boundary. The tank was observed to be in good condition with no apparent spills or discharges. No apparent spills or discharges were noted in the areas operated by Esso, Garaje Pedro, or Victor Auto Air. The disposal of waste oil is regulated under the facility's RCRA generator permit. In addition, the facility's USTs are regulated under PREQB's UST Program. Furthermore, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.14 FERREIRA FUNERAL HOME (Interamerican Avenue #146)

4.14.1 Latitude/Longitude (decimal degrees): +18.080875256 / -67.037753097

4.14.2 Site Description: The Ferreira Funeral Home is located on Interamerican Avenue (aka Luna Street) at its intersection with Calle Fuerza. The facility is owned by the Ferreira family and has been operated as a funeral home for 28 years (since approximately 1974). Solvents used as part of the embalming process include methanol and formaldehyde.

Mr. Javier Ferreira stated that a well exists in the parking lot north of the site building. Mr. Ferreira claimed that this well was not properly closed. The well was to be used by Ferreira; however, it was not used due to the presence of an oily sheen in the well water. Mr. Ferreira alleged that the adjacent GPR gas station's disposal practices included the disposal of oil waste into an on-site septic system.

4.14.3 Site Determination/Rationale: No hazardous wastes are currently generated as part of the embalming process. No apparent spills or discharges were observed during the facility inspection. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.15 GARAJE RODRIGUEZ (Calle Luna – Across from Santa Rosa de Lima Church)

4.15.1 Latitude/Longitude (decimal degrees): +18.077565181 / -67.027757117

4.15.2 Site Description: Garaje Rodriguez is an automobile body shop located on Calle Luna, across from Santa Rosa de Lima Church. The facility is bordered to the north by Calle Luna, to the west by a Texaco Station, and to the south by a drainage ditch. The property is owned by Mr. German Rodriguez. The site has been operated as an automobile body shop for approximately 45 years. The garage is composed of three block walls with a corrugated metal roof. The western side of the garage is open. Operations include auto body repair and painting. According to Mr. Rodriguez, waste paints and solvents are collected in buckets and left to evaporate. One 5-gallon bucket of waste paint was observed within the garage during the facility inspection. After evaporation, the buckets are discarded with regular trash. During the inspection, a drainage swale was noted along the southern boundary of the property. Runoff from the site (including the garage area) was observed to flow toward this swale, which was observed to be flowing west along the southern property boundary. The Retiro Industrial Park (owned by PRIDCO) was observed on the south side of the drainage swale. In addition, a septic system was observed in the southeastern portion of the property. This system is beneath a small shed, which has a bathroom for the employees. This system is approximately 1-year old. The bathroom currently receives water from a hose connected to a home located on the north side of Luna Street. There

are no monitoring wells on the site property. Garage Rodriguez currently employs two people.

4.15.3 Site Determination/Rationale: Based on the facility's use of solvents and paints for more then 45 years, and the fact that a VOC groundwater plume (which includes chlorinated solvents) exists in the area of contaminated public supply wells directly downgradient of the site, this facility is recommended for further assessment under CERCLA.

4.16 GULF S/S #056 (Road 122 Int. 362)

4.16.1 Latitude/Logitude (decimal degrees): +18.085426701 / -67.031666966

4.16.2 Site Description: The Gulf S/S #056 facility is located on east Road #122 at the intersection with Road 362. The property is currently used for gasoline distribution and light mechanical (i.e., oil changes) purposes. The facility is also used as a car wash. The property owner is Mr. Carlos Ramos Velei. PREQB files indicate that the facility has two active gasoline tanks with capacities of 10,000 gallons and 12,000 gallons. Two monitoring wells were observed on the property in the area of the gasoline USTs and these wells are periodically sampled by Gulf. There is an aboveground storage tank used to store waste oil. This tank was observed to be in good condition with secondary containment. Waste oil is disposed of by a licensed waste removal vendor. There is an on-site well which is used for the car wash area.

4.16.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted at the facility. The floors of the light mechanical area were noted to be clean with no staining. The facility's USTs are regulated under PREQB's UST Program. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.17 HOSPITAL DE LA CONCEPCION (NEW) (Road 2; Km 173.4)

4.17.1 Latitude/Longitude (decimal degrees): +18.097401526 / -67.038100061

4.17.2 Site Description: The Hospital de la Concepcion (New) facility is located on the northern side of Road # 2. The facility has operated as a hospital since July 2004. Prior to that, the property was undeveloped. Chemicals stored on site include xylene, various alcohols, and formaldehyde. During the facility inspection, it was noted that wastes were stored in the pathology laboratory. Waste solvents were noted to be stored in 5-gallon buckets. PREQB files indicate that there are USTs associated with the facility. One 20,000-gallon tank is listed as "temporarily out of use" and three 2,000-gallon tanks are listed as "permanently out-of-use." PREQB's database does not indicate the contents stored within these tanks. The facility also has permits with PREQB for on-site generator emissions and for the disposal of medical wastes.

4.17.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted at the facility. In addition, the facility is permitted for on-site generator emissions and for the disposal of medical wastes. USTs are regulated under PREQB's UST Program. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.18 HOSPITAL DE LA CONCEPCION (OLD) (Calle Luna #41)

4.18.1 Latitude/Longitude (decimal degrees): +18.081767993 / -67.047084423

4.18.2 Site Description: The Hospital de la Concepcion (Old) facility is located on Calle Luna in a commercial area of San German. The facility has been inactive since 2004, when operations were moved to a new facility located on Road #2 (i.e., Hospital de la Concepcion [New]). According to facility personnel, no environmental assessments were completed as part of the closure of the facility. During the facility inspection, wastes were observed to be stored in the former pathology laboratory. Wastes included xylene, various alcohols, and formaldehyde. These were the only wastes generated while the facility was active. A floor drain was also observed in the pathology laboratory. According to personnel, this drain leads to either the sanitary or storm water system.

4.18.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted at the facility. Since wastes were observed to be stored inside and in good condition, the site is not recommended for placement into CERCLIS.

4.19 HOSPITAL METROPOLITANO (Calle Javilla #8)

4.19.1 Latitude/Longitude (decimal degrees): +18.082252185 / -67.040085337

4.19.2 Site Description: The Hospital Metropolitano is located on the north side of Calle Javilla in a commercial/residential area of San German. According to the hospital coordinator, the facility has operated as a hospital for over 30 years. The hospital originally operated under the name Centro de Salud Familiar DOH. Hospital Metropolitano has operated at this facility for the past several years. EPA RCRA files indicate that in 2000, Centro de Salud Familiar DOH registered under RCRA as a large-quantity generator. The hazardous waste notification form indicates that this registration was due to the closure of on-site USTs. A review of PREQB files indicates that the facility operated two diesel fuel USTs (2,000 and 500 gallons) which are listed as "permanently out of use." The facility currently has permits with PREQB for on-site generator emissions and for the disposal of medical wastes.

4.19.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were observed. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.20 INTERAMERICAN UNIVERSITY – SAN GERMAN (Calle Luna)

4.20.1 Latitude/Longitude (decimal degrees): +18.084485888 / -67.049394572

4.20.2 Site Description: The Interamerican University San German Campus (Interamerican) is located on Calle Luna (aka Interamerican Avenue). Wastes generated on campus are associated with the University's Science Hall, which consists of the Biology, Environmental, and Chemistry Departments. Unused chemicals are stored in a concrete shed attached to the southwestern portion of the Science Building, near the organic laboratory. This shed has 4-inch curbing at the door and a capped floor drain. Chemicals observed in the chemical storage shed included TCE, carbon tetrachloride, acetone, and methanol. Bottles were observed to be stored on plastic with raised edges. The floor of the chemical storage shed was observed to be clean with no staining. Waste chemicals generated from the laboratory are stored in a waste storage building, located to the southeast of the Science Building. This area consists of a concrete building surrounded by a 10-foot-high barbed-wire fence. There were no floor drains inside the building and concrete

curbing exists outside the building; however, there are drains located outside of the building. Access to the waste storage area is secured by a locked gate. EPA RCRA files indicate that Interamerican is currently registered under RCRA as a small-quantity generator. Generated wastes are removed by a licensed waste-removal vendor.

PREQB files indicate that Interamerican University has two 4000-gallon gasoline tanks, two 500-gallon diesel fuel tanks, and one 1,500-gallon diesel fuel tank. All of these tanks are listed as "Permanently Out of Use" in PREQB's database. The closure status of these tanks is unknown.

4.20.3 Site Determination/Rationale: During the facility inspection, the chemical storage and waste storage areas were noted to be in good condition. In addition, no apparent spills or discharges were noted at the facility. A review of the facility's material safety data sheets did not indicate that the facility uses or stores PCE. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.21 JAVILLA S/S 1058 (Calle Javilla #12)

4.21.1 Latitude/Longitude (decimal degrees): +18.082839237 / -67.040834812

4.21.2 Site Description: The Javilla S/S 1058 facility is located on the northern side of Calle Javilla and is currently used for gasoline distribution and light mechanical purposes. The property is owned by Mr. Luis Padovani. According to Mr. Padovani, the light mechanical operations have taken place to the rear (i.e., north) of the facility since 2001. Prior to 2001, the only mechanical operations taking place at the facility consisted of oil changes. EPA RCRA files indicate that in 1996, the facility filed under RCRA as a small-quantity generator. PREQB files indicate that the facility has three active 8,000-gallon gasoline tanks, one 4,000-gallon diesel fuel tank, and one 560-gallon used oil tank. Four gasoline tanks (8,000, 2,200, 3,000, and 5,000 gallons), one 4,000-gallon diesel fuel tank, and one 560-gallon used oil tank are listed in PREQB's database as "permanently out-of-use." Monitoring wells were observed on the property in the area of the gasoline USTs.

4.21.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. Rain water (1 to 2 inches) was observed to be ponding in the area of the light mechanical area (i.e., under a canopy) in the rear of the property. The disposal of waste oil is regulated under the facility's RCRA small-quantity generator permit. The facility's USTs are regulated under PREQB's UST Program. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.22 KMART STORE #3896 (Road #2 Int. Road #122)

4.22.1 Latitude/Longitude (decimal degrees): +18.0890216527 / -67.030764892

4.22.2 Site Description: Kmart Store #3896 is a retail store located within Plaza de Oeste San German, which is a shopping center located at the intersection of State Road #2 and Avenida Castro Perez (aka Road #122). In addition to the sales of various goods, Kmart offers several services, including recycling of waste oil and car batteries, a small cafeteria, and development of photographs. The facility currently employs between 122 and 127 employees. Kmart has operated at this location since approximately 1991. Kmart accepts waste oil form the general public, where it is stored in a fiberglass aboveground storage tank outside the rear (i.e.,

southwestern corner) of the building. In addition, when car batteries are purchased at Kmart, the old batteries are left by the purchaser. Car batteries are stored inside the building. Other wastes generated at Kmart include oil/grease generated by facility's kitchen. This oil is stored in drums outside the building adjacent to the waste oil tank. Waste oil, kitchen oil/grease, and car batteries are disposed of by licensed waste-removal vendors.

Kmart's photograph development operation takes place inside the northwestern portion of the building. Part of the process includes a silver recovery unit, which houses a filter cartridge used to contain silver waste. When these cartridges are full, they are removed by a licensed waste-removal vendor. Kmart personnel indicated that prior to using the silver recovery unit, wastes were stored in drums in the rear of the facility; adjacent to the waste oil and kitchen oil/grease.

4.22.3 Site Determination/Rationale: During the facility inspection, the waste storage areas were observed to be in good condition. The inside and outside areas of the facility were observed to be in good condition with no apparent spills or discharges. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. There are no monitoring wells on site. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.23 NEW AGE WIRELESS (Road #2 Int. Road #122)

4.23.1 Latitude/Longitude (decimal degrees): +18.089924962 / -67.030430637

4.23.2 Site Description: The New Age Wireless facility (New Age) is a retail outlet located within Store #15 of the San German Shopping Center, located at the intersection of State Road #2 and Road #122. New Age has operated at the facility approximately 4 to 5 months and is currently responsible for the sale of various wireless products and plans. Prior to New Age occupying the facility, Photo Imagen operated in the building for an unspecified period of time. According to the New Age site contact, Photo Imagen sold photographic equipment; no photo development took place during Photo Imagen's occupation of the facility. EPA RCRA files indicate that in the early 1990s, the facility was occupied by Kodak Rohola, Inc. (Kodak). Kodak operated a photographic retail outlet with a mini lab for film and paper processing. In 1991, Kodak registered under RCRA as a small-quantity generator of wastes associated with the photograph development process. RCRA files indicate that in 1994, the facility no longer generated hazardous waste and was out of business

4.23.3 Site Determination/Rationale: During the facility inspection, the facility was noted to be in good condition with no apparent spills or discharges. No hazardous wastes are currently generated. In addition, expected wastes previously generated at the facility do not include PCE. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.24 OLD MARKET PLAZA (96 Interamerican Avenue)

4.24.1 Latitude/Longitude (decimal degrees): +18.081256712 / -67.041670296

4.24.2 Site Description: The Old Market Plaza is located at Interamericana Avenue (aka Luna Street) and is owned by the Municipality of San German. The facility currently consists of a public parking garage and a sports bar (i.e., Hoops Sports Bar and Grill). EPA RCRA files indicate that in 2004, the municipality of San German registered Old Market Plaza, under

RCRA, as a large-quantity generator (EPA ID No. PRD0987376225). Wastes generated were classified as D008 waste associated with the abatement of lead-based paint. No other hazardous waste was to be generated as part of the lead-based paint abatement.

4.24.3 Site Determination/Rationale: During the facility inspection, the facility was noted to be in good condition with no apparent spills or discharges. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.25 OLYMPIC CLEANERS AND LAUNDROMAT (Calle Luna #18B)
4.25.1 Latitude/Longitude (decimal degrees): +18.081856062 / -67.048401821
4.25.2 Site Description: Olympic Cleaners and Laundromat (Olympic) is located on the south side of Calle Luna. Olympic has operated at this location since 1979. The owner of the property is Mr. Raphael Rodriguez Gonzalez and the site operator is Ms. Linda Cintron. According to Ms. Cintron, the building was empty when she started operations in 1979. To her recollection, the building was formerly operated as an automobile parts retail store. Olympic currently provides dry cleaning and laundry services to its customers. The facility utilizes mineral spirits as part of the dry cleaning process. Olympic uses approximately 8 drums of mineral spirits per year. PCE has never been used as part of the dry cleaning process. Spent filters are placed in boxes and discarded with regular trash. During the facility inspection, a drum of mineral spirits (mineral spirits #66) was observed to be stored on the floor inside the building adjacent to the dry cleaning unit. The drum was noted to be in good condition with no apparent spills. There are no monitoring wells or septic tanks/fields on the site property.

4.25.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. In addition, PCE has not been used as part of the dry cleaning process. Based on an evaluation of the above conditions, the facility is not recommended for placement into CERCLIS.

4.26 PCB HORIZON TECHNOLOGY, INC. (Road 362; Km 1.0)
4.26.1 Latitude/Longitude (decimal degrees): +18.088815460 / -67.037592858
4.26.2 Site Description: The PCB Horizons, Inc. facility (PCB) is located on the north side of Road #362 in a commercial/industrial area of San German. The property is owned by PRIDCO, who leases the facility to PCB. The facility is currently inactive and is currently in the process of being disassembled and decommissioned. The facility currently has no power; the building is currently being gutted at the request of PRIDCO. According to the on-site contact, previous occupants of the facility included Digital Equipment Corporation (1968-1993), Circo Caribe Corp. (1993-1997), and Via Systems de PR, Inc. (1997-2003). Operations conducted at the facility by all of these companies included the manufacture of printed circuit boards.

EPA RCRA files indicate that previous investigations conducted at the facility include a RCRA Facility Assessment and RCRA Facility Investigation. These investigations identified the presence of contaminated soil and groundwater under the site. Contaminants included chlorinated ethenes and petroleum hydrocarbons. Under EPA oversight, Digital proceeded to remedy the soil and groundwater contamination as a voluntary Interim Measure following requirements of the RCRA Corrective Action process. The facility is currently operating a groundwater remediation system, where extraction wells pump contaminated groundwater for

treatment prior to discharge under a PRASA permit. Approximately 80,000 gallons of contaminated groundwater per day are pumped for treatment. The system is operated by Hewlett Packard (formerly Compaq Corporation; formerly Digital Equipment Corp.). The system is currently in operation.

A review of background filles indicates that the site appears in CERCLIS (EPA ID No. PRR991291857) under the name "Digital Equipment Corporation." A Site Inspection was conducted at the facility in 1989.

During the facility inspection, three aboveground storage tanks (ASTs) were observed. Two ASTs contained water (one for fire suppression and one to hold well water). The third AST was a 9,000-gallon tank used to store copper solution from the plating process. This tank was surrounded by a concrete berm which contained any potential spills. Water (2-3 feet) was observed in the bottom of the bermed area. Car batteries were observed to be stored a concrete surface with no containment. A hazardous waste drum storage facility was also observed. This area included a concrete floor, 3-foot-high concrete walls, and a roof. Hundreds of drums were stored in this area. Ponded water, believed to be the result of a leaking roof, was observed the hazardous waste drum storage area. Monitoring wells are located throughout the facility.

4.26.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were observed. Background files indicated that the site is already listed in CERCLIS. In addition, contaminated soil and groundwater at the site are being remedied under a voluntary Interim Measure following the requirements under the RCRA Corrective Action process. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.27 PACE ANALYTICAL, INC. (El Retiro Industrial Park; Calle B)
4.27.1 Latitude/Longitude (decimal degrees): +18.075521456 / -67.026877185
4.27.2 Site Description: Pace Analytical, Inc. (Pace) is an analytical laboratory located within the PRIDCO-owned Retiro Industrial Park. The facility is bordered to the east and south by a Caribe GE facility, to the north by Calle B, and to the west by Calle C. The building has been used as an analytical laboratory since 1969. Companies operating within the building included Omni Research (1969-1989) and Caribbean Bio-Labs, Inc. (1989-2003). Pace has operated within the building since December 2003. Pace currently receives soil and aqueous samples from environmental clients for analysis. They also receive samples from pharmaceutical clients. Pace is currently registered under RCRA as a small-quantity generator. Pace stated that the most common solvents used in their process are methylene chloride and chloroform. Sample wastes are routinely tested and if deemed hazardous, they are stored in a hazardous waste storage area located outside the western side of the building. Wastes are subsequently removed by a licensed waste-removal vendor. The hazardous waste storage area was noted to consist of a concrete surface with block walls and a roof. Access to the hazardous waste storage area is secured by a locked gate. Pace personnel stated that there have been no spills or discharges from the facility since they began operations in 2003. The facility currently employs 38 people. No monitoring wells or septic tanks/fields exist at the facility.

Background files indicate that two RCRA compliance inspections were conducted at the facility.

In 1983, Omni Research, Inc. was cited for minor violations associated with generated remainder latex. In 1993, Caribbean Bio-Labs, Inc. was cited for failure to label containers located in the hazardous waste storage area.

4.27.3 Site Determination/Rationale: During the facility inspection, the hazardous waste storage area was noted to be in good condition. No apparent spills or discharges were noted at the facility. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.28 PACHECO DRY CLEANERS (Calle Luna #69)

4.28.1 Latitude/Longitude (decimal degrees): +18.084296179 / -67.057019233

4.28.2 Site Description: Pacheco Dry Cleaners (Pacheco) is located on the north side of Calle Luna. Pacheco has operated at this location as a dry cleaner since 2004. The owner of the property is Armondo Pacheco. Prior to 2004, the building was reportedly used as housing for college students. Pacheco currently provides dry cleaning and laundry services to its customers. Since beginning operations, Pacheco has utilized one dry cleaning machine. The facility utilizes mineral spirits as part of the dry cleaning process. Pacheco uses approximately 3 drums of mineral spirits per year. PCE has never been used as part of the dry cleaning process. Filters are changed twice per year with used filters being disposed of at a local recycling center. Pacheco was unable to provide documentation for the disposal of the filters. During the facility inspection, a drum of mineral spirits (mineral spirits #66) was observed to be stored on the floor inside the building adjacent to the dry cleaning unit. The drum was noted to be in good condition with no apparent spills. During the inspection of the exterior of the facility, a drainage swale was noted . This swale was observed to be flowing west along the northern property boundary, than south along and western property boundary and under Luna Street. Rinse water was observed to be flowing from the rear of the building and into the swale. Further inspection indicated that the liquid contained soapy water from Pacheco's washing machines. There are no monitoring wells or septic tanks/fields on the site property.

4.28.3 Site Determination/Rationale: With the exception of the rinse water from the facility's washing machines, no apparent spills or discharges of hazardous materials associated with the dry cleaning process were noted. In addition, PCE has not been used as part of the dry cleaning process. Based on an evaluation of the above conditions, the facility is not recommended for placement into CERCLIS.

4.29 PENCHI FUNERAL HOME (El Colon Street)

4.29.1 Latitude/Longitude (decimal degrees): +18.081767993 / -67.047084423

4.29.2 Site Description: The Penchi Funeral Home is located on El Colon Street at the intersection of Luna Street. The facility is owned by the Penchi family and has been operated as a funeral home since 1970. Prior to 1970, the building was operated as a pasta manufacturing and processing facility. Solvents used as part of the embalming process include methanol and formaldehyde.

4.29.3 Site Determination/Rationale: No hazardous wastes are currently generated as part of the embalming process. No apparent spills or discharges were observed during the facility inspection. Based on an evaluation of the above conditions, the site is not recommended for

placement into CERCLIS.

4.30 PEP BOYS MANNY MOE & JACK (Road 122; Km 1.1)

4.30.1 Latitude/Longitude (decimal degrees): +18.087876087 / -67.031204980

4.30.2 Site Description: The Pep Boys Manny Moe and Jack facility is located on Route 122 just south of the San German Shopping Center. The facility consists of one building which has two functional areas, including a retail area and an area where light mechanical operations take place. The building was constructed in approximately 1995 and has only been occupied by Pep Boys. The site is completely paved. Pep Boys filed an Acknowledgement of Notification of Hazardous Waste Activity with EPA in 1995, as a small-quantity generator of D001, D008, and D016 wastes. Wastes generated include waste water/coolant, used oils, and filters. All wastes generated are stored inside the building. The facility has no floor drains. To the rear (i.e., south) of the building is an area where used tires are staged for recycling. Tires are contained by a cement block enclosure with a roof and one open end, which is fenced with a locked gate. There are no monitoring wells on the site.

4.30.3 Site Determination/Rationale: During the facility inspection, all storage areas were observed to be in good condition with no apparent spills or discharges. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.31 PR ARMY NATIONAL GUARD (Road 360 Int. Road 362)

4.31.1 Latitude/Longitude (decimal degrees): +18.088509552 / -67.039055937

4.31.2 Site Description: The PR Army National Guard facility is located on Road 360 at its intersection with Road 362 in San German. The facility has been occupied by the PR National Guard since the 1970s; facility personnel did not have any knowledge of previous occupants or uses of the property. EPA RCRA files indicate that in 1993 the facility was registered under RCRA as a small-quantity generator. Wastes generated were classified as D001 (i.e., ignitable) waste. According to on-site personnel, no wastes are generated or stored at the facility. The only chemicals include household cleaners as well as paints, isopropanol degreasers, and gun cleaners. All of these products were store in stored in cabinets.

4.31.3 Site Determination/Rationale: During the facility inspection, the facility was noted to be in good condition with no apparent spills or discharges. Access to the facility was noted to be secured by a fence with a locked gate. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.32 RAMOS ALUMINUM WORKS (Road 360; Km 0.8)

4.32.1 Latitude/Longitude (decimal degrees): +18.087401178 / -67.039952925

4.32.2 Site Description: The Ramos Aluminum Works (Ramos) facility is involved in the assembly of metal doors, sash frames, and moldings. The property is owned by PRIDCO. Ramos Aluminum has occupied the facility for approximately six years (i.e., since 2000). According to Ramos personnel, the facility was previously used as a lumberyard. The assembly process is dry with no wastes being generated. Scrap aluminum from the assembly process is recycled. All completed assemblies are painted off site. In the northern portion of the parking lot is a small automobile repair shop (Taller Ojeda). Operations consist of light mechanical operations (i.e., oil changes). The facility has a permit for waste oil recycling. Waste oil is stored in an aboveground storage tank. No staining or evidence of spills was observed in this area.

4.32.3 Site Determination/Rationale: Both the Ramos and Taller Ojeda facilities were noted to be in good condition with good housekeeping. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.33 SAN GERMAN AUTO CARE (Calle Luna #18)

4.33.1 Latitude/Longitude (decimal degrees): +18.081856062 / -67.048401821

4.33.2 Site Description: The San German Auto Care facility is located on the south side of Luna Street in the rear portion of the property; behind the Olympic Cleaners and Laundromat. The facility currently performs light mechanical repairs and maintenance of automobiles. Activities include wheel balancing/alignment and oil changes. The current operator has been on the property for approximately 10 years. Prior to San German Auto Care, the facility was operated by Wheel Alignment Pagan, who operated a similar business to San German Auto Care. Prior to that, a metal fabrication operation was reportedly conducted on site, where metal frames were fabricated for heavy-duty trucks. According to the current site operator, the commercial activities have been conducted on the property for approximately 40 to 50 years.

The facility currently consists of a garage, which has three concrete walls with a corrugated metal roof. The northern side of the garage is open, with no walls. During the facility inspection, automobile parts were noted to be stored on the concrete surface throughout the facility's exterior. A 50-gallon waste oil storage tank was also noted on the northwest corner of the garage. A small oil stain was noted adjacent to this tank. No monitoring wells or septic tanks/fields exist at the facility.

4.33.3 Site Determination/Rationale: During the facility inspection, no spills or discharges were noted, with the exception of the small oil stain adjacent to the 50-gallon waste tank. This is common for light mechanical facilities and waste oil is subject to CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the facility is not recommended for placement into CERCLIS.

4.34 SAN GERMAN S.T.P. (Road 360; Km 1.4)

4.34.1 Latitude/Longitude (decimal degrees): +18.092362160 / -67.037946682

4.34.2 Site Description: The San German S.T.P. facility is a sewage treatment plant located on Road 360 at its intersection with Road 362 in San German. The facility is owned by PRASA. The facility currently consists of two sewage treatment plants. PRASA is in the process of constructing a replacement sewage treatment plant. EPA RCRA files indicate that in 1980, the facility was registered under RCRA as a generator. The hazardous waste notification form did not specify the type of generator or the type of waste generated. According to on-site personnel, no hazardous wastes are generated or stored at the facility. The only raw material consists of chlorine. Non-hazardous sludge from the facility is shipped to the Yauco Landfill.

4.34.3 Site Determination/Rationale: During the facility inspection, a storage area was observed where replacement equipment, including valves and transformers, were stored outside. The transformers were non-PCB containing. Several drums were also noted in this area. According to on-site personnel, these drums contained a diesel fuel/water mixture. Overall, the facility was noted to be clean and well-maintained with no apparent spills or discharges. Based

on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.35 TEXACO S/S #651 (Calle Luna Km 33.6)

4.35.1 Latitude/Longitude (decimal degrees): +18.077674101 / -67.027791413

4.35.2 Site Description: The Texaco S/S #651 facility is located on Calle Luna, Km. 33.6 and is currently used for gasoline distribution and light mechanical (i.e., oil changes) purposes. The facility is also used as a car wash. The facility is currently owned by Texaco and operated by Mr. Julio Ortiz. Mr. Ortiz stated that he will purchase the property from Texaco in the near future. Background information indicates that the facility has two active gasoline tanks with capacities of 10,000 gallons and 12,000 gallons. Two 8,000-gallon gasoline tanks are listed as "permanently out-of-use." Monitoring wells were observed on the property in the area of the gasoline USTs. Mr. Ortiz stated that soil and groundwater samples were collected in association with the removal of USTs and that the results of these activities could be obtained from Texaco. A drainage swale was noted in the rear of the facility. This drainage swale extended west along the southern property boundary and then north along the western property boundary. The swale continued north under Luna Street towards the Rio Guanajibo. The Retiro Industrial Park was observed on the south side of this drainage swale.

4.35.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted in the light mechanical or waste oil storage area. Runoff from the car wash area was noted to be flowing to the drainage swale. The disposal of waste oil is regulated under the facility's RCRA generator permit. The facility's USTs are regulated under PREQB's UST Program. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.36 TEXACO S/S EFRAIN SAMBOLIN #638 (Calle Luna #8)

4.36.1 Latitude/Longitude (decimal degrees): +18.082461724 / -67.050544540

4.36.2 Site Description: The Texaco S/S Efrain Sambolin #638 facility is located on Calle Luna #8 and is currently used for gasoline distribution. The facility is currently owned by Efrain Sambolin and was previously owned by his father (also named Efrain Sambolin). According to the current owner, oil changes were conducted at the facility more than 40 years ago; however, this practice has not taken place on site since that time. The facility is also used as a car wash. Background information indicates that the facility has two active gasoline tanks with capacities of 10,000 gallons and 12,000 gallons. One 8,000-gallon gasoline tank is listed as "permanently out-of-use." Monitoring wells (approximately 14) were observed on the property in the area of the gasoline USTs. To the rear of the building, a drum was observed. This drum was filled with water. Air monitoring instruments did not detect readings above background from this drum. A line of trees extends along the north border of the facility. To the north of this tree line, a small stream extends along the northern border of the facility; this stream appears to flow to the east.

4.36.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. In addition, the facility's USTs are regulated under PREQB's UST Program. Furthermore, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions,

the site is not recommended for placement into CERCLIS.

4.37 TEXACO S/S MAZIE GARCES #613 (Calle Luna #123)

4.37.1 Latitude/Longitude (decimal degrees): +18.081075640 / -67.039765413

4.37.2 Site Description: The Texaco Mazie Garces #613 facility is located on Calle Luna #123 and is currently used for gasoline distribution. The facility is currently owned by Mazie Garces, who has owned the property since 1973. The property has been used as a gas station for 74 years. PREQB files indicate that the facility has two active gasoline tanks with capacities of 10,000 gallons and 8,000 gallons. Two monitoring wells were observed on the property in the area of the gasoline USTs. The owner indicated that these wells are sampled monthly by a contractor of Texaco.

4.37.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted at the facility. The facility's USTs are regulated under PREQB's UST Program. In addition, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.38 TIPOGRAFIA EL AGUILA (#63 Dr. Santiago Veve Avenue)

4.38.1 Latitude/Longitude (decimal degrees): +18.081635429 / -67.037933589

4.38.2 Site Description: The Tipografia el Aguila facility is located on Dr. Santiago Veve Avenue in a commercial area of San German. Current operations at this facility include the production of small print items, including notebooks, receipts, and invitations. Process materials on site include various inks and solvents. According to facility personnel, the facility previously received one notice of violation from the Occupational Safety and Health Agency (OSHA) for failure to provide material safety data sheet training to employees. On-site personnel stated that there have been no fires, spills, or accidents at the facility.

4.38.3 Site Determination/Rationale: During the on-site inspection, the facility was noted to consist of a counter area, an office, and a print shop. All materials associated with on-site operations were noted to be stored inside with no apparent spills or discharges; no materials are stored outside. A review of the facility's material safety data sheets did not indicate that the facility uses or stores chlorinated solvents. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.39 TOTAL PETROLEUM #1116 (Road #2; Km 174.3)

4.39.1 Latitude/Longitude (decimal degrees): +18.093654628 / -67.032197158

4.39.2 Site Description: The Total Petroleum #1116 facility is located on the north side of Road #2 in San German. According to the attendant, the property is owned by Mr. Enid Velez. The facility is only used for gasoline distribution; no mechanical operations currently take place at the facility. A convenience store is also located on the facility. At some time in the past, the facility was known as "Big John Gas Station." PREQB files indicate that the facility has two active 12,000-gallon gasoline tanks and one 8,000-gallon diesel fuel tank.

4.39.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. The facility's USTs are regulated under PREQB's UST Program. In addition, there is a possibility that hazardous substances potentially released at the site fall under

CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.40 TROPICAL FRUIT PRODUCTS CO., INC. (Road #102; Km 37.4)

4.40.1 Latitude/Longitude (decimal degrees): **+18.077005503 / -67.990503339**

4.40.2 Site Description: Tropical Fruit Products Co., Inc. is a former canned fruit and vegetable facility located on Road #102 (Km 37.4) in San German. The property is owned by PRIDCO. The facility appears to be abandoned and includes a house and three large buildings. The buildings are several stories in size. To the south of the buildings are fields that appear to be a mango orchard. During the facility inspection, several junked vehicles and miscellaneous debris were observed throughout the property. Several drums of unknown contents were observed to be stored on the surface immediately south of the northern-most manufacturing building. A dilapidated trailer was observed along a dirt access road leading to the orchard. This trailer appeared to contain dozens of 5-gallon buckets, believed to contain hydraulic oil. A possible pit was also observed along the access road, which is located to the east of the manufacturing buildings.

4.40.3 Site Determination/Rationale: Based on the observations made on the property during the facility inspection, this facility is recommended for further assessment and entry into CERCLIS. Based on the presence of several abandoned waste sources on site which may contain hazardous materials, a removal assessment, conducted under the EPA Removal Program, may be warranted to assess the potential storage of hazardous materials on the property.

4.41 VICTORY MIDWAY GAS STATION (Road #2; Km 177.2)

4.41.1 Latitude/Longitude (decimal degrees): **+18.079343207 / -67.009466611**

4.41.2 Site Description: The Victory Midway Gas Station facility is located on the northern side of Road #2 and is currently used for gasoline distribution. The property is currently owned by Ms. Annette Fuster. The facility was previously operated by Esso Standard Oil Co. (Esso). The facility was subsequently operated by Midway, then the name was changed to Victory Midway. During Esso's occupation of the property, it is believed that light mechanical activities took place at the facility. EPA RCRA files indicate that in 1996, Esso filed under RCRA as a small-quantity generator. Wastes previously generated by Esso are believed to have been used oil. PREQB files indicate that the facility has two active 10,000-gallon gasoline tanks. Three 6,000-gallon gasoline tanks and one 500-gallon used oil tank are listed in PREQB's database as "permanently out-of-use." During the facility inspection, diesel fuel pumps were also noted on the property, indicating that there are USTs containing diesel fuel. Monitoring wells were observed on the property in the area of the USTs.

4.41.3 Site Determination/Rationale: During the facility inspection, no apparent spills or discharges were noted. The facility does not currently generate any wastes. In addition, the facility's USTs are regulated under PREQB's UST Program. Furthermore, there is a possibility that hazardous substances potentially released at the site fall under CERCLA's petroleum exclusion. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.42 WALGREENS #167 (Calle Luna Int. Carro Street)

4.42.1 Latitude/Longitude (decimal degrees): +18.081617109 / -67.042711086

4.42.2 Site Description: Walgreens #167 is a retail store located on Calle Luna at the intersection of Carro Street in San German. According to facility personnel, Walgreens has occupied the building for approximately 13 years (i.e., since 1993). Prior to Walgreens, the building was reportedly used as a disco. The only waste generated is silver from the film development process. A silver recovery unit is used as part of the process. The recovery unit includes a filter cartridge; silver waste is contained within this filter. When filter cartridges are full, they are removed by a licensed waste-removal vendor. A review of EPA RCRA files indicates that the facility is registered as a small-quantity generator of D011 wastes. In addition, the Walgreens photographic laboratory has a pre-treatment permit (Permit No. AVA-E-03-315-016) with PRASA. The facility is permitted to discharge 5 gallons per day to PRASA. The facility is required to collect periodic samples for analysis. The maximum permit requirement for silver is 0.2 milligrams per liter (mg/L) in 24 hours.

4.42.3 Site Determination/Rationale: During the facility inspection, the silver recovery unit was observed to be in good condition and stored inside the building. The inside and outside areas of the facility were observed to be in good condition with no apparent spills or discharges. A review of on-site documentation indicated that no chlorinated solvents are stored at the facility. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.43 WALGREENS #670 (Baxter Avenue #10)

4.43.1 Latitude/Longitude (decimal degrees): +18.087995403 / -67.029743218

4.43.2 Site Description: Walgreens #670 is a retail store located on Baxter Avenue in San German. The only waste generated is silver from the film development process. A silver recovery unit is used as part of the process. The recovery unit includes a filter cartridge; silver waste is contained within this filter. When filter cartridges are full, they are removed by a licensed waste-removal vendor; filters are disposed of approximately every six months.

4.43.3 Site Determination/Rationale: During the facility inspection, the silver recovery unit was observed to be in good condition and stored inside the northwestern corner of the building. The inside and outside areas of the facility were observed to be in good condition with no apparent spills or discharges. A review of on-site documentation indicates that no chlorinated solvents are stored at the facility. Based on an evaluation of the above conditions, the site is not recommended for placement into CERCLIS.

4.44 WALLACE INTERNATIONAL DE P.R., INC. (Retiro Industrial Park; Calle B)

4.44.1 Latitude/Longitude (decimal degrees): +18.077472811 -67.029096807

4.44.2 Site Description: The Wallace International (Wallace) facility consists of two buildings located on Calle B within the Retiro Industrial Park. The facility is owned by PRIDCO. Current operations at the facility include the casting and finishing of table flatware. Operations have taken place at the current facility since 1973. Wallace also operated in the Retiro Industrial Park under the name of International Silver de PR, Inc. According to on-site personnel, the facility was previously used for the manufacture of softballs. Seventy employees currently work at the facility.

According to facility personnel, storm water is discharged under a NPDES Multi-Sector Permit with EPA. The facility is also permitted with PREQB for air emissions associated with the facility's generator, oxidation baths, and evaporators. Facility personnel indicated that an on-site well exists on the facility; however, the well has not been used for years. There are no monitoring wells, or septic tanks/fields on the facility. PREQB files indicate that the facility has two USTs listed "permanently out-of-use." One tank contained diesel fuel; the database does not indicate the contents of the other tank.

During its operational history, the facility generated spent solvents including PCE, TCE, and 1,1,1-TCA. Other wastes include spent corrosive liquids, which include nitric and sulfuric acids. Disposal of wastes are regulated under Wallace's RCRA small-quantity generator permit (EPA ID No. PRD090405648). During the facility inspection, the acid storage area was noted to be inside the facility. This area was noted to be in good condition with secondary containment.

Waste solvents and oils are stored outside in the rear of the facility building. During the inspection of the waste storage area in the rear exterior of the facility, drums of TCE and waste oil were observed to be stored on asphalt with no secondary containment. The asphalt was noted to be in poor condition, with cracks and several areas of exposed soil. Several drums were rusted with one was noted to be bulging. Broken fluorescent bulbs were noted in an area behind a concrete retaining wall. A half-buried drum and an oil spill (with absorbent spread over it) were also noted in this area. Poor housekeeping was noted throughout the rear exterior of the facility

4.44.3 Site Determination/Rationale: Based on the previous and current use of chlorinated solvents at the facility, the poor condition of the storage areas located outside the facility building noted during the facility inspection, and the site's proximity to the Retiro well, which was recently closed due to VOC contamination, the Wallace International facility is recommended for further assessment under CERCLA.

5.0 SUMMARY / RECOMMENDATIONS

Based on available background information and the facility inspections conducted in the San German Study Area, the following facilities are identified as areas of concern where further action under CERCLA is recommended:

- Abandoned Gulf Station
- Acorn Cleaners
- Baytex International
- CCL Insertco de PR
- Garaje Rodriguez
- Tropical Fruit Products, Inc.
- Wallace International de P.R., Inc.

It is recommended that each of these sites (with the exception of Tropical Fruit Products, Inc.) be investigated to determine the likelihood of each of these facilities being possible sources to the VOC groundwater contamination of public potable supplies. Recommended field activities include collection of surface and subsurface soil samples and groundwater samples from background areas (i.e., upgradient), on-site (i.e., in the vicinity of possible waste sources), and downgradient areas with respect to each facility.

Based on the presence of several abandoned waste sources at the Tropical Fruit Products, Inc. site that might contain hazardous materials, a removal assessment under the EPA Removal Program may be warranted to assess the potential storage of hazardous materials on the property.

It should be noted that additional areas of concern may exist within the Retiro Industrial Park, as SAT 2 was not able to perform facility inspections of all buildings within the park. Many of these buildings were occupied as early as the 1950s, and information regarding site operations and waste disposal methods are not available in background files. Figure 3 (Appendix F) presents a map presenting the historical occupants of buildings within the Retiro Industrial Park.

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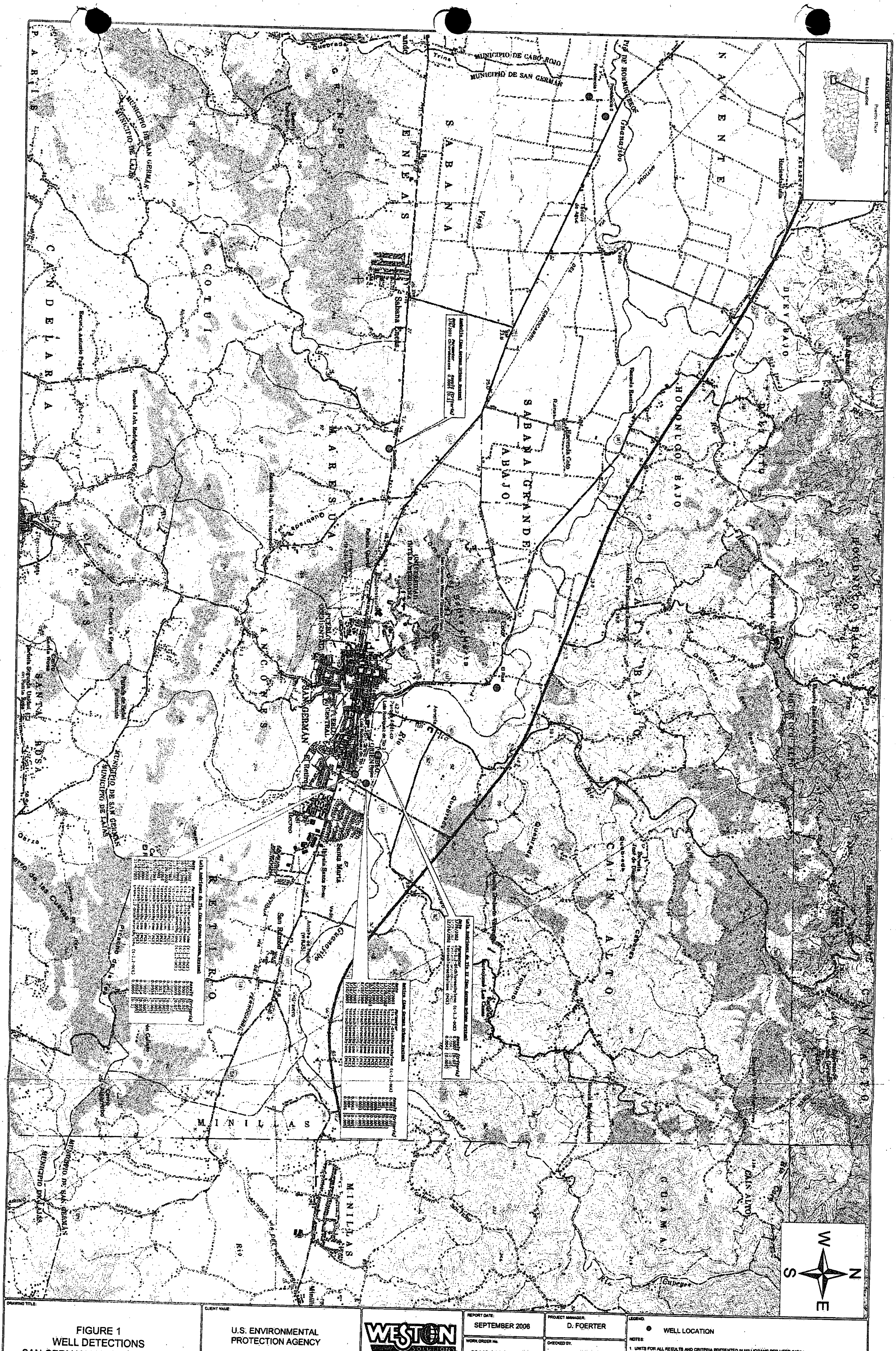
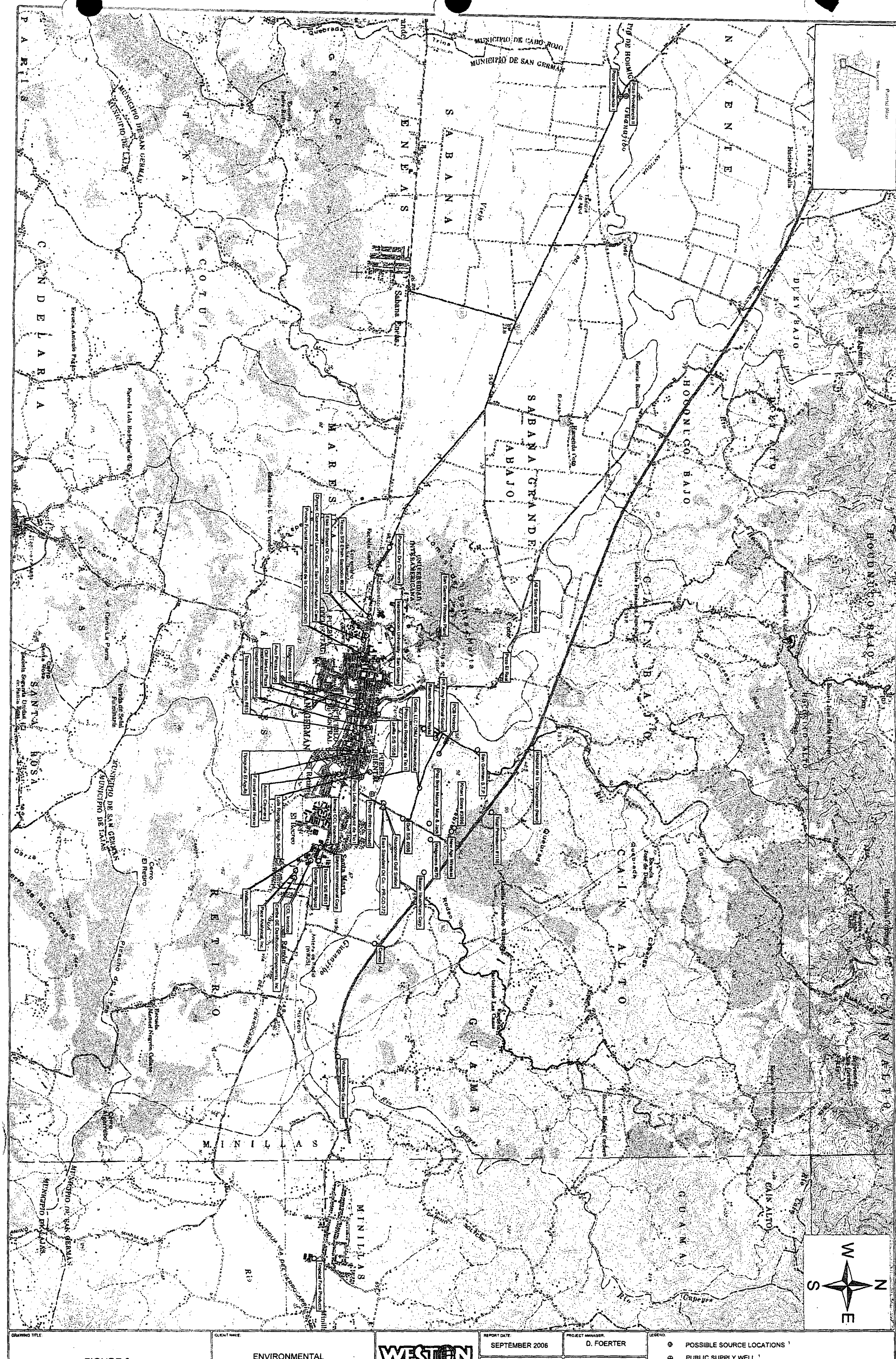
APPENDIX F: Retiro Industrial Park – Historical Occupants (Figure 3)



DRAWING TITLE:	CLIENT NAME:		REPORT DATE:	PROJECT MANAGER:	LEGEND:
FIGURE 1 WELL DETECTIONS SAN GERMAN URBANO SYSTEM (2002-2005)	U.S. ENVIRONMENTAL PROTECTION AGENCY	WESTON SOLUTIONS Weston Solutions, Inc. 205 Campus Drive Edison, New Jersey 08837-3939 Tel: (732) 417-5800 Fax: (732) 417-5801 http://www.westonsolutions.com	SEPTEMBER 2006	D. FOERTER	● WELL LOCATION
	PROJECT NAME:		WORK ORDER No. 20113.011.001.0023.00	CHECKED BY: J. LYNES	NOTES: 1. UNITS FOR ALL RESULTS AND CRITERIA PRESENTED IN MILLIGRAMS PER LITER (MG/L). 2. CRITERIA PRESENTED ARE THE MAXIMUM CONTAMINANT LEVEL (MCL). 3. THIS MAP SHOWS DETECTIONS OF ORGANIC COMPOUNDS, EXCLUDING TRIHALOMETHANES, DI-ETHYL PHTHALATE, AND COMPOUNDS NOT IN THE SUPERFUND CHEMICAL DATA MATRIX (SCDM). NON-DETECT RESULTS NOT INCLUDED.
SCALE: 0 385 770 1,540 2,310 3,080 Feet DATE: SEPTEMBER 2006	SAN GERMAN SITE DISCOVERY INITIATIVE		REVISION No. 0 FILE PATH: L:/SAT 2/San German Site Discovery Initiative (023)/GIS/MXD/03653_SGSDI_Exceedance.mxd	CONTRACT No. EP-W-05-048	SOURCES: 1. PUERTO RICO AQUEDUCT AND SEWER AUTHORITY (PRASA) CAGUAS CENTRAL LABORATORY. QUARTERLY ANALYTICAL RESULTS, 2002-2005, PROVIDED TO WESTON IN NOVEMBER 2005. 2. USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLES: SAN GERMAN, PR.



DRAWING TITLE:	CLIENT NAME:		REPORT DATE:	PROJECT MANAGER:	LEGEND:
FIGURE 2 STUDY AREA and PUBLIC SUPPLY WELL LOCATION MAP	ENVIRONMENTAL PROTECTION AGENCY	WESTON SOLUTIONS Weston Solutions, Inc. 205 Campus Drive Edison, New Jersey 08837-3939 Tel: (732) 417-5800 Fax: (732) 417-5801 http://www.westonsolutions.com	SEPTEMBER 2006	D. FOERTER	POSSIBLE SOURCE LOCATIONS [1] PUBLIC SUPPLY WELL [1] FILTRATION PLANT [1]
			WORK ORDER No: 20113.011.001.0023.00	CHECKED BY: J. LYNES	
	PROJECT NAME: SAN GERMAN SITE DISCOVERY INITIATIVE		REVISION No: 0	CONTRACT No: EP-W-05-048	SOURCES: 1. WESTON SOLUTIONS, INC., REGION 2 SITE ASSESSMENT TEAM, SITE LOGBOOK, SAT2.20113.023.001 JULY 2006. 2. USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLES: SAN GERMAN, PR.
SCALE: 0 385 770 1,540 2,310 3,080 Feet	DATE: SEPTEMBER 2006		FILE PATH: L:/SAT 2/San German Site Discovery Initiative (023)/GIS/MXD/03581_SGSDI_Study_Area_091806.mxd		

REFERENCE 28

Assessment of Ground-Water Withdrawals at Municipal Industrial Parks in Puerto Rico, 2000

By José M. Rodríguez

Prepared in cooperation with the

PUERTO RICO INDUSTRIAL DEVELOPMENT COMPARY

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confined north of latitude 18°25'00", where the Lower Aquifer underlies an unnamed confining unit designated as the upper member of the Cibao Formation (Rodríguez-Martínez, 1995). The San Sebastián Formation constitutes the basal confining unit of the Lower Aquifer. West of the municipality of Arecibo (figs. 1 and 6), the Lower Aquifer is fragmented and heterogeneous with the Montebello Limestone Member of the Cibao Formation and the Lares Limestone grading to the less permeable members of the Cibao Formation and the San Sebastián Formation.

In southwest Puerto Rico, the fissured aquifers are in the Ponce Limestone of Miocene age (along coastal areas) and Upper Cretaceous limestones bordering the Lajas Valley (Graves, 1991) (fig. 20). However, few wells tap these limestone units exclusively. Wells completed in these limestone units receive water from the overlying intergranular deposits.

The potentiometric surface of the Upper Aquifer from Aguadilla to Camuy is generally less than 10 ft above mean sea level (amsl) (Renken and Gómez-Gómez, 1994) (figs. 3 to 5). Locally, this would place the depth to ground water in the range of 100 to 400 ft below land surface (bls). East of Arecibo, the potentiometric surface in the Upper Aquifer is generally not greater than 10 ft amsl, but may have been as much as 20 ft amsl prior to large scale ground-water withdrawals that commenced after 1960 (Gómez-Gómez and Torres-Sierra, 1988; Cherry, 2001)(figs. 6 and 7). The depth to water in the Upper Aquifer ranges from 400 ft bls near Quebradillas to about 40 ft bls near Arecibo (figs. 4 and 6).

The transmissivity of the Upper Aquifer in northwest Puerto Rico varies substantially. Along the north to south extent of the aquifer, the highest transmissivities are found where the freshwater lens is thickest. This exists where streams and wetlands are more distant from the Upper Aquifer recharge sources. Estimates of transmissivity within these areas range from 10,000 to greater than 100,000 feet squared per day (ft^2/d) (Olcott, 1997). Along any north-to-south transect, the transmissivity approaches zero near inland areas where the Upper Aquifer pinches-out against the upper member of the Cibao Formation or volcaniclastic rocks; the transmissivity is less than 10,000 ft^2/d along the coast, where the freshwater lens thins-out. Transmissivity of the Lower Aquifer is greatest in the area within the municipios of Barceloneta and Florida (fig. 8), but does not exceed 3,000 ft^2/d (F. Gómez-Gómez, U.S. Geological Survey, written commun., 2001). Outside this geographic area, transmissivity is generally not greater than 500 ft^2/d (Olcott, 1997). Transmissivity estimates for the fissured aquifers in southwest Puerto Rico are unavailable, because few wells tap these units exclusively.

The Upper Aquifer is absent in some parts of San Juan, and where present, it is very thin and ground-water yields are small (Rodríguez-Martínez, 1995). In the Loíza area, the Upper Aquifer is about 750 ft thick (Rodríguez-Martínez, 1995) (fig. 11 and 32). However, the freshwater portion of the aquifer in the coastal zones of San Juan and Loíza is less than 30 ft thick (Rodríguez-Martínez, 1995) (figs. 11 and 32). The Lower Aquifer in the San Juan area is composed mostly by the Mucarabones Sand, which consists of sandstone and gravel (Rodríguez-Martínez, 1995).

Aquifer transmissivity estimates for the Lower Aquifer, obtained from specific-capacity data near the industrial parks of San Juan, range from 2,000 to 3,000 ft^2/d. Depth to water in the Lower Aquifer near the industrial parks range from about 9 to 18 ft bls in San Juan to about 6 ft bls in Carolina. Depth to water in the Upper Aquifer in Loíza is about 3 ft bls.

Intergranular Aquifers

The intergranular aquifers are present in the alluvial deposits that fill bedrock valleys in the interior and coastal areas of Puerto Rico. Intergranular aquifers of eastern, southern, western, interior, and island municipios of Puerto Rico have distinct hydrogeologic properties, and therefore are discussed separately.

Eastern Puerto Rico

Industrial parks within alluvial valleys are located in eastern Puerto Rico within the municipios of Fajardo, Ceiba, Naguabo, Humacao, Yabucoa, and Maunabo (figs. 12 through 14). The thickness of the alluvial deposits near the industrial parks ranges from approximately 170 ft in Fajardo (industrial park and number, IP-099), 100 ft in Humacao, and about 180 ft in Maunabo (figs. 12 through 14).

The potentiometric surface of the alluvial aquifers near the industrial parks in the Fajardo to Humacao area ranges from 20 to 50 ft amsl (figs. 12 through 14). The potentiometric surface in these alluvial valleys indicate that the direction of the ground-water flow is towards the streams (Adolphson and others, 1977; Graves, 1989; and Perez-Blair, 1997). The depth to water near the industrial parks in the alluvial aquifer ranges from approximately 12 ft bls in Fajardo to 22 ft bls in Humacao.

Transmissivity estimates for the alluvial aquifers range from approximately 100 to 2,500 ft^2/d in Fajardo (Pérez-Blair, 1997), from about 500 to 2,000 ft^2/d in Humacao and Naguabo (Graves, 1989), from 1,000 to 7,000 in Yabucoa (Renken and others, 2002), and from about 1,000 to 8,000 ft^2/d in Maunabo (Adolphson and others, 1977). A transmissivity estimate from specific capacity data from the PRASA Calzada well (fig. 14) near an industrial park in Maunabo is 8,500 ft^2/d, which is consistent with previous estimates.

Western Puerto Rico

The industrial parks located in alluvial valleys in western Puerto Rico are in the municipios of Añasco, Mayagüez, Hormigueros, San Germán, and Sabana Grande (figs. 17, 19, and 20). The potentiometric surface in the Río Guanajibo

Valley near Hormigueros and San Germán is about 7 and 40 ft amsl, respectively (Colón-Dieppa and Quiñones-Márquez, 1985). The potentiometric surface in the Río de Añasco Valley near Añasco is about 15 ft amsl (Díaz and Jordan, 1987). The depth to water near the municipal industrial parks is reported to be about 5 ft bls in Mayagüez and about 25 ft bls in San Germán. According to the Puerto Rico Aqueduct and Sewer Authority (PRASA) Guanajibo well records, the thickness of the alluvial deposits near IP-198 in Sabana Grande is reported to be as much as 105 ft. A transmissivity of 2,800 ft^2/d was estimated from specific capacity data from PRASA Guanajibo well (fig. 20) in Sabana Grande.

Southern Puerto Rico

The South Coastal Plain Alluvial Aquifer (SCPAA), which underlies the municipios from Ponce to Patillas (figs. 22 through 26), includes six alluvial fans that form a continuous alluvial plain (Renken and Gómez, 1994). The potentiometric surface near the industrial parks is less than 10 ft amsl from Santa Isabel to Arroyo, and is about 50 ft amsl in Patillas. The depth to the water table in the alluvial aquifer at these industrial parks from Patillas to Santa Isabel range from 9 to 39 ft bls.

Aquifer transmissivities in the SCPAA near the industrial parks are estimated to be 5,000 ft^2/d in Santa Isabel, from 5,000 to 30,000 ft^2/d in Salinas, and from less than 500 to 5,000 ft^2/d in Guayama (Quiñones-Aponte and others, 1997). In Arroyo and Patillas, the estimated transmissivities in the alluvial aquifer range from less than 2,000 to 25,000 ft^2/d.

The freshwater lens in these aquifers is thickest near Santa Isabel, where the thickness is approximately 400 ft (Renken and others, 2002). Near the industrial parks in Salinas, the freshwater lens thickness ranges from 100 to 260 ft (Renken and others, 2002). The freshwater lens thickness is less than 65 ft in Guayama and Patillas, and approximately 70 ft in Arroyo. Almost all principal streams in the Salinas to Patillas area are intermittent in the upper portions of the alluvial fans. This is related to the high permeability of the deposits along the stream reaches, which are composed of coarse gravel and boulders (Quiñones-Aponte and others, 1997).

Interior Puerto Rico

The principal alluvial valleys in interior Puerto Rico are the Caguas-Juncos valley and the Cayey valley (figs. 29 and 31). The Caguas-Juncos valley includes part of the municipios of Caguas, Gurabo, and Juncos. The potentiometric surface in the Caguas-Juncos alluvial valley near the industrial parks ranges from 160 to 200 ft amsl in the Caguas area and 140 to 170 ft amsl in the Gurabo and Juncos areas (Puig and Rodríguez, 1990). The potentiometric surface indicates that the ground-water flow direction in the Caguas-Juncos valley is generally toward stream channels (Puig and Rodríguez, 1990). The thickness of the alluvial deposits near the industrial areas in Caguas ranges from about 45 to 90 ft (Puig and Rodríguez, 1990). In the Caguas area, the alluvial aquifer is in contact with weathered volcanic bedrock, which may serve as a source of additional ground water. The thickness of the alluvial deposits in the Gurabo and Juncos areas ranges from 50 to approximately 100 ft (Puig and Rodríguez, 1990). Depth to water in the alluvial aquifer ranges from 18 to 36 ft bls near the industrial parks in Caguas, 14 to 39 ft bls near Gurabo and Juncos, and from 28 to 37 ft bls near the industrial areas in Cayey.

The transmissivity of the aquifer near the industrial areas of Caguas is estimated to be less than 500 ft^2/d (Puig and Rodríguez, 1990). Aquifer transmissivities in the alluvial aquifer near industrial parks located in the Gurabo and Juncos areas of the Caguas-Juncos valley were estimated to range from less than 500 to less than 1,000 ft^2/d (Puig and Rodríguez, 1990). In the Cayey alluvial valley, the transmissivity estimates for the aquifer near IP-336 ranges from 1,000 to 5,000 ft^2/d.

Island Municipios

The principal alluvial valley in the offshore municipios is the Esperanza Valley in Isla de Vieques (fig. 33). Thickness of sedimentary deposits in the Esperanza Valley ranges from 0 to 90 ft (Torres-González, 1989). The elevation of the water table ranges from 10 to 100 ft amsl. Transmissivity estimates for the Esperanza Valley ranges from 200 ft^2/d near the eastern boundary of the valley to 2,000 ft^2/d at the west boundary (Torres-González, 1989).

Intergranular Unit Overlying Fissured Rock Unit

The intergranular units overlying fissured rock units are present in the north and south coast, and southwest Puerto Rico. These units have distinct hydrogeologic properties, and therefore, are discussed separately.

North Coast

Alluvial deposits form the aquifers within four valleys along the north coast of Puerto Rico and are an important source of ground water. These alluvial valleys were formed by the Río Grande de Arecibo (fig. 6), Río Grande de Manatí (fig. 7), Río Cibuco (fig. 7), and Río de La Plata (fig. 9). The alluvial deposits overlie and are hydraulically connected to the Aymamón and Aguada Limestones. Beneath the industrial parks in Arecibo, Barceloneta, Vega Baja, and Toa Baja are alluvial deposits that form the hydrogeologic units (figs. 6 through 9). The thickness of the alluvial deposits near the industrial parks is approximately 100 ft in Arecibo (Quiñones-Aponte, 1986a) and Barceloneta, approximately 45 ft in Vega Baja, and approximately 90 ft in Toa Baja (Troester, 1999).

The potentiometric surface in the Río Grande de Arecibo alluvial valley indicates that ground-water flow is towards discharge zones towards the northeast of the valley (Quiñones-Aponte, 1986a) (figs. 6). In the Río Grande de Manatí alluvial valley near Barceloneta, the potentiometric surface indicates that ground-water flow is generally towards the Río Grande de Manatí (Gómez-Gómez, 1984). Depth to water near the industrial areas in the alluvial valleys located along the coastal plain from Arecibo to Toa Baja ranges from 5 ft bls to 13 ft bls (figs. 6 through 9).

The transmissivity estimates for the freshwater section of the alluvial aquifer near the industrial parks are less than 5,000 ft^2/d in Arecibo (Quiñones-Aponte, 1986), less than 10,000 ft^2/d in Barceloneta and Vega Baja (Torres-González and Díaz, 1984), and from 10,000 to 25,000 ft^2/d near Toa Baja (Torres-González and Díaz, 1984). However, the transmissivity estimates for the limestone aquifers underlying the alluvium range from 10,000 to 100,000 ft^2/d (Olcott, 1997).

South Coast

In the Ponce to Juana Díaz area (fig. 22), the intergranular deposits are underlain by the Ponce Limestone near the coast and the Juana Díaz Formation in inland areas (Glover, 1971). The Juana Díaz Formation consists primarily of low permeability clastic deposits and chalk beds. Where saturated, the Juana Díaz Formation contains saline water that is not suitable for human consumption (McClymonds, 1972). The thickness of the alluvial deposits in the Ponce area ranges from approximately 30 to 100 ft near the northern edge of the deposits to greater than 300 ft along the adjacent in coastal areas. Transmissivities of the aquifer range from 1,000 to 10,000 ft^2/d near the industrial parks in Ponce (McClymonds, 1972).

Southwest Puerto Rico

Industrial parks located within alluvial valleys overlying fissured rock are located at Lajas, Guánica, Yauco, Guayanilla, and Peñuelas in southwest Puerto Rico (figs. 19 through 21). The potentiometric surface in the Lajas valley indicates that the principal direction of the ground-water flow is from the foothills towards the center of the valley (Graves, 1991). In the alluvial valleys at Guánica (McClymonds, 1967), Yauco (Quiñones-Aponte, 1986b), Guayanilla (Crooks and others, 1968), and Peñuelas (Grossman and others, 1972) the potentiometric surface indicates a general ground-water flow direction from the upper to lower part of the valleys. The thickness of the alluvial deposits reported near the industrial parks is approximately 70 ft in Lajas (Graves, 1991), 110 ft in Guánica (McClymonds, 1967), 75 ft near the town of Yauco (Quiñones-Aponte, 1986b), 40 ft in Peñuelas (Grossman and others, 1972), and less than 40 ft in Guayanilla (Crooks and others, 1968).

The aquifer transmissivity estimates near the industrial parks in Lajas range from approximately 100 to 8,000 ft^2/d (Graves, 1991), near Guánica approximately 5,000 to 25,000 ft^2/d (McClymonds, 1967), near Yauco approximately 5,000 to 15,000 ft^2/d (Quiñones-Aponte, 1986b), near Guayanilla approximately 1,000 to 5,000 ft^2/d (Crooks and others, 1968), and near Peñuelas less than 500 ft^2/d (Grossman and others, 1972).

In southwest Puerto Rico, streamflow infiltration is the primary source of recharge for the alluvial stream-valley aquifers (Crooks and others, 1968; Quiñones-Aponte, 1986). Mean-annual precipitation in southwest Puerto Rico is low and aquifer recharge from precipitation is insignificant.

Strata with Limited and Local Ground-Water Resources

Strata with limited and local ground-water resources underlie most of the interior and northeastern Puerto Rico. The interior of Puerto Rico is comprised of volcaniclastic, igneous, and metamorphic rocks that form minor aquifers. These rock units are highly faulted and folded (Olcott, 1997) and are composed of tuffaceus siltstone, breccia, andesitic to basaltic rocks, and minor limestone. The volcaniclastic rocks store and transmit water through fractures and secondary openings in areas where precipitation is significant (Olcott, 1997). In the vicinity of streams, well yields may be partially or completely sustained by induced surface-water seepage from streams (Rodríguez-Martínez and others, 2001).

Industrial parks constructed over volcaniclastic, igneous, and metamorphic rocks are located primarily in the municipios of the center of the island from Las Piedras in the east to Rincón in the west (fig. 1). Transmissivity estimates from specific-capacity data for wells near the industrial parks range from 15 to 60 ft^2/d. Depths to water at wells near the industrial parks range from 14 to 70 ft bls.

Igneous intrusive (plutonic) rocks are present in the central and southeast portions of the island. Unless fractured, intrusive rocks are not a ground-water source (Olcott, 1997). Several industrial parks are constructed over plutonic rocks, principally in the municipios in east-central Puerto Rico (Las Piedras and San Lorenzo; fig. 31) and near the center of the island (Ciales and Jayuya; figs. 7 and 27). Depths to water range from 24 to 43 ft bls in industrial parks in Las Piedras and San Lorenzo. Transmissivity values of approximately 50 to 70 ft^2/d were estimated from specific-capacity data for wells at or near industrial parks in Las Piedras and San Lorenzo. In an industrial park in Las Piedras, transmissivity values estimated from specific-capacity data for wells located near a creek ranged from 300 to 400 ft^2/d.

Table 2. Hydrogeologic properties of aquifers within or near industrial parks in Puerto Rico.—Continued

[C, confined; U, unconfined; n.d., no data available; SFC, Potential streamflow capture; RI, Rainfall infiltration; SLLGWR, Strata with local and limited ground resources; NCLA, North Coast Limestone Aquifer; RGAAVA, Río Grande de Añasco Alluvial Valley Aquifer; I/F, Intergranular unit overlying fissured aquifer; SCPAA, South Coastal Plain Alluvial Aquifer; CJVAA, Caguas -Juncos Valley Alluvial Aquifer; CVAA, Cayey Valley Alluvial Aquifer; RESRDAV, Río Espíritu Santo to Río Demajagua Alluvial Valleys; GAA, Guánica Alluvial Valley; GUAA, Guayanilla Alluvial Valley; RGVA, Río Guanajibo Valley Aquifer, HNAA, Humacao-Naguabo Alluvial Aquifer; MAA, Maunabo Alluvial Valley; TAA, Tallaboa Alluvial Aquifer; EAA, Esperanza Alluvial Valley; YVAA, Yabucoa Valley Alluvial Aquifer; YAVAA; Yauco Valley Alluvial Aquifer]

Municipality and industrial park number	Aquifer name	Estimated ground-water withdrawals, in gallons per day (within industrial park or within 0.6 mile radius)	Hydrogeologic properties: Generalized hydrogeologic unit	Confined or unconfined (C/U)	Estimated transmissivity range or expected upper limit, in feet squared per day	Depth to water, in feet below land surface	Fresh or saline water	Local aquifer recharge source (potential stream flow capture or rainfall infiltration)
Quebradillas								
111	NCLA	0/ 180,000	Fissured	U	1,000-5,000	400	Fresh	RI
276	NCLA	0	Fissured	U	1,000-5,000	370	Fresh	RI
400	NCLA	0	Fissured	U	1,000-5,000	400	Fresh	RI
Rincón								
136	Unnamed	0 / 20,000	SLLGWR	U	n.d.	n.d.	Saline	RI
Río Grande								
006	Volcanic Rocks	0	SLLGWR	U	<100	n.d.	Fresh	RI
020	Volcanic Rocks	0	SLLGWR	U	<100	n.d.	Fresh	RI
155	Volcanic Rocks	0	SLLGWR	U	<100	n.d.	Fresh	SFC/RI
225	Unnamed	0	SLLGWR	U	n.d.	n.d.	Saline	RI
Sabana Grande								
198/374	RGVA	0/ 90,000	Intergranular	U	<5,000	10	Fresh	SFC/RI
941	RGVA	0	Intergranular	U	<500	n.d.	Fresh	RI
Salinas								
087/226	SCPAA	0 / 30,000	Intergranular	C/U	20,000-30,000	9	Fresh	RI
090	SCPAA	0 / 750,000	Intergranular	C/U	5,000	24	Fresh	RI
San Germán								
049	Volcanic Rocks	0	SLLGWR	U	<100	25	Fresh	RI
264	Volcanic Rocks	0 / 70,000	SLLGWR	U	<100	n.d.	Fresh	RI
412	Volcanic Rocks	0	SLLGWR	U	<100	n.d.	Fresh	RI
San Juan								
016	NCLA	0	SLLGWR	U	n.d.	n.d.	Saline	RI
021/150	NCLA	0	SLLGWR	U	<5,000	9	n.d.	RI
052	NCLA	0	SLLGWR	U	n.d.	11	Saline	RI
074	Unnamed	0	SLLGWR	U	<500	12	Fresh	RI
137	NCLA	0	SLLGWR	U	n.d.	18	n.d.	RI

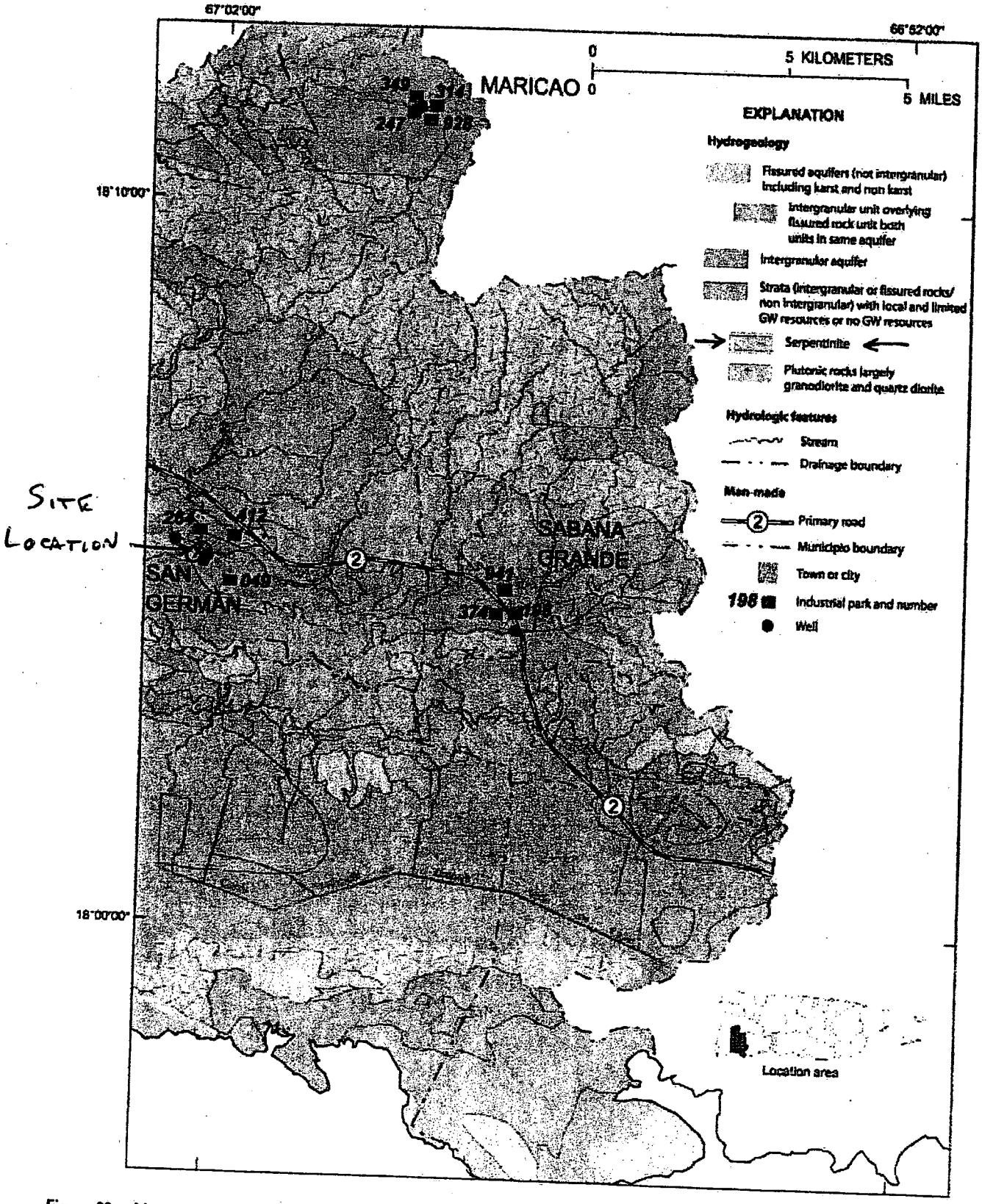


Figure 20. Map showing hydrogeologic units and location of municipal industrial parks near Maricao, Sabana Grande, and San Germán, Puerto Rico.

REFERENCE 29

2.3.2 GUANAJIBO REGION

By Thalia D. Veve

2.3.2.A Location and Major Geographic Features

The Guanajibo region, located on the west coast of Puerto Rico, covers an area of approximately 146 mi^2. The principal population centers in the Guanajibo region are San Germán, Hormigueros, Cabo Rojo, and Mayagüez (fig. 2.3.2.A-1).

The Guanajibo region is characterized by a broad alluvial valley (the Central Guanajibo valley) covering about 29 mi^2. This valley is bounded on all sides by hills, except to the northwest, where it is bounded by the Mona Passage. At the coast, the Guanajibo valley extends northward joining the Río Yagüez valley. A barrier of low-lying hills almost completely separates the Central Guanajibo Valley from the coast. These hills form a ridge called the Cordillera Sabana Alta that reaches its greatest elevation in the east. West of these hills, the shore features a fringe of beach and swampy terrain. A large coastal lagoon, Laguna Joyuda, dominates the west-central coast areas.

The Central Guanajibo valley measures 18 miles in length along its east-west axis, with a width ranging from 6 miles in the east to 12 miles in the west. The Central Guanajibo valley has an area of about 25 mi^2. Elevations within the valley range from mean sea level at the coast to about 200 feet above mean sea level. Hills surrounding the valley reach maximum elevations of 1,968 feet above mean sea level in the Cordillera Central.

The major river in the region is the Río Guanajibo, flowing to the west-northwest. It originates along the western side of the Cordillera Central and flows to the sea on the west coast, south of Mayagüez. The principal tributaries to the Río Guanajibo are the Río Rosario, Río Duey, Río Hoconuco, Río Caín, Río Cupeyes, Río Cruces, and Río Flores, draining to the south-southwest, and the Río Viejo, draining to the west-northwest.

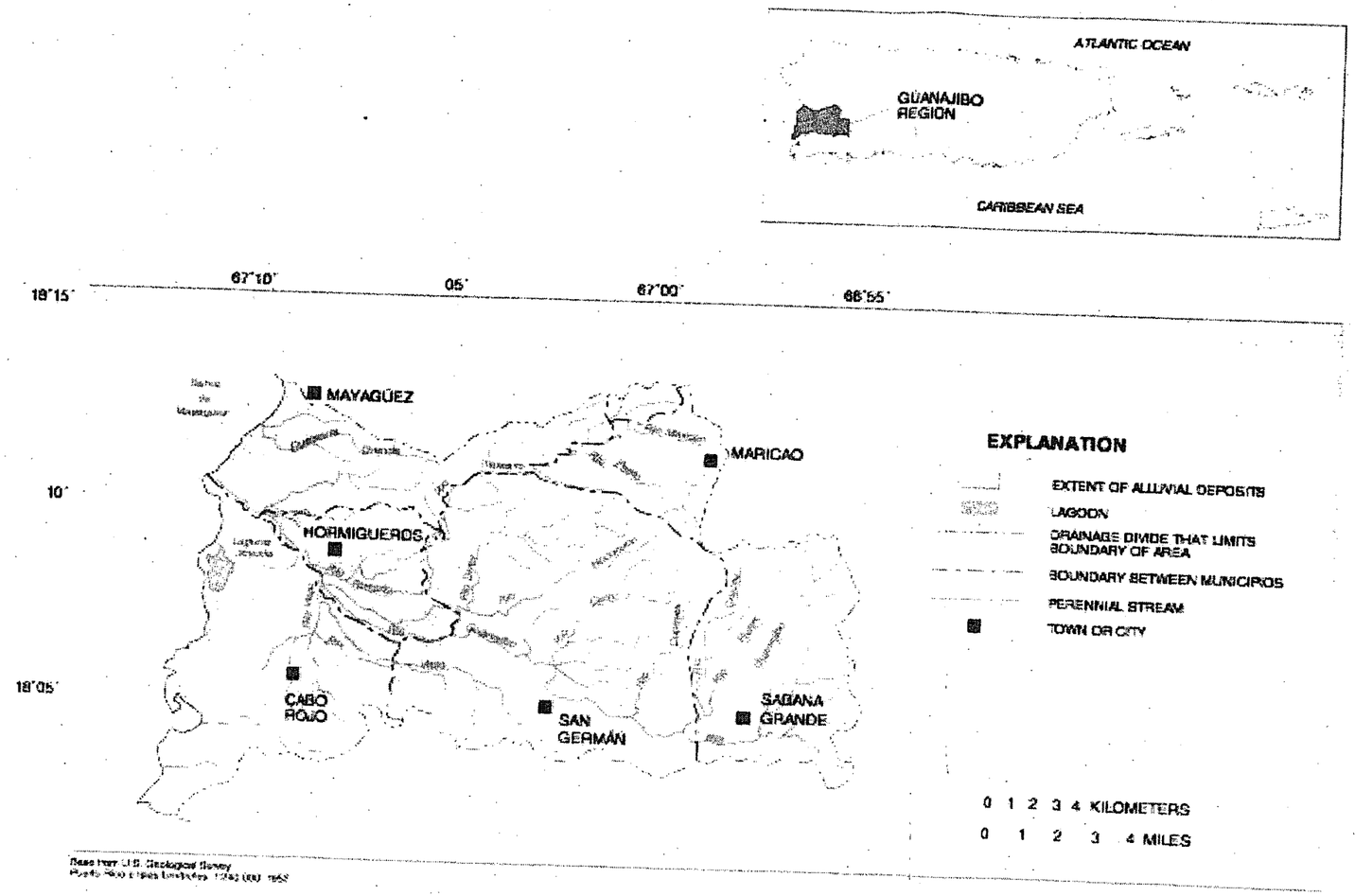


Figure 2.3.2.A-1 Location and major geographic features in the Guanajibo region, Puerto Rico.

(3)

Table 2.3.2.B-3 Ground-water withdrawals and estimated population served during 1982 for the Guanajibo region, Puerto Rico (Torres-Sierra and Avilés, 1986)

[Mgal/d, million gallons per day; ---, no data available; <, less than]

[1] Use		Estimated population served	Average ground-water withdrawals (Mgal/d)
I. Domestic Use			
A. Public Supply			
1. Cabo Rojo		28,419	1.94
2. Hormigueros		13,397	0.84
3. Maricao		---	---
4. Mayagüez		---	---
5. Sabana Grande		19,653	[2] <1.19
6. San Germán		23,634	[2] <1.49
	Subtotal	167,455	<5.46
B. Community Systems			
1. Cabo Rojo		5,626	0.22
2. Hormigueros		633	0.03
3. Maricao		4,335	0.18
4. Mayagüez		---	---
5. Sabana Grande		---	---
6. San Germán		9,288	[2] <0.37
	Subtotal	36,679	<0.43
II. Commercial Use			
1. Cabo Rojo		---	0.28
2. Hormigueros		---	0.04
3. Maricao		---	---
4. Mayagüez		---	---
5. Sabana Grande		---	[2] <0.07
6. San Germán		---	[2] <0.23
	Subtotal	---	<0.62
III. Industrial Use			
1. Cabo Rojo		---	0.03
2. Hormigueros		---	0.01
3. Maricao		---	---
4. Mayagüez		---	---
5. Sabana Grande		---	[2] <0.03
6. San Germán		---	[2] <0.20
	Subtotal	---	<0.27
IV. Agricultural Use (livestock)			
1. Cabo Rojo		---	0.13
2. Hormigueros		---	0.01
3. Mayagüez		---	---
4. Sabana Grande		---	[2] <0.04
5. San Germán		---	[2] <0.07
	Subtotal	---	<0.25
	Total	104,985	<7.03

[1] Municipios not listed under a specific use did not withdraw water for that use.

[2] Includes both surface- and ground-water sources.

2.3.2.C Geologic Setting

There are four major lithologically distinct rock groups present in the Guanajibo region (fig. 2.3.2.C-1). They are: the Bermeja Complex of Jurassic to Early Cretaceous age; a suite of volcanic, volcaniclastic, plutonic, and sedimentary rocks of Late Cretaceous age; limestone formations of Late Cretaceous age; and alluvial deposits of Quaternary age.

The Bermeja Complex of Jurassic to Early Cretaceous age (Montgomery and others, 1994) consists primarily of serpentinite, amphibolite, basalt, and chert. It is highly deformed and metamorphism has destroyed most primary textures, bedding, and lithological relations. It is most extensively exposed in the southwestern part of the Guanajibo region.

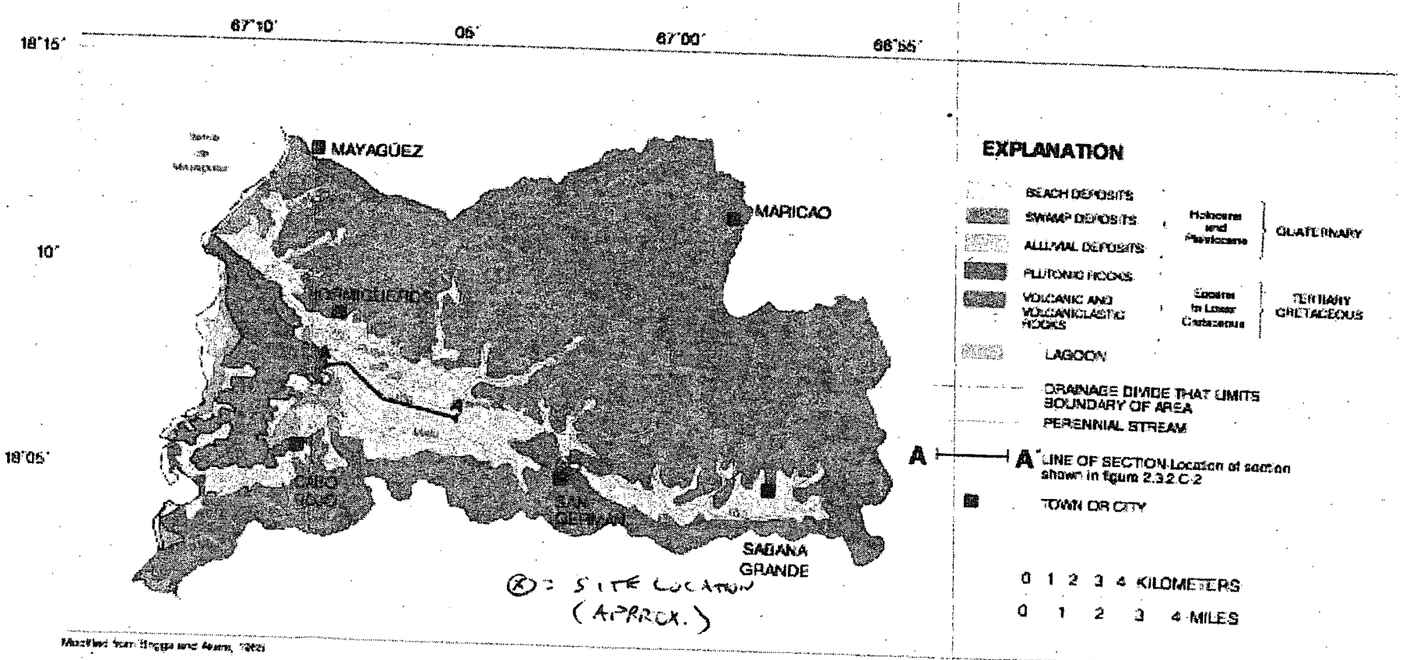


Figure 2.3.2.C-1 Generalized surficial geology in the Guanajibo region, Puerto Rico.

The suite of volcanic, volcaniclastic, plutonic, and sedimentary rocks of Late Cretaceous age predominate in the mountains surrounding the Central Guanajibo valley (fig. 2.3.2.C-2). Subsequent to their formation these rocks were folded and faulted (Colón-Dieppa and Quiñones-Márquez, 1985), and then subjected to extreme weathering and erosion. The Central Guanajibo valley largely lies within an anticline that has been breached by erosion and is bounded in part by faults (Mattson, 1960, p. 321; Colón-Dieppa and Quiñones-Márquez, 1985, p. 10).

The limestone formations of Late Cretaceous age in the Central Guanajibo valley include the Peñones Limestone, Cotui Limestone, Parguera Limestone, and Melones Limestone (Curet, 1986; Volckmann, 1984b and 1984c). While these various formations vary in coloration, they are generally massive to thick-bedded limestones rich in mollusk fossils. These formations overlie the Bermeja Complex and various of the volcanic, volcaniclastic, plutonic, and sedimentary rocks.

Alluvial deposits of Quaternary age overlie volcanic and volcaniclastic rocks in the southwestern Guanajibo region and the Bermeja Complex in the Central Guanajibo valley (Mattson, 1960; Colón-Dieppa and Quiñones-Márquez, 1985, p. 18). Clay predominates in the surface of the alluvium. These surficial clay deposits in the alluvium are generally underlain by sand lenses and, at greater depths, gravel lenses within the clay-rich alluvium.

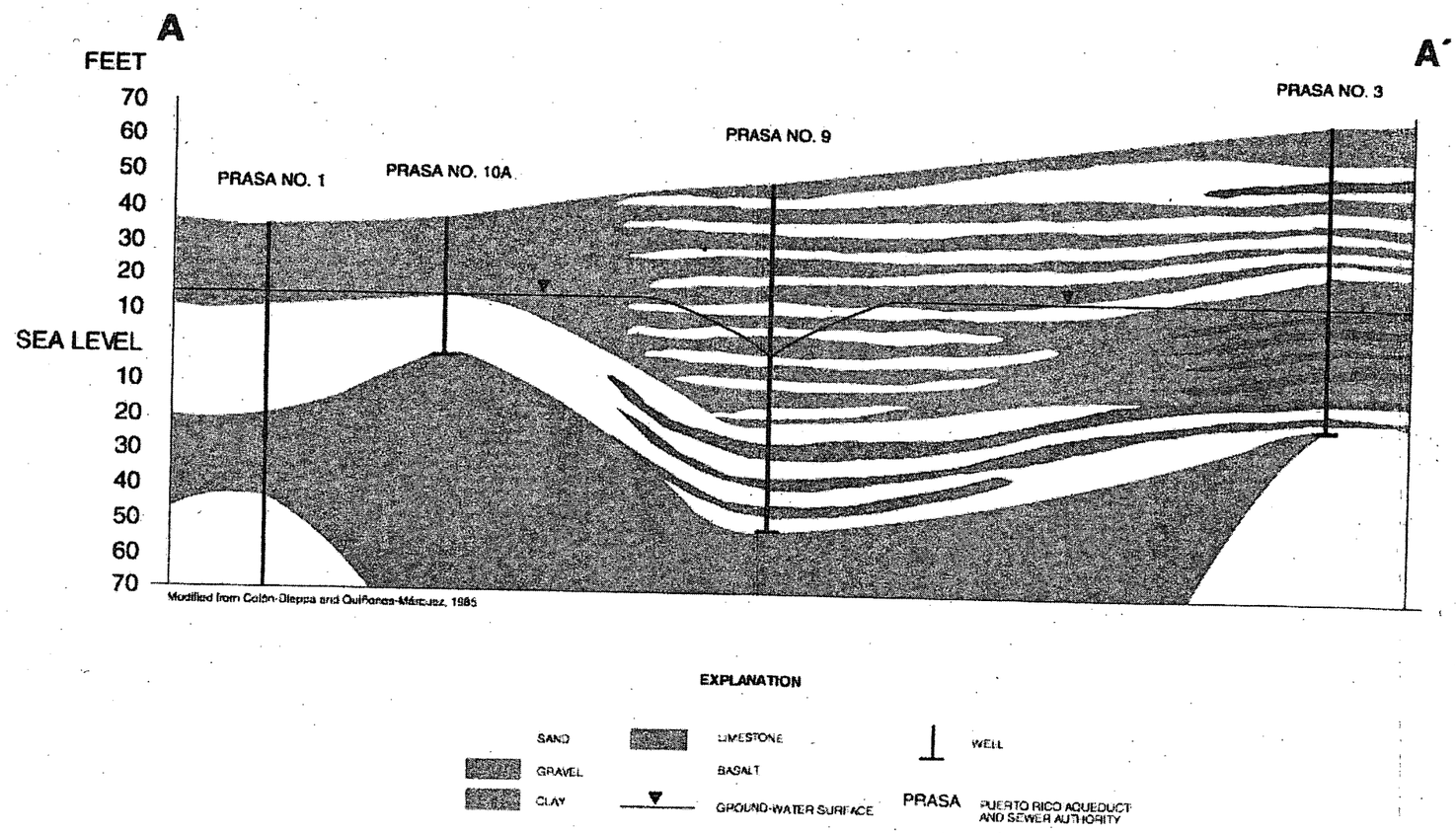


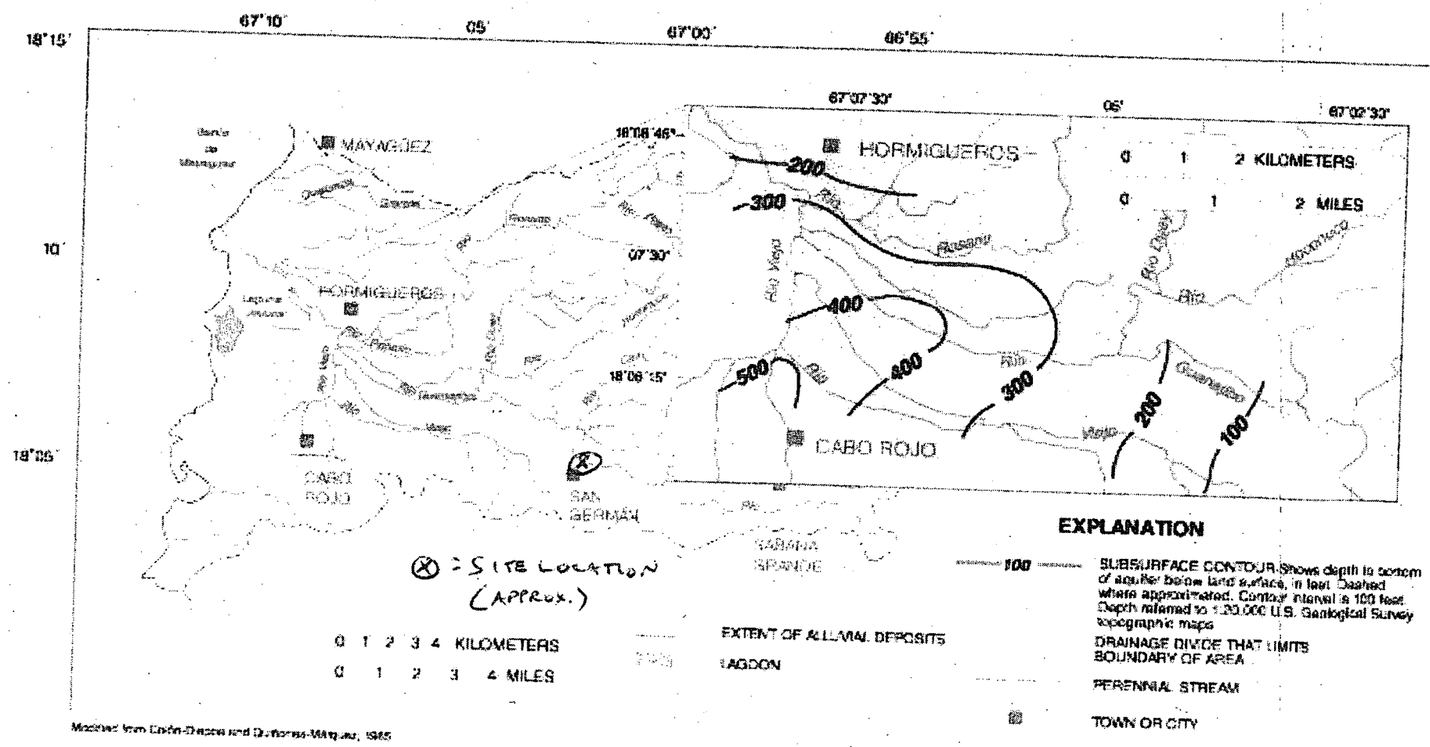
Figure 2.3.2.C-2 Locations of cross section and wells in the Central Guanajibo valley, Puerto Rico (location of cross section shown in figure 2.3.2.C-1).

(6)

2.3.2.D Hydrogeology

Ground water within the Central Guanajibo valley occurs in the limestone formations underlying the alluvium and in the sand and gravel lenses within the alluvium. Where volcanic rocks are highly fractured, limited amounts of ground water can be withdrawn. Limestone formations and sand and gravel lenses within the alluvium are concentrated in the western and southwestern parts of the Central Guanajibo valley. Clay, a nearly impermeable material, is more abundant in alluvial deposits in the northern and eastern Guanajibo region than in the Central Guanajibo valley. The alluvium is about 70 feet thick and the limestone is more than 200 feet thick in the Central Guanajibo valley and is thickest near Cabo Rojo, where the bedrock lies at 500 feet below land surface. These deposits become thinner toward the north and west, where they are less than 100 feet thick (fig. 2.3.2.D-1).

Aquifer characteristics in the southwestern Guanajibo region have been estimated from data on driller's logs. Yields to wells average from 280 to 660 gal/min (Colón-Dieppa and Quiñones-Márquez, 1985, p. 48). Maximum yields range from 75 to 1,100 gal/min and specific capacities from 2.4 to 40 gal/min per foot of drawdown (Colón-Dieppa and Quiñones-Márquez, 1985, p. 40). Transmissivities ranging from 670 to 6,000 ft^2/d were estimated from the specific capacities of the Puerto Rico Aqueduct and Sewer Authority wells drilled in the southwestern part of the Central Guanajibo valley (fig. 2.3.2.D-2; Colón-Dieppa and Quiñones-Márquez, 1985, p. 40). The aquifer in the Central Guanajibo valley is composed of limestone with some sand and gravel. Apparent transmissivity estimates for two wells in Cabo Rojo differed by one order of magnitude from 11,000 to 1,600 ft^2/d, in spite of being close together. The water bearing unit here consists primarily of fractured volcanic rock or limestone. The difference in performance between these two wells may be explained by differences in the degree of fracturing of the water bearing unit around them.



Modified from Colón-Dieppa and Quiñones-Márquez, 1985

Figure 2.3.2.D-1 Approximate depth to bedrock in the Central Guanajibo valley, Puerto Rico.

7

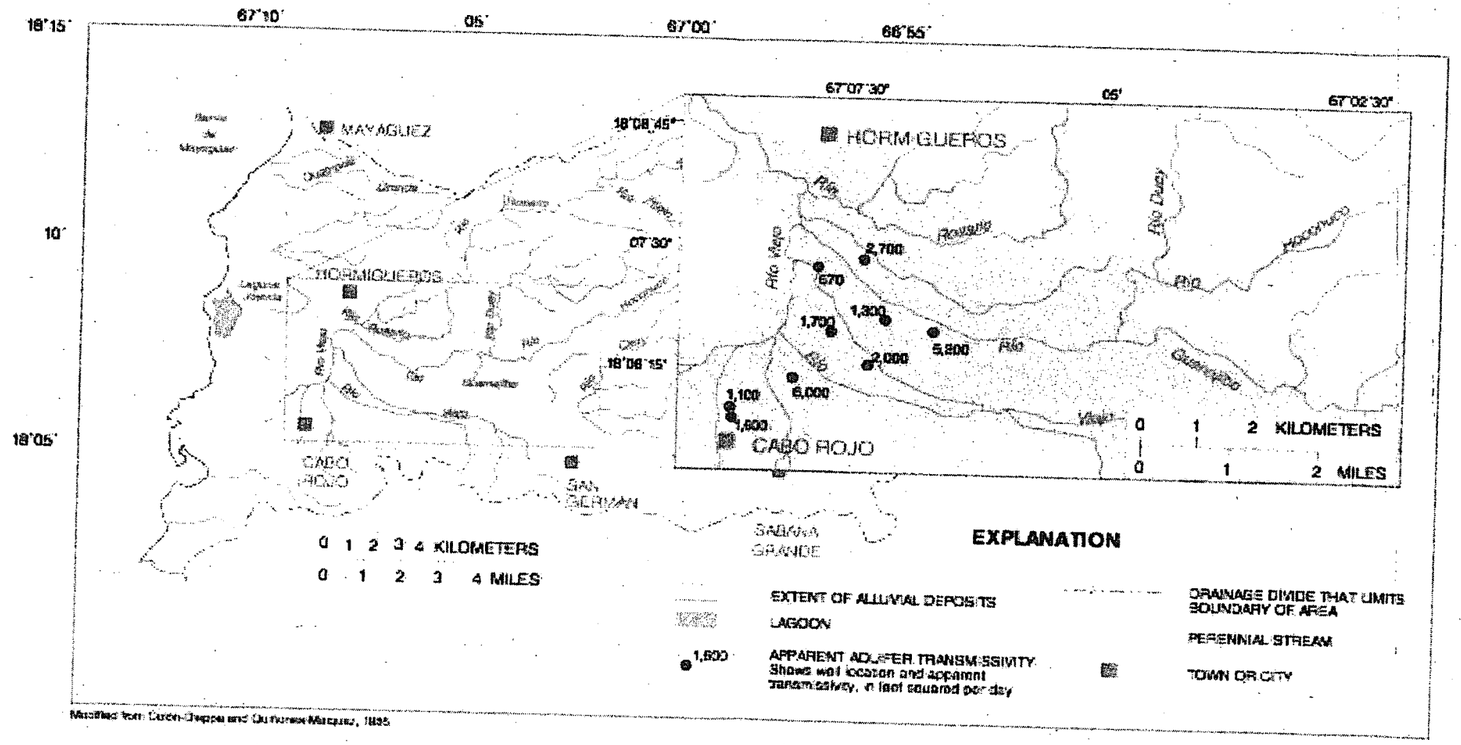


Figure 2.3.2.D-2 Apparent aquifer transmissivity in the Central Guanajibo valley, Puerto Rico.

8

2.3.2.E Ground-Water Levels and Movement

Aquifer recharge to the Guanajibo region originates principally along the contact between the alluvium and the igneous rocks. Direct recharge from rainfall is not believed to occur throughout the valley since clay covers almost the entire surface. In the few places where more permeable materials (limestone or sand and gravel) reach the surface, rainfall may recharge the aquifer. Annual rainfall in the lower part of the valley averages 56 inches, and in the upper reaches of the basin, annual rainfall ranges from 70 to 100 inches (Colón-Dieppa and Quiñones-Márquez, 1985, p. 6 and 20).

Ground-water levels within the Central Guanajibo valley range from 16 feet above mean sea level west of Hormigueros to 115 feet above mean sea level north of San Germán (fig. 2.3.2.E-1). Ground water moves from the surrounding hills to the center of the valley and then moves towards the coast following the general topography of the region. The water-table gradient generally is about 14 ft/mi (Colón-Dieppa and Quiñones-Márquez, 1985).

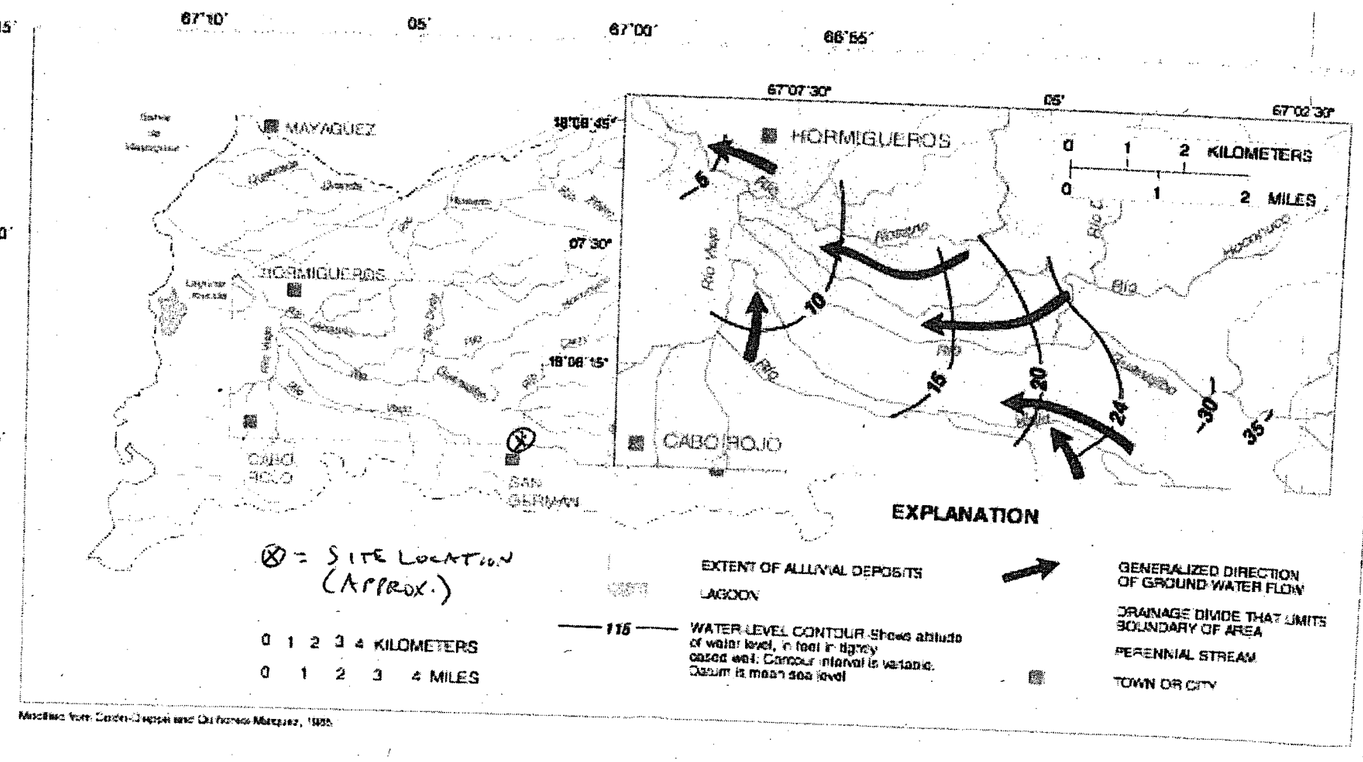


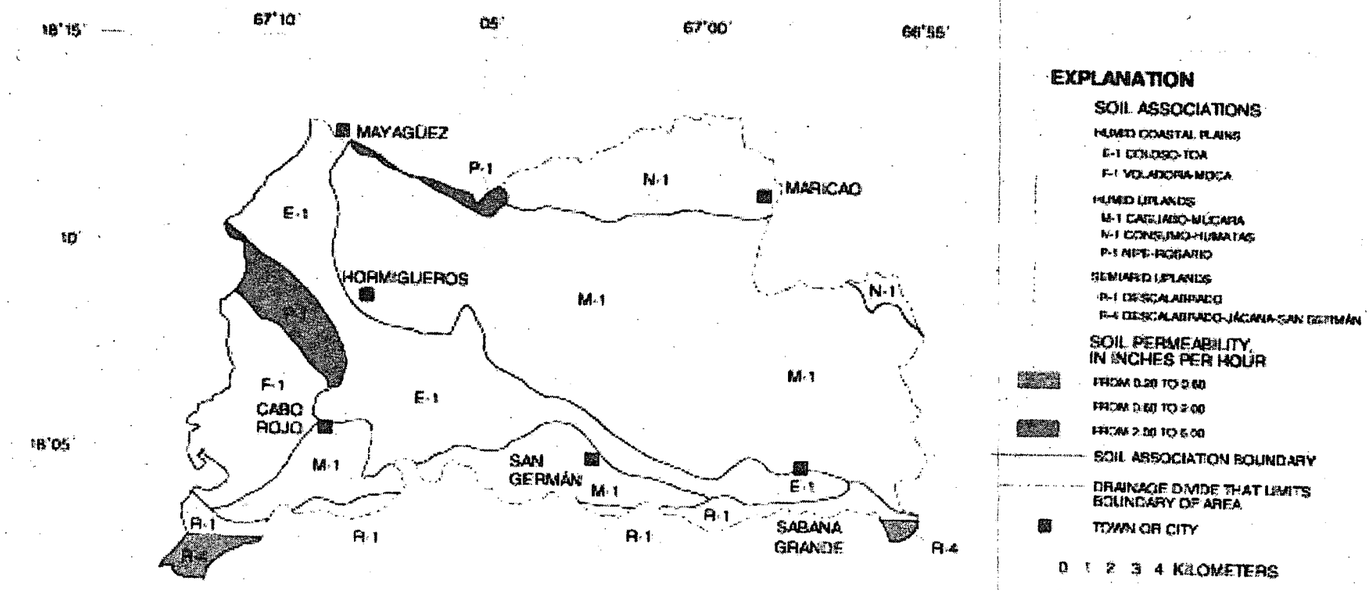
Figure 2.3.2.E-1 Altitude of water-level surface and direction of ground-water flow during June 1980 in the Central Guanajibo valley, Puerto Rico.

2.3.2.F Soil Permeability

The soil association overlying the Guanajibo region is the Coloso-Toa (fig. 2.3.2.F-1). This association is described by Gierbolini (1975, p. 7) as nearly level, porous soils that are loamy throughout. Scattered ponded areas are present in these soils that are frequently flooded and, subsequently, subject to sediment deposition. These soils were formed in sediments derived from limestone and volcanic rocks. The Coloso-Toa association has moderate permeabilities ranging from 0.60 to 2.00 in/hr (table 2.3.2.F-1). Depth from surface ranges from near zero to 60 inches and available water capacity ranges from 0.11 to 0.14 in/in of soil.

Table 2.3.2.F-1 Thickness, permeability, and available water capacity for the soil associations in the Guanajibo region, Puerto Rico (Modified from Gierbolini, 1975)

Area and soil association	Thickness (inches)	Permeability (inch per hour)	Available water capacity (inch per inch)
Humid Coastal Plains			
Coloso-Toa	0 to 60	0.60 to 2.00	0.11 to 0.14
Voladora-Moca	0 to 64	0.60 to 2.00	0.11 to 0.17
Humid Uplands			
Caguabo-Múcara	0 to 22	0.60 to 2.00	0.03 to 0.17
Consumo-Humatas	0 to 60	0.60 to 2.00	0.09 to 0.18
Nipe-Rosario	0 to 80	2.00 to 6.00	0.11 to 0.13
Semiarid Uplands			
Descalabrado	0 to 20	0.60 to 2.00	0.09 to 0.16
Descalabrado-Jácana-San Germán	0 to 34	0.20 to 0.60	0.03 to 0.16



Modified from Gierbolini, 1975; Roberto Acevedo, Soil Conservation Service, written communication, 1995

Figure 2.3.2.F-1 Soil associations and permeability in the Guanajibo region, Puerto Rico.

10

ATLAS OF GROUND-WATER RESOURCES IN PUERTO RICO AND THE U.S. VIRGIN ISLANDS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 94-4198

Prepared in cooperation with the
U.S. ENVIRONMENTAL PROTECTION AGENCY

ATLAS OF GROUND-WATER RESOURCES IN PUERTO RICO AND THE U.S. VIRGIN ISLANDS

By Thalia D. Veve and Bruce E. Taggart (editors)

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 94-4198

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U.S. ENVIRONMENTAL PROTECTION AGENCY

San Juan, Puerto Rico
1996

REFERENCE 30

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Gerry Gilliland
DATE: August 3, 2007

SUBJECT: Analytical Data – PRASA Retiro Well

Attached are analytical data sheets for Puerto Rico Aqueduct and Sewer Authority's Retiro well for the period June 1994 to May 1995. The data sheets show that the well was not yet contaminated with the chlorinated solvents tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE) at that time.

These data sheets were obtained from the Central PRASA Laboratory located in Caguas, Puerto Rico.

Signature/Date 8/3/07

PR AQUEDUCTS & SEWER AUTHORITY
Laboratory Area
P.O. Box 7066
Barrio Obrero Station
San Juan, Puerto Rico 00916

Attn: Lcda. Audrette Fournier

Work Order #: 223-01-22
Region: Mayaguez
Municipality: San German
System: Pozo
PWSID: 3323
Dated Collected: 6/20/94
Sample: 94-054-6953
Eq Lab Sample: 122271

Component: Pozo Retiño

Address: Ave. Castro Perez

Parameters	Units		Results	Mdl
1,1,1,2-Tetrachloroethane	mg/L	<	.0005	0.0005
1,1,1-Trichloroethane*	mg/L	<	.0005	0.0005
1,1,2,2-Tetrachloroethane	mg/L	<	.0005	0.0005
1,1,2-Trichloroethane*	mg/L	<	.0005	0.0005
1,1-Dichloroethane*	mg/L	<	.0005	0.0005
1,1-Dichloroethene	mg/L	<	.0005	0.0005
1,1-Dichloropropene	mg/L	<	.0005	0.0005
1,2,3-Trichlorobenzene	mg/L	<	.0005	0.0005
1,2,3-Trichloropropane	mg/L	<	.0005	0.0005
1,2,4-Trichlorobenzene*	mg/L	<	.0005	0.0005
1,2,4-Trimethylbenzene	mg/L	<	.0005	0.0005
1,2-Dibromo3chloropropane	mg/L	<	.0005	0.0005
1,2-Dibromoethane	mg/L	<	.0005	0.0005
1,2-Dichlorobenzene*	mg/L	<	.0005	0.0005
1,2-Dichloroethane*	mg/L	<	.0005	0.0005
1,2-Dichloropropane*	mg/L	<	.0005	0.0005
1,3,5-Trimethylbenzene	mg/L	<	.0005	0.0005
1,3-Dichlorobenzene	mg/L	<	.0005	0.0005
1,3-Dichloropropane	mg/L	<	.0005	0.0005
1,4-Dichlorobenzene*	mg/L	<	.0005	0.0005
2,2-Dichloropropane	mg/L	<	.0005	0.0005
2-Chlorotoluene	mg/L	<	.0005	0.0005
4-Chlorotoluene	mg/L	<	.0005	0.0005
Benzene*	mg/L	<	.0005	0.0005
Bromobenzene	mg/L	<	.0005	0.0005
Bromochloromethane	mg/L	<	.0005	0.0005
Bromodichloromethane*	mg/L	<	.0005	0.0005
Bromoform*	mg/L	<	.0005	0.0005
Bromomethane	mg/L	<	.0005	0.0005
Carbon Tetrachloride*	mg/L	<	.0005	0.0005
Chlorobenzene*	mg/L	<	.0005	0.0005
Chlorodibromomethane*	mg/L	<	.0005	0.0005

* Regulated Contaminants

Reported by: Ismael Martinez
Title: Laboratory Director

Released by: Iris Montanez
Title: Quality Assurance Director

ENVIRONMENTAL QUALITY LABORATORIES, INC.

PR AQUEDUCTS & SEWER AUTHORITY
Laboratory Area
P.O. Box 7066
Barrio Obrero Station
San Juan, Puerto Rico 00916

Attn: Lcda. Audrette Fournier

Work Order #: 223-01-22
Region: Mayaguez
Municipality: San German
System: Pozo
PWSID: 3323
Dated Collected: 6/20/94
Sample: 94-054-6953
Eq Lab Sample: 122271

Component: Pozo Retino

Address: Ave. Castro Perez

Parameters	Units		Results	Mdl
Chloroethane	mg/L	<	.0005	0.0005
Chloroform*	mg/L	<	.0005	0.0005
Chloromethane	mg/L	<	.0005	0.0005
Dibromomethane	mg/L	<	.0005	0.0005
Dichlorodifluoromethane	mg/L	<	.0005	0.0005
Ethyl Benzene*	mg/L	<	.0005	0.0005
Hexachlorobutadiene	mg/L	<	.0005	0.0005
Isopropylbenzene	mg/L	<	.0005	0.0005
M-P Xylenes*	mg/L	<	.0005	0.0005
Methylene Chloride*	mg/L	<	.0005	0.0005
N-Propylbenzene	mg/L	<	.0005	0.0005
Naphthalene	mg/L	<	.0005	0.0005
O-Xylene*	mg/L	<	.0005	0.0005
Styrene*	mg/L	<	.0005	0.0005
Tert-Butylbenzene	mg/L	<	.0005	0.0005
Tetrachloroethene*	mg/L	<	.0005	0.0005
Toluene*	mg/L	<	.0005	0.0005
Trichloroethene*	mg/L	<	.0005	0.0005
Trichlorofluoromethane	mg/L	<	.0005	0.0005
Vinyl Chloride*	mg/L	<	.0005	0.0005
cis-1,2-Dichloroethene*	mg/L	<	.0005	0.0005
cis-1,3-Dichloropropene	mg/L	<	.0005	0.0005
n-Butylbenzene	mg/L	<	.0005	0.0005
p-Isopropyltoluene	mg/L	<	.0005	0.0005
sec-Butylbenzene	mg/L	<	.0005	0.0005
trans-1,2-Dichloroethene*	mg/L	<	.0005	0.0005
trans-1,3-Dichloropropene	mg/L	<	.0005	0.0005

ISMAEL MARTINEZ JIMENEZ
Químico Licenciado
Estado Libre Asociado de Puerto Rico
LICENCIA NUM. 1486

* Regulated Contaminants

Reported by: Ismael Martinez
Title: Laboratory Director

Released by: Iris Montanez
Title: Quality Assurance Director

3

Drinking Water
HRS #83160
Environmental
HRS # E83079

ELAB, Inc.

PUERTO RICO AQUEDUCT AND AUTH.
602 BARBOSA AVENUE - THIRD FLOOR
HATO REY,PR 00917
ATTN: AUDRETTE FOURNIER

Page Number: 133
Date Received: 05/18/95
Date Reported: 06/01/95
Date Sampled: 05/16/95
Client PO Number: 93-SC-299

Submission #: 9505000272
Lab Sample Number: 81829
Client Sample Number: 95-054-1094
PWSID: 3323
Sample Description: POZO RETIRO
Sample Address: AVE CASTO PEREZ

Method	Component	Result	Units	MDL / MCL	Analyst	Date Analyzed	Date Prepared
353.2	NITRATE NITROGEN	0.15	MG/L	0.05 / 10.0	RG	05/23/95	
524.2	BENZENE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	BROMOBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	BROMOCHLOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	BROMODICHLOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	BROMOFORM	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	BROMOMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	N-BUTYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	SEC-BUTYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	TERT-BUTYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	CARBON TETRACHLORIDE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	CHLOROBENZENE	<0.0005	MG/L	0.0005 / 0.1	VG	05/25/95	
524.2	CHLOROETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	CHLOROFORM	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	CHLOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	O-CHLOROTOLUENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	P-CHLOROTOLUENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	DIBROMOCHLOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2-DIBROMO-3-CHLOROPROPANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2-DIBROMOETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	DIBROMOMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2-DICHLOROBENZENE	<0.0005	MG/L	0.0005 / 0.6	VG	05/25/95	
524.2	1,3-DICHLOROBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,4-DICHLOROBENZENE	<0.0005	MG/L	0.0005 / 0.075	VG	05/25/95	
524.2	DICHLORODIFLUOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,1-DICHLOROETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2-DICHLOROETHANE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	1,1-DICHLOROETHYLENE	<0.0005	MG/L	0.0005 / 0.007	VG	05/25/95	
524.2	CIS-1,2-DICHLOROETHYLENE	<0.0005	MG/L	0.0005 / 0.07	VG	05/25/95	
524.2	TRANS-1,2-DICHLOROETHYLENE	<0.0005	MG/L	0.0005 / 0.1	VG	05/25/95	
524.2	1,2-DICHLOROPROPANE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	1,3-DICHLOROPROPANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	2,2-DICHLOROPROPANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	

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Drinking Water
HRS #83160
Environmental
HRS # E83079
ELAB, Inc.

PUERTO RICO AQUEDUCT AND AUTH.
602 BARBOSA AVENUE - THIRD FLOOR
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ATTN: AUDRETTE FOURNIER

Submission #: 9505000272
Lab Sample Number: 81829
Client Sample Number: 95-054-1094
PWSID: 3323
Sample Description: POZO RETIRO
Sample Address: AVE CASTO PEREZ

Page Number: 134
Date Received: 05/18/95
Date Reported: 06/01/95
Date Sampled: 05/16/95
Client PO Number: 93-SC-299

Method	Component	Result	Units	MDL / MCL	Analyst	Date Analyzed	Date Prepared
524.2	1,1-DICHLOROPROPENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	CIS-1,3-DICHLOROPROPENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	TRANS-1,3-DICHLOROPROPENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	ETHYLBENZENE	<0.0005	MG/L	0.0005 / 0.7	VG	05/25/95	
524.2	HEXACHLOROBUTADIENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	ISOPROPYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	4-ISOPROPYLTOLUENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	METHYLENE CHLORIDE (DICHLOR	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	NAPHTHALENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	N-PROPYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	STYRENE	<0.0005	MG/L	0.0005 / 0.1	VG	05/25/95	
524.2	1,1,1,2-TETRACHLOROETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,1,2,2-TETRACHLOROETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	TETRACHLOROETHYLENE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	TOLUENE	<0.0005	MG/L	0.0005 / 1.0	VG	05/25/95	
524.2	1,2,3-TRICHLOROBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2,4-TRICHLOROBENZENE	<0.0005	MG/L	0.0005 / 0.07	VG	05/25/95	
524.2	1,1,1-TRICHLOROETHANE	<0.0005	MG/L	0.0005 / 0.2	VG	05/25/95	
524.2	1,1,2-TRICHLOROETHANE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	TRICHLOROETHYLENE	<0.0005	MG/L	0.0005 / 0.005	VG	05/25/95	
524.2	TRICHLOROFLUOROMETHANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2,3-TRICHLOROPROPANE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,2,4-TRIMETHYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	1,3,5-TRIMETHYLBENZENE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	VINYL CHLORIDE	<0.0005	MG/L	0.0005 / N/A	VG	05/25/95	
524.2	O-XYLENE	<0.0005	MG/L	0.0005 / 0.002	VG	05/25/95	
524.2	M-XYLENE	<0.0005	MG/L	0.0005 / 10	VG	05/25/95	
524.2	P-XYLENE	<0.0005	MG/L	0.0005 / 10	VG	05/25/95	
		<0.0005	MG/L	0.0005 / 10	VG	05/25/95	

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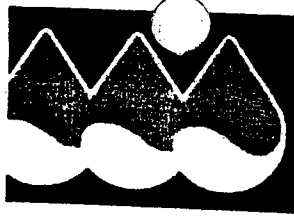
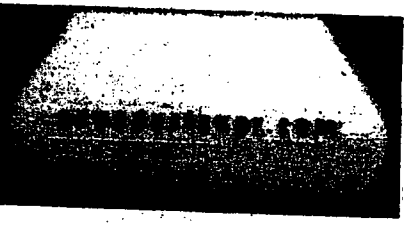
REFERENCE 31



Autoridad de
Acueductos y
Alcantarillados



Sistema: San Germán Urbano
PWS ID: 3323
Año: 2002

Introducción

Las enmiendas a la Reglamentación Nacional Primaria del Agua Potable de 1996, requiere a todo dueño o administrador de un sistema de agua público comunal, desarrollar un informe para dar a conocer detalles sobre la calidad del agua potable servida a la población. Es por eso que se publica este quinto informe del período de enero a diciembre de 2002, con la información correspondiente al sistema de agua público en referencia. La información a continuación se sobre las fuentes de agua del sistema y el cumplimiento con los estándares y niveles establecidos para agua potable por la Agencia de Protección Ambiental (EPA, por sus siglas en inglés) y el Departamento de Salud Estatal. Para información adicional sobre este Informe de Calidad de Agua Potable, puede comunicarse de lunes a viernes al 787-474-2025 en el área metropolitana, o al 1-866-997-8366 en la Isla, de 5:00 de la tarde a 9:00 de la noche efectivo 1 de julio de 2003.

Agua Potable

Es considerado normal encontrar una cantidad mínima de agentes contaminantes en el agua potable, incluyendo el agua embotellada. **Pero la presencia de estos no significa necesariamente que exista o que representan un riesgo a la salud.** Es importante orientarse sobre los contaminantes regulados y no regulados en el agua potable y sus efectos potenciales a la salud, información sobre estos puede ser obtenida en el Programa de Agua Potable del Departamento de Salud llamando al 787-777-0150, o en las oficinas locales de la EPA al teléfono 787-977-5870.

Reglamentación de Agua Potable

La reglamentación aplicable a los sistemas de acueductos es la Reglamentación Nacional Primaria de Agua Potable. Esta reglamentación es desarrollada por la Agencia de Protección

Ambiental Federal según dispone la Ley de Agua Potable Segura ("Safe Drinking Water Act") y establece los límites máximos permitidos para contaminantes en el agua potable y las técnicas de tratamiento necesarias. En Puerto Rico, el Departamento de Salud, es la agencia responsable de implementar y hacer cumplir esta reglamentación.

La reglamentación estatal requiere, además, tener operadores certificados en los sistemas públicos de agua. En enmiendas recientes a la reglamentación federal, se establecen guías sobre la certificación de operadores. Este requisito es para todos los sistemas de tratamiento del agua. Ondeo de Puerto Rico y la Autoridad de Acueductos y Alcantarillados (AAA), para cumplir con esta disposición, está adiestrando a sus Operadores para que la Junta Examinadora de Operadores de Plantas de Tratamiento de Aguas Potables y Aguas Usadas de Puerto Rico los evalúe y los certifique según la reglamentación estatal existente.

Este informe está disponible en el Internet en la dirección www.acueductospr.com/CCReport/

THIS REPORT CONTAINS VERY IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER. TRANSLATE IT, OR SPEAK WITH SOMEONE WHO UNDERSTANDS IT.

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Fuentes de Agua Potable

Las fuentes de abasto superficiales incluyen: ríos, lagos, quebradas y riachuelos. En la clasificación de fuentes subterráneas están: los pozos y los manantiales. El agua que llega a estos cuerpos de agua y en su trayectcria sobre la superficie de la tierra o en su paso a través del terreno, puede disolver minerales que están naturalmente en el terreno. Además, podría arrastrar sustancias que son el resultado de las diferentes actividades de los seres humanos y los animales. Es por estos sucesos y otros que es requisito aplicar tratamiento al agua para el consumo humano; entre los que se destaca la desinfección para ayudar en la eliminación de los contaminantes microbiológicos. Existen otras técnicas de tratamiento que podrían utilizarse, dependiendo de la calidad de la fuente de agua. En el caso de los sistemas con fuente de agua superficial, el tratamiento del agua es más complejo y se requiere utilizar la filtración.

Otro aspecto importante sobre las fuentes de aguas es la calidad que se mantenga, evitando la contaminación y deterioro de su estado natural. El Departmento de Salud y su Programa de Agua Potable tienen el *Source Water Protection Program* (SWAP) el cual tiene como objetivo

ayudar en la protección de estas fuentas de agua. Actualmente, se realizan evaluaciones de las fuentas de abasto y la información obtenida estará disponible al publico tan pronto sean completadas. La información disponible a la fecha es general y principalmente sobre el desarrollo y implementación del SWAP. Esta información puede obtenerse en el Departmento de Salud en las oficinas de su Programa de Agua Potable.

Sistema y sus Componentes

El sistema de referencia tiene los siguientes componentes o fuentes de abasto: (S)-superficiales y (G)-subterráneos. Entre los sistemas con fuentes superficiales se encuentran los que tienen plantas de filtración y en los subterráneos los que tienen pozos.

Planta de Filtros San Germán (fuente principal de agua: Río Hoconuco y Río Caín - S), Pozo Lola Rodríguez de Tió (G), Pozo Lola Rodríguez de Tió II (G), Pozo Retiro (G) y Pozo Real (G)

Contaminantes en las Fuentes de Agua Potable

El agua de las fuentes utilizadas en los sistemas públicos de agua, antes de recibir el tratamiento para convertirla en agua potable, podría tener los siguientes contaminantes:

- ***Microbiológicos*** – Estos incluyen virus y bacterias, que pueden originarse en las plantas de: plantas de tratamiento de alcantarillado, pozos sépticos, actividades de ganadería y vida silvestre.
- ***Químicos Inorgánicos*** - Estos incluyen sales y metales, que pueden tener origen natural o son el resultado de las escorrentías de lluvia. Además, otros orígenes pueden ser las descargas de agua con desperdicios domésticos o industriales, la producción de gases, aceites o cultivos.
- ***Plaguicidas y Herbicidas*** - Estos contaminantes pueden tener origen de una variedad de fuentes como: la agricultura, escorrentía de lluvia y de usos residenciales.
- ***Químicos Orgánicos*** – Estos incluyen químicos orgánicos sintéticos y volátiles, que son productos intermedios de procesos industriales y de la producción de petróleo. Además, pueden tener su origen en gasolineras, escorrentías de lluvia y pozos sépticos.
- ***Radiológicos*** - Estos pueden estar presentes en el terreno de forma natural.

La reglamentación requiere que en un período de tres años se realice en cada componente del sistema, un análisis para químicos inorgánicos, químicos orgánicos volátiles, químicos orgánicos sintéticos, herbicidas y plaguicidas. Las frecuencias de muestreo para los grupos de químicos mencionados pueden ser de forma trimestral, anual, cada tres años u otra. El total de

contaminantes para los que se requiere muestreo están en alrededor de 70. A esto, se incluye alrededor de 60 contaminantes no regulados para los que también se realizan análisis. Además, se realizan análisis de contaminantes microbiológicos mensualmente según la población servida por el sistema. También se realizan diariamente muestreos de cloro residual y turbidez.

Aviso especial

Algunas personas pueden ser más vulnerables que otras a los contaminantes que pueden estar presentes en el agua potable. Las personas con su sistema inmunológico comprometido tales como: las personas con cáncer que están recibiendo quimioterapia, las que han recibido transplantes de órganos, personas con VIH/SIDA u otras con problemas del sistema inmunológico, algunos ancianos e infantes, pueden estar especialmente en riesgo de infección. La EPA y el Centro para el Control y Prevención de Enfermedades, tienen información disponible para las personas con riesgo a infecciones por Cryptosporidium y otros contaminantes microbiológicos, la cual puede solicitarse llamando a la EPA al teléfono 1-800-426-4791 o en el www.epa.gov/safewater.

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Información Sobre Calidad de Agua Potable

La Tabla de Información de Calidad de Agua Potable contiene datos de los contaminantes que se encontraron en el agua en los análisis realizados durante el año 2002 o anterior y cuyo resultado estuvo por encima del nivel de detección del análisis. En los casos donde el muestreo de los contaminantes se realiza con una frecuencia menor al año, se reporta el último análisis y aparecerá el año cuando se realizó. A continuación se mencionan las definiciones de términos o abreviaciones utilizadas en la tabla.

- **NMC:** Nivel Máximo de Contaminante o el nivel más alto permitido en el agua potable. Los NMC son establecidos tan cerca como sea posible de la MNMC usando la mejor tecnología disponible.
- **MNMC:** Meta para el Nivel Máximo de Contaminante permitido o el nivel máximo en el agua potable bajo el cual no hay daños conocidos o esperados a la salud. La MNMC permite un margen de seguridad.
- **Contaminante:** sustancia o materia física, química, biológica o radiológica en el agua.
- **NA:** Nivel de Acción - Cuando se excede el NA o el nivel establecido de concentración del contaminante, es requerido aplicar tratamiento y cumplir con otros requerimientos de reglamentación para agua potable.

- **N/A:** no aplica
- **nd:** no detectable, comparado con el límite de detección de la prueba
- **ppb:** partes por billón o microgramos por litro
- **ppm:** partes por millón o miligramos por litro
- **ppt:** partes por trillón o nanogramos por litro
- **mrem/año:** milirems por año. Medida de exposición a radionucleidos.
- **pCi/l:** picocurios por litro. Medida de radioactividad
- **TT:** Técnica de Tratamiento – Es un proceso requerido para reducir el nivel de un contaminante en agua potable.
- **NTU:** Unidad Nefelométrica de Turbidez – Es la unidad para medir el material particulado en el agua.
- **Dispensa y Exención:** Permiso otorgado por el Departamento de Salud (DS) o Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) para no cumplir con un NMC o técnica de tratamiento bajo ciertas condiciones
- **Max.** : Máximo
- **Min.** : Mínimo
- **>:** signo de mayor que

La información contenida en esta tabla proviene de los análisis realizados para: químicos orgánicos volátiles, químicos orgánicos sintéticos y contaminantes microbiológicos. Además, en los sistemas que tienen fuentes de agua superficiales se incluye la turbidez. La dioxina y asbesto no forman parte de esta evaluación ya que existe una dispensa en la frecuencia de muestreo.

Tabla: Información de Calidad de Agua Potable

Se analizaron alrededor de 130 contaminantes en el período de muestreo establecido por reglamentación, los encontrados están mencionados en la siguiente tabla.

Contaminante (unidad)	NMC	MNMC	Resultado		Min.-Max.	Fecha de Muestreo
Microbiológicos						
Bacterias Coliformes Totales (total positivas)	> 1	0	1	(1)	0 - 1	Marzo/2002
No Regulados						
Sulfato (ppm)	N/A	N/A	19		6.6 - 19	2000/2001
Químicos Inorgánicos						
Arsénico (ppb)	Nota (4)	N/A	1.2		0.15 - 1.2	2001
Bario (ppm)	2	2	0.08		0.001 - 0.08	2001
Cromo (ppb)	100	100	20.7		13.8 - 20.7	2001
Fluoruro (ppm)	4	4	0.1		0.03 - 0.1	2002
Nitrato [como nitrógeno] (ppm)	10	10	0.76		0.32 - 0.76	2002
Químicos Orgánicos						
Acidos Haloacéticos (ppb)	60 (3)	N/A	47		30-104	2002
Carbono Total Orgánico [TOC]	TT	N/A	1.1		1.0 - 1.3	2002
Químicos Orgánicos Volátiles						
cis -1.2 - Dicloroetileno (ppb)	70	70	0.55		0.5 - 0.7	2002
Tetracloroetileno (ppb)	5	0	3.2		0.5 - 6.4	2002
TTHM's [Trihalometanos Total] (ppb)	80	N/A	55		34-76	2002
Radionucleidos						
Radio 226 y 228 [combinados] (pCi/l)	5	0	0.3		nd - 2	2001
Turbidez						
Turbidez (% menor o igual a 0.5 NTU usando TT)	TT = 95%	N/A	99%		99% - 100%	Abril/2002
Turbidez máxima (NTU)	TT = 5	N/A	0.46		0.01-0.46	Abril/2002

Contaminante (unidad)	NMC	MNMC	Resultado	Lugares por encima NA	Fecha de Muestreo
Plomo y Cobre					
Cobre (ppm)	1.3	1.3	0.73	1	2000
Plomo (ppb)	15	0	<2.7	2	2000

Notas

**** Violación al NMC***

(1) El sistema obtuvo 1 muestra positiva en coliformes totales de 30 muestras tomadas en marzo. Durante el año se tomaron 334 muestras y 1 muestra fue positiva(3.3%).

(3) Los ácidos haloacéticos es la suma de las concentraciones de ácido monocloroacético, ácido dicloroacético, ácido tricloroacético,

ácido monobromoacético y ácido dibromoacético. La EPA ha establecido un NMC de 60 ppb para esta suma y será efectivo en sistemas grandes en el 2002 y en sistemas pequeños en el 2004.

(4) El NMC actual para arsénico es de 50 ppb. La EPA ha establecido un nuevo NMC de 10 ppb a ser efectivo en enero de 2006.

Fuentes Principales de Contaminantes en Agua Potable o Comentarios

Acidos Haloacéticos - Residuos o subproductos del proceso de desinfección del agua

Arsénico - Erosiones de depósitos naturales; escorrentías de huertos; aguas conresiduos de fabricación de vidrio y desperdicios electrónicos.

Bacterias Coliformes Totales - Están presentes en el ambiente.

Bario - Descargas de refinerías de metal; erosión de los depósitos naturales y descargas de desperdicios de excavaciones.

cis - 1,2-Dicloroetileno -Descargas de industrias químicas.

Cobre - Corrosión del sistema de tubería casera; erosión de los depósitos naturales; lixiviación de los conservantes de la madera.

Cromio - Descarga de las fábricas de acero y de papel; erosión de depósitos naturales.

Fluoruro - Erosión de los depósitos naturales; aditivo del agua que previene el deterioro dental; descarga de fábricas de fertilizantes y aluminio.

Nitrato [como nitrógeno] - Escorrentía con fertilizantes; lixiviación de pozos sépticos y alcantarillado; erosión de los depósitos naturales

Plomo - Corrosión del sistema de tubería casera; erosión de depósitos naturales.

Radio 226 y 228 - Erosión de depósitos naturales.

Sulfato - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Tetracloroetileno - Efluentes de fábricas y empresas de limpieza en seco.

TOC - Están presentes en el ambiente.

TTHM's [Trihalometanos Total] - Residuos o subproductos del proceso de desinfección del agua.

Turbidez - Escorrentías de suelos.

Violaciones de Muestreo y Reporte

Las violaciones de muestreo y reporte, no representan incumplimiento con los estándares de calidad de agua y ocurren cuando no se realiza un muestreo requerido o cuando no se cumple con la fecha para someter un informe.

En la siguiente tabla se encuentran las violaciones de muestreo y reporte por contaminante o grupo de contaminante de este sistema para el 2002.

CONTAMINANTE	PERIODO DE MUESTREO	MUESTRAS REQUERIDAS	MUESTRAS TOMADAS
Químicos Orgánicos Volátiles (VOC)	Octubre-Diciembre/2002	1	0

Autoridad de Acueductos y Alcantarillados de Puerto Rico

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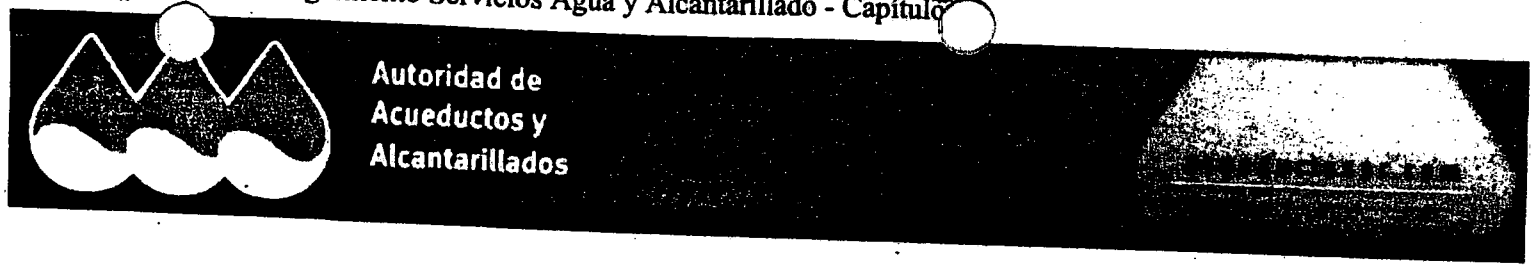

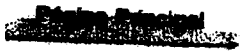
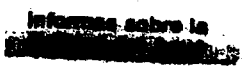

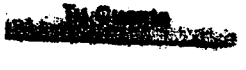
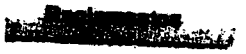

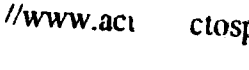

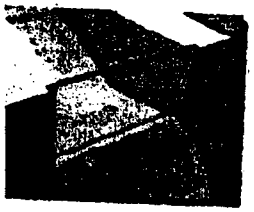

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Sistema: San Germán Urbano
PWS ID: 3323
Año: 2003

Introducción

Las enmiendas a la Reglamentación Nacional Primaria del Agua Potable de 1996, requieren a todo dueño o administrador de un sistema de agua público comunal, desarrollar un informe para dar a conocer detalles sobre la calidad del agua potable servida a la población. Es por eso que se publica este sexto informe del período de enero a diciembre de 2003, con la información correspondiente al sistema de agua público en referencia. La información a continuación es sobre las fuentes de agua del sistema y del cumplimiento con los estándares y niveles establecidos para agua potable por la Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) y el Departamento de Salud Estatal. Para información adicional sobre este Informe de Calidad de Agua Potable, puede comunicarse de lunes a viernes al 787-474-2025 en el área metropolitana, o al 1-866-997-8366 en la Isla, de 5:00 de la tarde a 9:00 de la noche efectivo 1de julio de 2004..

Agua Potable

Es considerado normal encontrar una cantidad mínima de agentes contaminantes en el agua potable, incluyendo el agua embotellada. **Pero la presencia de estos no significa necesariamente que exista o que representan un riesgo a la salud**. Es importante orientarse sobre los contaminantes regulados y no regulados en el agua potable y sus efectos potenciales a la salud. Información sobre estos puede ser obtenida en el Programa de Agua Potable del Departamento de Salud llamando al teléfono: (787)-777-0150, o en las oficinas locales de la EPA al teléfono: (787)-977-5870..

Reglamentación de Agua Potable

La reglamentación aplicable a los sistemas de acueductos es la Reglamentación Nacional

Primaria de Agua Potable. Esta reglamentación es desarrollada por la Agencia de Protección Ambiental Federal según dispone la Ley de Agua Potable Segura ("Safe Drinking Water Act") y establece los límites máximos permitidos para contaminantes en el agua potable y las técnicas de tratamiento necesarias. En Puerto Rico, el Departamento de Salud, es la agencia responsable de implantar y hacer cumplir esta reglamentación.

La reglamentación estatal requiere, además, tener operadores certificados en los sistemas públicos de agua. En enmiendas recientes a la reglamentación federal, se establecen guías sobre la certificación de operadores. Este requisito es para todos los sistemas de tratamiento de agua. La Autoridad de Acueductos y Alcantarillados (AAA), para cumplir con esta disposición, está adiestrando a sus Operadores para que la Junta Examinadora de Operadores de Plantas de Tratamiento de Agua Potable y Aguas Usadas de Puerto Rico, los evalúe y los certifique según la reglamentación estatal existente.

THIS REPORT CONTAINS VERY IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER. TRANSLATE IT, OR SPEAK WITH SOMEONE WHO UNDERSTANDS IT. THIS REPORT IS ALSO AVAILABLE IN ENGLISH ON THE INTERNET AT www.acueductospr.com

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Fuentes de Agua Potable

Las fuentes de abasto superficiales incluyen: ríos, lagos, quebradas y riachuelos. En la clasificación de fuentes subterráneas están: los pozos y los manantiales. El agua que llega a estos cuerpos de agua y en su trayectoria sobre la superficie de la tierra o en su paso a través del terreno, puede disolver minerales que están naturalmente en el terreno. Además, podría arrastrar sustancias que son el resultado de las diferentes actividades de los seres humanos y los animales. Es por estos sucesos y otros que es requisito aplicar tratamiento al agua para el consumo humano; entre los que se destaca la desinfección para ayudar en la eliminación de los contaminantes microbiológicos. Existen otras técnicas de tratamiento que podrían ser utilizadas, dependiendo de la calidad de la fuente de agua. En el caso de los sistemas con fuente de agua superficial, el tratamiento del agua es más complejo y se requiere utilizar la filtración.

Otro aspecto importante sobre las fuentes de aguas es la calidad que se mantenga, evitando su

contaminación y deterioro de su estado natural. El Departmento de Salud y su Programa de Agua Potable tienen el *Source Water Protection Program* (SWAP) el cual tiene como objetivo ayudar en la protección de estas fuentas de agua. Actualmente, se realizan evaluaciones de las fuentas de abasto y la información obtenida estará disponible al publico tan pronto sean completadas. La información disponible a la fecha es general y principalmente sobre el desarrollo y implementación del SWAP. Esta información puede obtenerse en el Departmento de Salud en las oficinas de su Programa de Agua Potable.

Sistema y sus Componentes

El sistema de referencia tiene los siguientes componentes o fuentes de abasto: (S)-superficiales y (G)-subterráneos. Entre los sistemas con fuentes superficiales se encuentran los que tienen plantas de filtración y en los subterráneos los que tienen pozos.

Planta de Filtros San Germán (fuente principal de agua: Río Hoconuco y Río Caín - S), Pozo Lola Rodríguez de Tió (G), Pozo Lola Rodríguez de Tió II (G), Pozo Retiro (G) y Pozo Real (G)

Contaminantes en las Fuentes de Agua Potable

El agua de las fuentes utilizadas en los sistemas públicos de agua, antes de recibir el tratamiento para convertirla en agua potable, podría tener los siguientes contaminantes:

- ***Microbiológicos*** – Estos incluyen virus y bacterias, que pueden originarse en las plantas de: plantas de tratamiento de alcantarillado, pozos sépticos, actividades de ganadería y vida silvestre.
- ***Químicos Inorgánicos*** - Estos incluyen sales y metales, que pueden tener origen natural o son el resultado de las escorrentías de lluvia. Además, otros orígenes pueden ser las descargas de agua con desperdicios domésticos o industriales, la producción de gases, aceites o cultivos.
- ***Plaguicidas y Herbicidas*** - Estos contaminantes pueden tener origen de una variedad de fuentes como: la agricultura, escorrentía de lluvia y de usos residenciales.
- ***Químicos Orgánicos*** – Estos incluyen químicos orgánicos sintéticos y volátiles, que son productos intermedios de procesos industriales y de la producción de petróleo. Además, pueden tener su origen en gasolineras, escorrentías de lluvia y pozos sépticos.
- ***Radiológicos*** - Estos pueden estar presentes en el terreno de forma natural.

La reglamentación requiere que en un período de tres años se realice en cada componente del sistema, un análisis para químicos inorgánicos, químicos orgánicos volátiles, químicos

orgánicos sintéticos, herbicidas y plaguicidas. Las frecuencias de muestreo para los grupos de químicos mencionados pueden ser de forma trimestral, anual, cada tres años u otra. El total de contaminantes para los que se requiere muestreo están en alrededor de 70. A esto, se incluye alrededor de 60 contaminantes no regulados para los que también se realizan análisis. Además, se realizan análisis de contaminantes microbiológicos mensualmente según la población servida por el sistema. También se realizan diariamente muestreos de cloro residual y turbidez.

Aviso especial

Algunas personas pueden ser más vulnerables a los contaminantes que pueden estar presentes en el agua potable. Las personas con su sistema inmunológico comprometido tales como: las personas con cáncer que están recibiendo quimioterapia, las que han recibido transplantes de órganos, personas con VIH/SIDA u otras con problemas del sistema inmunológico, algunos ancianos e infantes, pueden estar especialmente en riesgo de infección. La EPA y el Centro para el Control y Prevención de Enfermedades, tienen información disponible para las personas con riesgo a infecciones por Cryptosporidium y otros contaminantes microbiológicos, la cual puede solicitarse llamando a la EPA al teléfono 1-800-426-4791 o en el www.epa.gov/safewater.

Información Sobre Calidad de Agua Potable

La Tabla de Información de Calidad de Agua Potable contiene datos de los contaminantes que se encontraron en el agua en los análisis realizados durante el año 2003 o anterior y cuyo resultado estuvo por encima del nivel de detección del análisis. En los casos donde el muestreo de los contaminantes se realiza con una frecuencia menor al año, se reporta el último análisis y aparecerá el año cuando se realizó. A continuación se mencionan las definiciones de términos o abreviaciones utilizadas en la tabla.

- **NMC:** Nivel Máximo de Contaminante o el nivel más alto permitido en el agua potable. Los NMC son establecidos tan cerca como sea posible de la MNMC usando la mejor tecnología disponible.
- **MNMC:** Meta para el Nivel Máximo de Contaminante permitido o el nivel máximo en el agua potable bajo el cual no hay daños conocidos o esperados a la salud. La MNMC permite un margen de seguridad.
- **NMRD:** Nivel Máximo de Residual de Desinfectante o el nivel más alto permitido en el agua potable. Hay evidencia que la adición de un desinfectante es necesaria para el control de contaminantes microbiológicos. .

- **MNMRD:** Meta para el Nivel Máximo de Residual de Desinfectante o nivel máximo en el agua potable bajo el cual no hay daños conocidos o esperados a la salud. El MNMRD no refleja los beneficios del uso de desinfectantes para el control de contaminantes microbiológicos.
- **Contaminante:** sustancia o materia física, química, biológica o radiológica en el agua.
- **NA:** Nivel de Acción - Cuando se excede el NA o el nivel establecido de concentración del contaminante, es requerido aplicar tratamiento y cumplir con otros requerimientos de reglamentación para agua potable.
- **N/A:** no aplica
- **nd:** no detectable, comparado con el límite de detección de la prueba
- **ppb:** partes por billón o microgramos por litro
- **ppm:** partes por millón o miligramos por litro
- **ppt:** partes por trillón o nanogramos por litro
- **mrem/año:** milirems por año. Medida de exposición a radionucleidos.
- **pCi/l:** picocurios por litro. Medida de radioactividad
- **TT:** Técnica de Tratamiento – Es un proceso requerido para reducir el nivel de un contaminante en agua potable.
- **NTU:** Unidad Nefelométrica de Turbidez – Es la unidad para medir el material particulado en el agua.
- **Dispensa y Exención:** Permiso otorgado por el Departamento de Salud (DS) o Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) para no cumplir con un NMC o técnica de tratamiento bajo ciertas condiciones
- **Max.** : Máximo
- **Min.** : Mínimo
- >: signo de mayor que

La información contenida en esta tabla proviene de los análisis realizados para: químicos orgánicos volátiles, químicos orgánicos sintéticos y contaminantes microbiológicos. Además, en los sistemas que tienen fuentes de agua superficiales se incluye la turbidez. La dioxina y asbesto no forman parte de esta evaluación ya que existe una dispensa en la frecuencia de muestreo.

Tabla: Información de Calidad de Agua Potable

Se analizaron alrededor de 130 contaminantes en el período de muestreo establecido por reglamentación, los encontrados están mencionados en la siguiente tabla.

Contaminante (unidad)	NMC	MNMC	Resultado		Min.-Max.	Fecha de Muestreo
Microbiológicos						
Bacterias Coliformes Totales (total positivas)	> 1	0	2	*, (1)	0 - 2	Septiembre. Noviembre/2003
No Regulados						
Niquel (ppm)	N/A	N/A	5.8		1.8 - 5.8	2003
Sulfato (ppm)	N/A	N/A	46		6.6 - 46	2000/2003
Uranio (pCi/l)	30	0	3		1.0 - 3.0	2003
Químicos Inorgánicos						
Arsenico (ppb)	Nota (4)	N/A	1.2		0.15 - 1.2	2001
Bario (ppm)	2	2	0.08		0.001 - 0.08	2001
Cianuro (ppb)	200	200	4		N/A	2003
Cloro Residual (ppm)	4	4	1.54		1.27 - 1.78	2003
Cromio (ppb)	100	100	20.7		5.7 - 20.7	2001/2003
Fluoruro (ppm)	4	4	0.1		0.03 - 0.1	2002/2003
Nitrato [como nitrógeno] (ppm)	10	10	2.4		nd - 2.4	2003
Selenio (ppb)	50	50	1.5		N/A	2003
Químicos Orgánicos						
Acidos Haloacéticos (ppb)	60 (3)	N/A	45		18 - 40	2003
Químicos Orgánicos Volátiles						
cis -1,2 - Dicloroetileno (ppb)	70	70	0.42		nd - 1.2	2003
Clorobenceno (ppb)	100	100	0.5		N/A	2003
Tetracloroetileno (ppb)	5	0	2		nd - 6	2003
TTHM's [Trihalometanos Total] (ppb)	80	N/A	54		29 - 72	2003
Radionucleidos						
Actividad bruta de partículas alfa (pCi/l)	15	0	3.3		nd - 3.3	2003
Radio 226 y 228 [combinados] (pCi/l)	5	0	0.3		nd - 2	2001
Turbidez						
Turbidez (% menor o igual a 0.5 NTU usando TT)	TT = 95%	N/A	93%	*	93% - 100%	Agosto/2003
Turbidez maxima (NTU)	TT = 5	N/A	0.96		0.01 - 0.96	Julio/2003

Lugares por **Fecha de**

Contaminante (unidad)	NMC	MNMC	Resultado	encima NA	Muestreo
Plomo y Cobre					
Cobre (ppm)	1.3	1.3	0.71	0	2003
Plomo (ppb)	15	0	1.7	0	2003

Notas

**** Violación al NMC***

(1) El sistema obtuvo 2 muestras positivas en coliformes totales de 25 y 48 muestras tomadas en septiembre y noviembre, respectivamente. Durante el año se tomaron 365 muestras y 6 muestras fueron positivas(19.0%).

(3) Los ácidos haloacéticos es la suma de las concentraciones de ácido monocloroacético, ácido dicloroacético, ácido tricloroacético, ácido monobromoacético y ácido dibromoacético. La EPA ha establecido un NMC de 60 ppb para esta suma y será efectivo en sistemas grandes en el 2002 y en sistemas pequeños en el 2004.

(4) El NMC actual para arsénico es de 50 ppb. La EPA ha establecido un nuevo NMC de 10 ppb para ser efectivo en enero 2006.

Fuentes Principales de Contaminantes en Agua Potable o Comentarios

15

Acidos Haloacéticos - Residuos o subproductos del proceso de desinfección del agua

Actividad bruta de partículas alfa - Erosión de depósitos naturales de ciertos minerales que son radiactivos y pueden emitir radiación conocida como radiación alfa.

Arsénico - Erosiones de depósitos naturales; escorrentías de huertos; aguas conresiduos de fabricación de vidrio y desperdicios electrónicos.

Bacterias Coliformes Totales - Están presentes en el ambiente.

Bario - Descargas de refinerías de metal; erosión de los depósitos naturales y descargas de desperdicios de excavaciones.

Cianuro - Descarga de fábricas de metal y acero; descarga de fábricas de fertilizantes y plástico.

cis - 1,2-Dicloroetileno -Descargas de industrias químicas.

Cloro Residual - Es usado en el agua para el control de microbios.

Clorobenceno - Descarga de fábricas de químicos y agricultura.

Cobre - Corrosión del sistema de tubería casera; erosión de los depósitos naturales; lixiviación de los conservantes de la madera.

Cromio - Descarga de las fábricas de acero y de papel; erosión de depósitos naturales.

Fluoruro - Erosión de los depósitos naturales; aditivo del agua que previene el deterioro dental; descarga de fábricas de fertilizantes y aluminio.

Niquel - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Nitrato [como nitrógeno] - Escorrentía con fertilizantes; lixiviación de pozos sépticos y alcantarillado; erosión de los depósitos naturales

Plomo - Corrosión del sistema de tubería casera; erosión de depósitos naturales.

Radio 226 y 228 - Erosión de depósitos naturales.

Selenio - Descargas de las refinerías de metal y petróleo; erosión de los depósitos naturales; descargas de minas.

Sulfato - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Tetracloroetileno - Efluentes de fábricas y empresas de limpieza en seco.

TTHM's [Trihalometanos Total] - Residuos o subproductos del proceso de desinfección del agua.

Turbidez - Escorrentías de suelos.

Uranio - Erosión de depósitos natutales.

Violaciones al Nivel Máximo de Contaminante Permitido

- La violación en coliformes totales informada en la tabla ocurrió en septiembre y noviembre, al obtenerse más de una muestra positiva durante el mes. Los coliformes totales son bacterias comunes en el ambiente y generalmente no son nocivas. Sin embargo, la presencia de estas bacterias en el agua potable es generalmente asociada a problemas con el proceso de purificación del agua potable o con las tuberías que distribuyen las mismas e indica que el agua puede estar contaminada con organismos que podrían causar enfermedades. Los síntomas de estas enfermedades pueden incluir diarreas, calambres, náuseas y posiblemente ictericia y cualquier otro síntoma asociado con fatiga y dolor de cabeza. No obstante, estos síntomas pueden ser causados no solamente por los organismos que pudieran estar en el agua, sino por otros factores ajenos a la calidad del agua potable. Inmediatamente al tener conocimiento de esta violación se comenzó el proceso de corrección que incluyó desagues de las líneas y aumento del nivel de cloro residual. Además se tomaron muestras de seguimiento necesarias.

- La violación a la técnica de tratamiento de filtración informada en al tabla ocurrió en agosto en el componente Planta de Filtros San Germán, al obtener un por ciento de cumplimiento menor a 95. La turbidez es una medida del material partículado en el agua. Es de importancia en el agua potable porque las partículas de forma irregular pueden albergar diferentes tipos de microorganismos. Las partículas que causan turbidez no son dañinas o visibles en las concentraciones que estamos midiendo, pero el efecto neto de un agua turbia es un aumento en la razón de supervivencia de los microorganismos que se encuentran en el agua cruda. El problema se debió a fuertes lluvias. Se ajustó la dosis de coagulante y se procedió a tomar muestras de bacteriología en la salida de la planta y en la red de distribución.

Violaciones de Muestreo y Reporte

Las violaciones de muestreo y reporte, no representan incumplimiento con los estándares de calidad de agua y ocurren cuando no se realiza un muestreo requerido o cuando no se cumple con la fecha para someter un informe. En la siguiente tabla se encuentran las violaciones de muestreo y reporte por contaminante o grupo de contaminante de este sistema para el 2003.

CONTAMINANTE	PERIODO DE MUESTREO	MUESTRAS REQUERIDAS	MUESTRAS TOMADAS
Plaguicida, Pesticida, PCB y SOC	Abril-Junio/2003	1	0

(7)

Autoridad de Acueductos y Alcantarillados de Puerto Rico
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Sistema: San Germán Urbano
PWS ID: 3323
Año: 2004

Introducción

Las enmiendas a la Reglamentación Nacional Primaria del Agua Potable de 1996, requiere a todo dueño o administrador de un sistema de agua público comunal, desarrollar un informe para dar a conocer detalles sobre la calidad del agua potable servida a la población. Es por eso que se publica este séptimo informe del período de enero a diciembre de 2004, con la información correspondiente al sistema de agua público en referencia. La información a continuación es sobre las fuentes de agua del sistema y del cumplimiento con los estándares y niveles establecidos para agua potable por la Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) y el Departamento de Salud Estatal. Para información adicional sobre este Informe de Calidad de Agua Potable, puede comunicarse de lunes a viernes al 787-474-2025 en el área metropolitana, o al 1-866-997-8366 en la Isla, de 5:00 p.m. a 9:00 p.m. efectivo 1de julio de 2005.

Agua Potable

Es considerado normal encontrar una cantidad mínima de agentes contaminantes en el agua potable, incluyendo el agua embotellada. **Pero la presencia de estos no significa necesariamente que exista o que representan un riesgo a la salud.** Es importante orientarse sobre los contaminantes regulados y no regulados en el agua potable y sus efectos potenciales a la salud, información sobre estos puede ser obtenida en el Programa de Agua Potable del Departamento de Salud llamando al teléfono: (787)-777-0150, o en las oficinas locales de la EPA al teléfono: (787)-977-5870.

Reglamentación de Agua Potable

La reglamentación aplicable a los sistemas de acueductos es la Reglamentación Nacional Primaria de Agua Potable. Esta reglamentación es desarrollada por la Agencia de Protección Ambiental Federal según dispone la Ley de Agua Potable Segura ("Safe Drinking Water Act") y establece los límites máximos permitidos para contaminantes en el agua potable y las técnicas de tratamiento necesarias. En Puerto Rico, el Departamento de Salud, es la agencia responsable de implantar y hacer cumplir esta reglamentación.

La reglamentación estatal requiere, además, tener operadores certificados en los sistemas públicos de agua. En enmiendas recientes a la reglamentación federal, se establecen guías sobre la certificación de operadores. Este requisito es para todos los sistemas de tratamiento del agua. La Autoridad de Acueductos y Alcantarillados (AAA), para cumplir con esta disposición, está adiestrando a sus Operadores para que la Junta Examinadora de Operadores de Plantas de Tratamiento de Agua Potable y Aguas Usadas de Puerto Rico, los evalúe y los certifique según la reglamentación estatal existente.

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THIS REPORT CONTAINS VERY IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER. TRANSLATE IT, OR SPEAK WITH SOMEONE WHO UNDERSTANDS IT.

Fuentes de Agua Potable

Las fuentes de abasto superficiales incluyen: ríos, lagos, quebradas y riachuelos. En la clasificación de fuentes subterráneas están: los pozos y los manantiales. El agua que llega a estos cuerpos de agua y en su trayectoria sobre la superficie de la tierra o en su paso a través del terreno, puede disolver minerales que están naturalmente en el terreno. Además, podría arrastrar sustancias que son el resultado de las diferentes actividades de los seres humanos y

los animales. Es por estos sucesos y otros que es requisito aplicar tratamiento al agua para el consumo humano; entre los que se destaca la desinfección para ayudar en la eliminación de los contaminantes microbiológicos. Existen otras técnicas de tratamiento que podrían ser utilizadas, dependiendo de la calidad de la fuente de agua. En el caso de los sistemas con fuente de agua superficial, el tratamiento del agua es más complejo y se requiere utilizar la filtración.

Otro aspecto importante sobre las fuentes de aguas es la calidad que se mantenga, evitando su contaminación y deterioro de su estado natural. El Departmento de Salud y su Programa de Agua Potable tienen el *Source Water Protection Program* (SWAP) el cual tiene como objetivo ayudar en la protección de estas fuentas de agua. Actualmente, se realizan evaluaciones de las fuentas de abasto y la información obtenida estará disponible al publico tan pronto sean completadas. La información disponible a la fecha es general y principalmente sobre el desarrollo y implementación del SWAP. Esta información puede obtenerse en el Departmento de Salud en las oficinas de su Programa de Agua Potable.

Sistema y sus Componentes

El sistema de referencia tiene los siguientes componentes o fuentes de abasto: (S)-superficiales y (G)-subterráneos. Entre los sistemas con fuentes superficiales se encuentran los que tienen plantas de filtración y en los subterráneos los que tienen pozos.

Planta de Filtros San Germán (fuente principal de agua: Río Hoconuco y Río Caín - S), Pozo Lola Rodríguez de Tió I (G), Pozo Lola Rodríguez de Tió II (G), Pozo Retiro (G), Pozo Providencia 1 (G), Pozo Providencia 2 (G), Pozo Sambolín (G) y Pozo Real (G)

Contaminantes en las Fuentes de Agua Potable

El agua de las fuentes utilizadas en los sistemas públicos de agua, antes de recibir el tratamiento para convertirla en agua potable, podría tener los siguientes contaminantes:

- ***Microbiológicos*** – Estos incluyen virus y bacterias, que pueden originarse de: plantas de tratamiento de alcantarillado, pozos sépticos, actividades de ganadería y vida silvestre.
- ***Químicos Inorgánicos*** - Estos incluyen sales y metales, que pueden tener origen natural o son el resultado de las escorrentías de lluvia. Además, otros orígenes pueden ser las descargas de agua con desperdicios domésticos o industriales, la producción de gases, aceites o cultivos.
- ***Plaguicidas y Herbicidas*** - Estos contaminantes pueden tener origen de una variedad de fuentes como: la agricultura, escorrentía de lluvia y de usos residenciales.
- ***Químicos Orgánicos*** – Estos incluyen químicos orgánicos sintéticos y volátiles, que son productos intermedios de procesos industriales y de la producción de petróleo. Además, pueden tener su origen en gasolineras, escorrentías de lluvia y pozos sépticos.
- ***Radiológicos*** - Estos pueden estar presentes en el terreno de forma natural.

La reglamentación requiere que en un período de tres años se realice en cada componente del sistema, un análisis para químicos inorgánicos, químicos orgánicos volátiles, químicos orgánicos sintéticos, herbicidas y plaguicidas. Las frecuencias de muestreo para los grupos de químicos mencionados pueden ser de forma trimestral, anual, cada tres años u otra. El total de contaminantes para los que se requiere muestreo están en alrededor de 70. A esto, se incluye alrededor de 60 contaminantes no regulados para los que también se realizan análisis. Además, se realizan análisis de contaminantes microbiológicos mensualmente según la población servida por el sistema. También se realizan diariamente muestreos de cloro residual y turbidez.

Aviso especial

Algunas personas pueden ser más vulnerables a los contaminantes que pueden estar presentes en el agua potable.

Las personas con su sistema inmunológico comprometido tales como: las personas con cáncer que están recibiendo quimioterapia, las que han recibido transplantes de órganos, personas con VIH/SIDA u otras con problemas del sistema inmunológico, algunos ancianos e infantes, pueden estar especialmente en riesgo de infección. La EPA y el Centro para el Control y Prevención de Enfermedades, tienen información disponible para las personas con riesgo a infecciones por Cryptosporidium y otros contaminantes microbiológicos, la cual puede solicitarse llamando a la EPA al teléfono 1-800-426-4791 o en el www.epa.gov/safewater.

Información Sobre Calidad de Agua Potable

La Tabla de Información de Calidad de Agua Potable contiene datos de los contaminantes que se encontraron en el agua en los análisis realizados durante el año 2004 o anterior y cuyo resultado estuvo por encima del nivel de detección del análisis. En los casos donde el muestreo de los contaminantes se realiza con una frecuencia menor al año, se reporta el último análisis y aparecerá el año cuando se realizó. A continuación se mencionan las definiciones de términos o abreviaciones utilizadas en la tabla.

- **NMC:** Nivel Máximo de Contaminante o el nivel más alto permitido en el agua potable. Los NMC son establecidos tan cerca como sea posible de la MNMC usando la mejor tecnología disponible.
- **MNMC:** Meta para el Nivel Máximo de Contaminante permitido o el nivel máximo en el agua potable bajo el cual no hay daños conocidos o esperados a la salud. La MNMC permite un margen de seguridad.
- **Contaminante:** sustancia o materia física, química, biológica o radiológica en el agua.
- **NA:** Nivel de Acción - Cuando se excede el NA o el nivel establecido de concentración del contaminante, es requerido aplicar tratamiento y cumplir con otros requerimientos de reglamentación para agua potable.
- **N/A:** no aplica
- **nd:** no detectable, comparado con el límite de detección de la prueba
- **ppb:** partes por billón o microgramos por litro
- **ppm:** partes por millón o miligramos por litro
- **ppt:** partes por trillón o nanogramos por litro
- **mrem/año:** milirems por año. Medida de exposición a radionucleidos.
- **pCi/l:** picocurios por litro. Medida de radioactividad
- **TT:** Técnica de Tratamiento – Es un proceso requerido para reducir el nivel de un contaminante en agua potable.
- **NTU:** Unidad Nefelométrica de Turbidez – Es la unidad para medir el material particulado en el agua.
- **Dispensa y Exención:** Permiso otorgado por el Departamento de Salud (DS) o Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) para no cumplir con un NMC o técnica de tratamiento bajo ciertas condiciones

- **Max. :** Máximo
- **Min. :** Mínimo
- **>:** signo de mayor que
- **MRDL:** Nivel Máximo Desinfectante Residual
- **MRDLG:** Meta del Nivel Máximo Desinfectante Residual

La información contenida en esta tabla proviene de los análisis realizados para: químicos orgánicos volátiles, químicos orgánicos sintéticos y contaminantes microbiológicos. Además, en los sistemas que tienen fuentes de agua superficiales se incluye la turbidez. La dioxina y asbesto no forman parte de esta evaluación ya que existe una dispensa en la frecuencia de muestreo.

Tabla: Información de Calidad de Agua Potable

Se analizaron alrededor de 142 contaminantes en el período de muestreo establecido por reglamentación, los encontrados están mencionados en la siguiente tabla.

Contaminante (unidad)	**NMC**	**MNMC**	**Resultado**		**Min.-Max.**	**Fecha de Muestreo**
Microbiológicos						
Bacterias Coliformes Totales (total positivas)	> 1	0	4	(1)	0-4	Julio/2004
Coliformes fecales y E. coli (total positivas al año)	Nota (2)	0	3		N/A	2004
No Regulados						
Níquel (ppm)	N/A	N/A	5.8000		1.8 - 5.8	2003
Sulfato (ppm)	N/A	N/A	46.4		6.6 - 46.4	2000/2003
Uranio (pCi/l)	30	0	3		1.0 - 3.0	2003
Químicos Inorgánicos						
Arsénico (ppb)	Nota (4)	N/A	1.2		0.15 - 1.2	2001
Bario (ppm)	2	2	0.08		0.001 - 0.08	2001
Cianuro (ppb)	200	200	4		N/A	2003
Cloro Residual (ppm)	4	4	1.47		1.43-1.52	2004
Cromio (ppb)	100	100	20.7		5.7 - 20.7	2001/2003
Fluoruro (ppm)	4	4	0.12		0.03 - 0.12	2002/2003
Nitrato [como nitrógeno] (ppm)	10	10	1.04		0.42 - 1.04	2004
Selenio (ppb)	50	50	1.5		N/A	2003
Químicos Orgánicos						

Acidos Haloacéticos (ppb)	60 (3)	N/A	40	6-156	2004
Carbono Total Orgánico [TOC]	TT	N/A	1.0	1.0-1.0	2004
Químicos Orgánicos Volátiles					
Tetracloroetileno (ppb)	5	0	2	nd - 3.1	2004
TTHM's [Trihalometanos Total] (ppb)	80	N/A	54	0.5-83	2004
Radionuclidos					
Actividad bruta de partículas alfa (pCi/l)	15	0	3.3	nd - 3.3	2003
Radio 226 y 228 [combinados] (pCi/l)	5	0	0.3	nd - 2	2001
Turbidez					
Turbidez (% menor o igual a 0.5 NTU usando TT)	TT = 95%	N/A	97%	97%-100%	Noviembre/2004
Turbidez máxima (NTU)	TT = 5	N/A	0.49	0.01-0.49	Octubre/2004
Contaminante (unidad)	**NMC**	**MNMC**	**Resultado**	**Lugares por encima NA**	**Fecha de Muestreo**
Plomo y Cobre					
Cobre (ppm)	1.3	1.3	0.71	0	2003
Plomo (ppb)	15	0	1.7	0	2003

Notas

**** Violación al NMC***

(1) El sistema obtuvo 4 muestras positivas en coliformes totales de 45 muestras tomadas en junio. Durante el año se tomaron 432 muestras y 17 muestras fueron positivas (43.1%).

(2) Una muestra de rutina y una de repetición son positivas en coliformes Totales y una es positivo también en coliformes fecales o E. coli.

(3) Los ácidos haloacéticos es la suma de las concentraciones de ácido monocloroacético, ácido dibromoacético, ácido tricloroacético, ácido monobromoacético y ácido dibromoacético. La EPA ha establecido un NMC de 60 ppb para esta suma y será efectivo en sistemas grandes en el 2002 y en sistemas pequeños en el 2004.

(4) El NMC actual para arsénico es de 50 ppb. La EPA ha eatablecido un nuevo NMC de 10ppb para ser efectivo en enero 2006.

Fuentes Principales de Contaminantes en Agua Potable o Comentarios

Acidos Haloacéticos - Residuos o subproductos del proceso de desinfección del agua

Actividad bruta de partículas alfa - Erosión de depósitos naturales de ciertos minerales que son radiactivos y pueden emitir radiación conocida como radiación alfa.

Arsénico - Erosiones de depósitos naturales; escorrentías de huertos; aguas conresiduos de fabricación de vidrio y desperdicios electrónicos.

Bacterias Coliformes Totales - Están presentes en el ambiente.

Bario - Descargas de refinerías de metal; erosión de los depósitos naturales y descargas de desperdicios de excavaciones.

Cianuro - Descarga de fábricas de metal y acero; descarga de fábricas de fertilizantes y plástico.

Cloro Residual - Es usado en el agua para el control de microbios.

Cobre - Corrosión del sistema de tubería casera; erosión de los depósitos naturales; lixiviación de los conservantes de la madera.

Coliformes fecales y E. coli - Desperdicio de animales o descarga sanitaria.

Cromio - Descarga de las fábricas de acero y de papel; erosión de depósitos naturales.

Fluoruro - Erosión de los depósitos naturales; aditivo del agua que previene el deterioro dental; descarga de fábricas de fertilizantes y aluminio.

Níquel - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Nitrato [como nitrógeno] - Escorrentía con fertilizantes; lixiviación de pozos sépticos y alcantarillado; erosión de los depósitos naturales

Plomo - Corrosión del sistema de tubería casera; erosión de depósitos naturales.

Radio 226 y 228 - Erosión de depósitos naturales.

Selenio - Descargas de las refinerías de metal y petróleo; erosión de los depósitos naturales; descargas de minas.

Sulfato - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Tetracloroetileno - Efluentes de fábricas y empresas de limpieza en seco.

TOC - Están presentes en el ambiente.

TTHM's [Trihalometanos Total] - Residuos o subproductos del proceso de desinfección del agua.

Turbidez - Escorrentías de suelos.

Uranio - Erosión de depósitos natutales.

Violaciones al Nivel Máximo de Contaminante Permitido

- La violación en coliformes totales informada en la tabla ocurrió en julio, al obtenerse más de una muestra positiva durante el mes. Otra violación ocurrió en el mes de octubre en coliformes fecales. Los coliformes fecales y E. coli son también bacterias no dañinas y su presencia en el agua potable está asociada con desperdicios de animales o descargas sanitarias. Los coliformes totales son bacterias comunes en el ambiente y generalmente no son nocivas. Sin embargo, la presencia de estas bacterias en el agua potable es generalmente asociada a problemas con el proceso de purificación del agua potable o con las tuberías que distribuyen las mismas e indica que el agua puede estar contaminada con organismos que podrían causar enfermedades. Los síntomas de estas enfermedades pueden incluir diarreas, calambres, náuseas y posiblemente ictericia y cualquier otro síntoma asociado con fatiga y dolor de cabeza. No obstante, estos síntomas pueden ser causados no solamente por los organismos que pudieran estar en el agua, sino por otros factores ajenos a la

calidad del agua potable.

Violaciones de Muestreo y Reporte

Las violaciones de muestreo y reporte, no representan incumplimiento con los estándares de calidad de agua y ocurren cuando no se realiza un muestreo requerido o cuando no se cumple con la fecha para someter un informe. En la siguiente tabla se encuentran las violaciones de muestreo y reporte por contaminante o grupo de contaminante de este sistema para el 2004.

CONTAMINANTE	PERIODO DE MUESTREO	MUESTRAS REQUERIDAS	MUESTRAS TOMADAS
DBP	Octubre/2004	2	0
Trihalometanos Totales	Octubre-Diciembre/2004	4	0

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sistema inmunológico, algunos ancianos e infantes, pueden estar especialmente en riesgo de infección. La EPA y el Centro para el Control y Prevención de Enfermedades, tienen información disponible para las personas con riesgo a infecciones por Cryptosporidium y otros contaminantes microbiológicos, la cual puede solicitarse llamando a la EPA al teléfono 1-800-426-4791 o en el www.epa.gov/safewater.

Información Sobre Calidad de Agua Potable

La Tabla de Información de Calidad de Agua Potable contiene datos de los contaminantes que se encontraron en el agua en los análisis realizados durante el año 2005 o anterior y cuyo resultado estuvo por encima del nivel de detección del análisis. En los casos donde el muestreo de los contaminantes se realiza con una frecuencia menor al año, se reporta el último análisis y aparecerá el año cuando se realizó. A continuación se mencionan las definiciones de términos o abreviaciones utilizadas en la tabla.

- **NMC:** Nivel Máximo de Contaminante o el nivel más alto permitido en el agua potable. Los NMC son establecidos tan cerca como sea posible de la MNMC usando la mejor tecnología disponible.
- **MNMC:** Meta para el Nivel Máximo de Contaminante permitido o el nivel máximo en el agua potable bajo el cual no hay daños conocidos o esperados a la salud. La MNMC permite un margen de seguridad.
- **Contaminante:** sustancia o materia física, química, biológica o radiológica en el agua.
- **NA:** Nivel de Acción - Cuando se excede el NA o el nivel establecido de concentración del contaminante, es requerido aplicar tratamiento y cumplir con otros requerimientos de reglamentación para agua potable.
- **N/A:** no aplica
- **nd:** no detectable, comparado con el límite de detección de la prueba
- **ppb:** partes por billón o microgramos por litro
- **ppm:** partes por millón o miligramos por litro
- **ppt:** partes por trillón o nanogramos por litro
- **mrem/año:** milirems por año. Medida de exposición a radionucleidos.
- **pCi/l:** picocurios por litro. Medida de radioactividad
- **TT:** Técnica de Tratamiento – Es un proceso requerido para reducir el nivel de un contaminante en agua potable.
- **NTU:** Unidad Nefelométrica de Turbidez – Es la unidad para medir el material particulado en el agua.
- **Dispensa y Exención:** Permiso otorgado por el Departamento de Salud (DS) o Agencia de Protección Ambiental Federal (EPA, por sus siglas en inglés) para no cumplir con un NMC o técnica de tratamiento bajo ciertas condiciones
- **Max. :** Máximo

- **Min.** : Mínimo
- **>**: signo de mayor que
- **MRDL:** Nivel Máximo Desinfectante Residual
- **MRDLG:** Meta del Nivel Máximo Desinfectante Residual

La información contenida en esta tabla proviene de los análisis realizados para: químicos orgánicos volátiles, químicos orgánicos sintéticos y contaminantes microbiológicos. Además, en los sistemas que tienen fuentes de agua superficiales se incluye la turbidez. La dioxina y asbesto no forman parte de esta evaluación ya que existe una dispensa en la frecuencia de muestreo.

Tabla: Información de Calidad de Agua Potable

Se analizaron alrededor de 142 contaminantes en el período de muestreo establecido por reglamentación, los encontrados están mencionados en la siguiente tabla.

Contaminante (unidad)	NMC	MNMC	Resultado		Min.-Max.	Fecha de Muestreo
Microbiológicos						
Bacterias Coliformes Totales (total positivas)	> 1	0	13	*, (1)	0-13	mayo/2005
Coliformes fecales y E. coli (total positivas al año)	Nota (2)	0	2		N/A	2005
No Regulados						
Níquel (ppm)	N/A	N/A	5.8000		1.8 - 5.8	2003
Sulfato (ppm)	N/A	N/A	46.4		6.6 - 46.4	2000/2003
Uranio (pCi/l)	30	0	3		1.0 - 3.0	2003
Químicos Inorgánicos						
Arsénico (ppb)	50	N/A	1.2		0.15 - 1.2	2001
Bario (ppm)	2	2	0.08		0.001 - 0.08	2001
Cadmio (ppb)	5	5	4.00		n/a	2005
Cianuro (ppb)	200	200	4		n/a	2003
Cloro Residual (ppm)	4	4	1.68		1.56-1.78	2005
Cromio (ppb)	100	100	20.7		5.7 - 20.7	2001/2003
Fluoruro (ppm)	4	4	0.116		0.037-0.116	2005
Nitrato [como nitrógeno] (ppm)	10	10	1.55		0.96-1.55	2005
Selenio (ppb)	50	50	1.5		n/a	2003
Químicos Orgánicos						

Carbono Total Orgánico [TOC]	TT	N/A	1.0	*	0.9-1.0	2005
Químicos Orgánicos Volátiles						
cis -1,2 - Dicloroetileno (ppb)	70	70	0.75		nd-1.6	2005
Clorobenceno (ppb)	100	100	0.5		nd-0.5	2005
Tetracloroetileno (ppb)	5	0	1.8		nd-8.6	2005
Radionucleidos						
Actividad bruta de partículas alfa (pCi/l)	15	0	3.3		nd - 3.3	2003
Radio 226 y 228 [combinados] (pCi/l)	5	0	0.3		nd - 2	2001
Turbidez						
Turbidez (% menor o igual a 0.5 NTU usando TT)	TT = 95%	N/A	95%		95%-100%	noviembre/2005
Turbidez máxima (NTU)	TT = 5	N/A	1.84	*	0.01-1.84	abril/2005
Contaminante (unidad)	**NMC**	**MNMC**	**Resultado**		**Lugares por encima NA**	**Fecha de Muestreo**
Plomo y Cobre						
Cobre (ppm)	1.3	1.3	0.71		0	2003
Plomo (ppb)	15	0	1.7		0	2003

Notas

*** Violación al NMC***

(1) El sistema obtuvo 13 muestra positiva en coliformes totales de 43 muestras tomadas en mayo. Durante el año se tomaron 538 muestras y 28 muestras fueron positivas(5.2%).

(2) Una muestra de rutina y una de repetición son positivas en coliformes Totales y una es positivo también en coliformes fecales o E. coli.

Fuentes Principales de Contaminantes en Agua Potable o Comentarios

Actividad bruta de partículas alfa - Erosión de depósitos naturales de ciertos minerales que son radiactivos y pueden emitir radiación conocida como radiación alfa.

Arsénico - Erosiones de depósitos naturales; escorrentías de huertos; aguas conresiduos de fabricación de vidrio y desperdicios electrónicos.

Bacterias Coliformes Totales - Están presentes en el ambiente.

Bario - Descargas de refinerías de metal; erosión de los depósitos naturales y descargas de desperdicios de excavaciones.

Cadmio - Corrosión de las tuberías galvanizadas; erosión de los depósitos naturales; descargas de

refinerías de metal; escorrentías de baterías de desperdicios y pinturas.

Cianuro - Descarga de fábricas de metal y acero; descarga de fábricas de fertilizantes y plástico.

cis - 1,2-Dicloroetileno -Descargas de industrias químicas.

Clorobenceno - Descarga de fábricas de químicos y agricultura.

Cobre - Corrosión del sistema de tubería casera; erosión de los depósitos naturales; lixiviación de los conservantes de la madera.

Coliformes fecales y E. coli - Desperdicio de animales o descarga sanitaria.

Cromio - Descarga de las fábricas de acero y de papel; erosión de depósitos naturales.

Es usado en el agua para el control de microbios.

Fluoruro - Erosión de los depósitos naturales; aditivo del agua que previene el deterioro dental; descarga de fábricas de fertilizantes y aluminio.

Níquel - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Nitrato [como nitrógeno] - Escorrentía con fertilizantes; lixiviación de pozos sépticos y alcantarillado; erosión de los depósitos naturales

Plomo - Corrosión del sistema de tubería casera; erosión de depósitos naturales.

Radio 226 y 228 - Erosión de depósitos naturales.

Selenio - Descargas de las refinerías de metal y petróleo; erosión de los depósitos naturales; descargas de minas.

Sulfato - La reglamentación requiere muestreo de este contaminante mientras se continúa evaluando la necesidad de establecer un NMC y MNMC.

Tetracloroetileno - Efluentes de fábricas y empresas de limpieza en seco.

TOC - Están presentes en el ambiente.

Turbidez - Escorrentía de suelos.

Uranio - Erosión de depósitos naturales.

Violaciones al Nivel Máximo de Contaminante Permitido

- La violación a la técnica de filtración informada en la tabla ocurrió en abril en el componente Planta Filtros San Germán, al obtenerse en turbidez un valor mayor de 1 NTU a la salida de la planta. La turbidez es una medida del material particulado en el agua. Es de importancia en el agua potable porque las partículas de forma irregular pueden albergar diferentes tipos de microorganismos. Las partículas que causan turbidez no son dañinas o visibles en las concentraciones que estamos midiendo, pero el efecto neto de un agua turbia es un aumento en la razón de supervivencia de los microorganismos que se encuentran en el agua cruda.

- La violación para el TOC fue en el cuarto trimestre del 2005. El Carbono Total Orgánico (TOC) no tiene efectos en la salud. Sin embargo este provee un medio para la formación de productos de desinfección. Estos productos incluyen los Trialometanos (THMs) y los Acidos Haloacéticos (HAAs). Si el agua potable contienen estos productos de desinfección en exceso podría causar efectos adversos a la salud, incluyendo el hígado, en los riñones o en el sistema nervioso central.

También podría aumentar el riesgo de causar cáncer.

- La violación en coliformes totales informada en la tabla ocurrió en mayo, al obtenerse más de una muestra positiva durante el mes. Los coliformes totales son bacterias comunes en el ambiente y generalmente no son nocivas. Sin embargo, la presencia de estas bacterias en el agua potable es generalmente asociada a problemas con el proceso de purificación del agua potable o con las tuberías que distribuyen las mismas e indica que el agua puede estar contaminada con organismos que podrían causar enfermedades. Los síntomas de estas enfermedades pueden incluir diarreas, calambres, náuseas y posiblemente ictericia y cualquier otro síntoma asociado con fatiga y dolor de cabeza. No obstante, estos síntomas pueden ser causados no solamente por los organismos que pudieran estar en el agua, sino por otros factores ajenos a la calidad del agua potable.

Violaciones de Muestreo y Reporte

Las violaciones de muestreo y reporte, no representan incumplimiento con los estándares de calidad de agua y ocurren cuando no se realiza un muestreo requerido o cuando no se cumple con la fecha para someter un informe. En la siguiente tabla se encuentran las violaciones de muestreo y reporte por contaminante o grupo de contaminante de este sistema para el 2004.

CONTAMINANTE	*PERIODO DE MUESTREO*	*MUESTRAS REQUERIDAS*	*MUESTRAS TOMADAS*
Bacteriología	febrero 2005	50	15
Fluoruro	2005	1	0
Nitritos	2005	1	0
TTHM'S	julio-septiembre 2005	4	0

Autoridad de Acueductos y Alcantarillados
Estado Libre Asociado de Puerto Rico

INFORME SOBRE LA CALIDAD DEL AGUA POTABLE 2006

MENSAJE DEL PRESIDENTE

Proveer agua segura a todos nuestros clientes es nuestra misión y compromiso. Estamos obligados a cumplir con una de las reglamentaciones más estrictas que existe en el mundo para calidad de agua. Me refiero a la reglamentación federal de la Agencia de Protección Ambiental (EPA por su siglas en inglés) en combinación con la del Departamento de Salud de Puerto Rico.

El agua de Puerto Rico, a diferencia de muchos otros lugares fuera de Estados Unidos, es 100% potable. Es segura para tomar y cocinar y no representa un riesgo para la salud.

En ese contexto, nos complace presentarte el Informe de Calidad de Agua del 2006, que mide el nivel de 90 posibles contaminantes exigidos por ley.

A continuación encontrarás valiosa información acerca de la fuente de abasto del agua que utilizas y el proceso que seguimos para proteger tu salud a través del tratamiento que le proveemos al agua, el control y las pruebas de calidad. El Informe de Calidad de Agua que recibes es un requisito de ley. Surge como enmienda a la Ley de Agua Potable Segura en su sección del Derecho a la Comunidad a Estar Informada. Más allá de la ley, hemos incluido información sobre cómo ahorrar agua y qué puedes hacer para proteger nuestros abastos.

El compromiso de la AAA es continuar mejorando la calidad de agua que servimos y cumplir a cabalidad con todos los requisitos de Ley. Al presente la AAA desarrolla un programa agresivo de mejoras a la infraestructura que opera para producir agua potable y proveer tratamiento sanitario. Dicho programa se implanta como parte del Plan de Mejoras Capitales (PMC), el cual conllevará inversiones de aproximadamente $2.3 mil millones durante los próximos cinco años. La AAA llevará a cabo el diseño y construcción de nuevas plantas potabilizadoras y sanitarias, o mejoras a las facilidades existentes para mejorar los servicios de agua potable y sistemas sanitarios.

Estos cambios forman parte de la continua transformación de la Autoridad de Acueductos y Alcantarillados para restablecer la confianza en nuestro servicio y dirigirnos a alcanzar la excelencia operacional que los clientes merecen.

Ing. José F. Ortiz Vázquez
Presidente Ejecutivo

¿POR QUÉ HAY MINERALES O SUSTANCIAS EN EL AGUA?

Las fuentes de abasto de agua superficiales incluyen: ríos, lagos, quebradas y riachuelos. En la clasificación de fuentes subterráneas están los pozos y los manantiales. El agua que llega a estos cuerpos en su trayectoria sobre la superficie de la tierra o en su paso a través del terreno, puede disolver minerales que están naturalmente en el terreno. Además, podría arrastrar sustancias que son el resultado de las diferentes actividades de los seres humanos y los animales.

Es razonable encontrar una cantidad mínima de agentes contaminantes en el agua potable, incluyendo el agua embotellada. Pero la presencia de estos no significa necesariamente que exista o que representan un riesgo a la salud. Es importante orientarse sobre los contaminantes regulados y no regulados en el agua potable y sus efectos potenciales a la salud. Información sobre estos puede ser obtenida en el Programa de Agua Potable del Departamento de Salud llamando al teléfono: (787)-777-0150, o en las oficinas locales de la EPA al teléfono: (787) 977 -5870, o la línea de Agua Potable de la EPA al teléfono (800-426-4791).

¿DE DÓNDE PROVIENEN?

El agua de las fuentes utilizadas en los sistemas públicos, antes de recibir el tratamiento para convertirla en agua potable, podría tener los siguientes contaminantes:

- Microbiológicos - Éstos incluyen virus y bacterias, que pueden originarse de: descargas sanitarias, pozos sépticos, actividades de ganadería y vida silvestre.

- Químicos Inorgánicos - Éstos incluyen sales y metales, que pueden tener origen natural o son el resultado de las escorrentías de lluvia. Además, otros orígenes pueden ser las descargas de agua con desperdicios domésticos o industriales, la producción de gases, aceites o cultivos.

- Plaguicidas y Herbicidas - Éstos contaminantes pueden tener origen de una variedad de fuentes como: la agricultura, escorrentía de lluvia y de usos residenciales.

- Químicos Orgánicos - Éstos incluyen químicos orgánicos sintéticos y volátiles, que son productos intermedios de procesos industriales y de la producción de petróleo. Además, pueden tener su origen en gasolineras, escorrentías de lluvia y pozos sépticos.

- Radiológicos - Éstos pueden estar presentes en el terreno de forma natural.

Para asegurar que el agua que sale de la pluma en tu casa es segura para consumo humano la Agencia Federal de Protección Ambiental (EPA) establece reglamentaciones que limitan la cantidad de ciertos contaminantes en el agua de los sistemas públicos. La reglamentación aplicable a los sistemas de acueductos es la Reglamentación Nacional Primaria de Agua Potable. Esta reglamentación es desarrollada por la Agencia de Protección Ambiental Federal según dispone la Ley de Agua Potable Segura ("Safe Drinking Water Act") y establece los límites máximos permitidos para contaminantes en el agua potable y las técnicas de tratamiento

necesarias. En Puerto Rico, el Departamento de Salud, es la agencia responsable de implantar y hacer cumplir esta reglamentación.

EL ESTADO DE LOS ABASTOS DE AGUA

Otro aspecto importante sobre las fuentes de aguas es mantener la calidad evitando su contaminación y deterioro de su estado natural.

El Departamento de Salud y su Programa de Agua Potable tienen el Programa de Evaluación de Abastos de Agua (Source Water Assesment Program, SWAP por sus siglas en inglés) el cual tiene como objetivo ayudar en la protección de estas fuentes de agua. Se realizaron evaluaciones de las fuentes de abasto y la información obtenida estará disponible al público tan pronto concluya el informe. Esta puede obtenerse en el Departamento de Salud en las oficinas de su Programa de Agua Potable.

CÓMO ASEGURAMOS QUE TU AGUA SEA POTABLE

1. Proceso de Tratamiento

El proceso de tratamiento que ofrece la AAA transforma el agua natural en agua potable, eliminándole las sustancias y microorganismos potencialmente perjudiciales. Los procesos comprenden la coagulación, la floculación/sedimentación, la filtración, la desinfección y su distribución. El proceso de tratamiento toma el agua de ríos y lagos y las somete a procesos físicos y mecánicos. Uno de estos, coagula o atrapa las partículas para removerlas del agua. La floculación es el proceso por el cual los coágulos se unen entre sí para sedimentarse (hundirse) en el tanque donde se recuperará agua limpia. El agua limpia es filtrada y desinfectada con cloro para garantizar su potabilidad y cumplir de ese modo la reglamentación estatal y federal de calidad de agua potable.

2. Programa intenso de muestras realizadas en nuestros laboratorios

Bacteriología	49,676
Cloro Residual	49,676
Subproductos de desinfección	7,408
Inorgánicos	19,096
Orgánicos	3,359
Desinfectantes	4,209

3. La certificación de nuestros operadores, otra medida para asegurar la calidad del agua potable

La reglamentación requiere, además, tener operadores certificados en los sistemas públicos de agua. En enmiendas recientes a la reglamentación federal, se establecen guías sobre la certificación de operadores. Este requisito es para todos los sistemas de tratamiento de agua.

En la Autoridad de Acueductos y Alcantarillados (AAA), estamos adiestrando a nuestros operadores para que la Junta Examinadora de Operadores de Plantas de Tratamiento de Agua Potable y Aguas Usadas de Puerto Rico los evalúe y los certifique según la reglamentación existente.

Sistema: San German Urbano
PWSID: 3323

Información Sobre Calidad de Agua Potable

Las enmiendas a la Ley de Agua Potable Segura de 1996, requieren que enviemos a nuestros consumidores un breve informe sobre la calidad del agua servida durante el año y las fuentes que usamos para suplirla. Este informe resume los resultados obtenidos durante el año o el periodo reglamentario más reciente y el cumplimiento con los estándares y niveles establecidos para agua potable por la Agecia Protección Ambiental Federal (EPA, por sus siglas en inglés) y el Departamento de Salud Estatal.

En cumplimiento con las reglamentaciones estatales y federales, la Autoridad de Acueductos y Alcantarillados analiza mas de 90 posibles contaminantes que pudieran estar en el agua potable. La gran mayoría de estos contaminantes regulados no se encontraron en el agua de su sistema. Las tablas que presentaremos a continuación incluyen los pocos contaminantes que se encontraron en pequeñas cantidades (detectados) en su agua y se identifica si alguno excedió los niveles permitidos. Además encontrará información general sobre el agua, los contaminantes, de donde provienen, y los posibles efectos a la salud cuando se exceden los niveles permitidos.

Para información adicional sobre este Informe de Calidad de Agua Potable, puede comunicarse con los funcionarios de Cumplimiento y Control de Calidad de su Región de lunes a viernes al (787) 834-7540 efectivo el 1 de julio de 2007.

Información Importante para la Salud

Algunas personas pueden ser más vulnerables que la población general a los contaminantes que pueden estar presentes en el agua potable. Las personas con su sistema inmunológico comprometido tales como: las personas con cáncer que están recibiendo quimioterapia, las que han recibido transplantes de órganos, personas con VIH/SIDA u otras con problemas del sistema inmunológico, algunos ancianos e infantes, pueden estar especialmente en riesgo de alguna infección. La EPA y el Centro para el Control y Prevencción de Enfermedades, tienen información disponible para las personas con riesgo a infecciones por Cryptosporidium y otros contaminantes microbiológicos, la cual puede obtener llamando a la EPA al teléfono 1-800-426-4791 o en la dirección de Internet www.epa.gov/safewater.

¿De donde Proviene mi Agua?

El agua potable que usted consume puede provenir de componentes o fuentes de abasto tanto: superficiales (S), como subterráneos (G) o una combinación de ambas. En su caso, el sistema que le suple agua lo compone:

Planta de Filtros San Germán (fuente principal de agua: Río Hoconuco, y Río Cain - S), Pozo Providencia I (G) y Pozo Providencia II (G)), Pozo Lola Rodriguez de Tió (G) (stand by), Pozo Lola de Tió II (G) (stand by)

TURBIDEZ

La Turbidez es una medida de la transparencia o contenido de partículas en el agua. Se utiliza como indicador de cuan efectivo es el proceso de filtración en la remoción de posibles agentes contaminates. La monitoreamos como indicador de la calidad del agua tratada. Una alta turbidez puede interferir con la efectividad de la desinfección en el control de microorganismos. Estos organismo pueden provocar síntomas tales como nauseas, cólicos, diarrea y dolores de cabeza.

	Parámetro	Límites EPA NMC	Límites EPA MNMC	Resultados	Fecha	Origen Usual del Contaminante
3	Turbidez (% cummplimiento más bajo, con 0.3 NTU)	0.3 NTU	N/A	98.5 %	Junio / 2006	Escorrentía de suelos.
6	Turbidez máxima (NTU)	1 NTU	N/A	0.77	Agosto / 2006	Escorrentía de suelos.

Efectos Potenciales a la salud (*******)

3	No tiene efectos a la salud, pero mucha turbidez pueden tener organismos tales como bacterias, virus y parásitos los cuales pueden causar síntomas como nauseas, calambres, diarrea y dolores de cabeza asociados.
6	No tiene efectos a la salud, pero mucha turbidez pueden tener organismos tales como bacterias, virus y parásitos los cuales pueden causar síntomas como nauseas, calambres, diarrea y dolores de cabeza asociados.

BACTERIOLOGÍA

	Parámetro	Límites EPA NMC	Límites EPA MNMC	Resultados	Fecha	Origen Usual del Contaminante
2	Coliformes Fecales	>1	0	1	2006	Desperdicio de animales o descarga sanitaria
5	Bacterias Coliformes Totales	>1	0	4 *********	Julio	Están presentes en el ambiente.

Efectos Potenciales a la salud (*******)

2	son bacterias cuya presencia indica que el agua puede estar contaminada con escremento animal o de humano. Los microbios en estos desperdicios pueden causar diarrea, calambre, nausea, dolor de cabeza u otros síntomas
5	son bacterias las cuales están presentes naturalmente en el ambiente y son utilizadas como indicador de otras bacterias que pueden estar presentes también y causar daño potencial.

PLOMO Y COBRE

La frecuencia en que se monitorea el plomo y cobre dependerá de las fuentes de agua cruda y el historial de resultados. Se incluye el periodo de monitoreo más reciente.

	Parámetro	Nivel de Acción	MCLG	# de puntos que exceden nivel de acción	Valor de la Percentila 90	Fecha	Origen Usual del Contaminante
14	Cobre (ppm)	1.3	1.3	1	0.51	2006	Corrosión del sistema de tubería casera; erosión de depósitos naturales, lixiviación de conservantes de la madera
17	Plomo (ppb)	15	0	1	10.1	2006	Corrosión del sistema de tubería casera; erosión de depósitos naturales

Efectos Potenciales a la salud (*******)

14	
17	

Sistema: San German Urbano
PWSID: 3323

CONTAMINANTES REGULADOS DETECTADOS

	Contaminantes	NMC - TT MRDL - NA	NMCL	Resultados Valor	Resultados Rango	Fecha	Origen usual del Contaminante
Químicos Inorgánicos							
16	Fluoruro (ppm)	4	4	0.116	0.037-0.116	2005	Erosión de los depósitos naturales; aditivo del agua que previene el detenoro dental; descarga de fábricas de fertilizantes y aluminio.
19	Nitrato [como nitrógeno] (ppm)	10	10	0.24	N/A	2006	Escorrentía con fertilizantes, lixiviación de pozos sépticos y alcantarillado, erosión de los depositos naturales
114	Cloro Residual (ppm)	4	4	1.65	0.04 - 3.08	2006	Es usado en el agua para el control de microbios
Químicos Orgánicos Volátiles							
68	Tetracloroetileno (ppb)	5	0	0.82	N/A	2006	Efluentes de fábricas y empresas de limpieza en seco
Regla Desinfectantes y Subproductos de Desinfección							
73	TTHM's [Trihalometanos Total] (ppb)	80	N/A	53.6	21.1 - 65.4	2006	Residuos o subproductos del proceso de desinfección del agua.
99	Acidos Haloacéticos (ppb)	60	N/A	40	10.64 - 60	2006	Residuos o subproductos del proceso de desinfección del agua
110	Carbono Total Orgánico [TOC]	TT	N/A	1.2	0.9 - 1.2	2006	Están presentes en el ambiente

Contaminante Detectados No Regulados

Incluímos información de contaminantes no regulados que fueron monitoreados durante el año. Estos se monitorean para determinar si estan presentes en el agua, recopilar información que ayude a la EPA a decidir si es necesario regularlos o establecer niveles permitido.

	Contaminante	Valor	Rango	Fecha	Origen Usual del Contaminante
96	Sulfato (ppm)	5.9	N/A	2006	La reglamentación requiere muestreo mientras se establece un NMC y MNMC.

Otros Contaminantes Detectados

Contaminante	Promedio	Importancia de los resultados	Origen Usual del Contaminante

Violaciones de Muestreo y Reporte

La Autoridad de Acueductos y Alcantarillados esta obligada a tomar y analizar muestras del agua servida en unos periodos y con un frecuencia establecida en la reglamentación. Las violaciones de muestreo y reporte, no representan incumplimiento con los estándares de calidad de agua y ocurren cuando no se realiza un muestreo requerido, o cuando no se cumple con la fecha para someter un informe. En la siguiente tabla se encuentran las violaciones de muestreo y reporte por contaminante o grupo de contaminantesde este sistema para el 2006.

Contaminante	Periodo de Muestreo	Muestras Requeridas	Muestras Tomadas
Nitrato [como nitrógeno] (ppm)	JUL-SEP 2006	2	1
Químicos Orgánicos Sintéticos, Herbicidas y Pesticidas	ENE-DIC 2006	2	0

Términos y Definiciones

Los siguientes términos y definiciones le facilitarán entender la información contenida en este informe sobre la Calidad de Agua de su Sistema.

NMC: Nivel Máximo de Contaminante o nivel más alto permitido en el agua potable. Los NMC son establecidos tan cerca como sea posible del MNMC usando la mejor tecnología disponible.
MNMC: Meta para el Nivel Máximo de Contaminante permitido o el nivel máximo en el agua potable bajo el cual no hay riesgos conocidos o esperados a la salud. Los MNMC permite un margen de seguridad.
N/A: Nivel de Acción - La concentración de un contaminante que provocará que se realicen acciones como establecer tratamiento para prevenir efectos adversos de salud.
TT: Técnica de Tratamiento - Es un proceso requerido para controlar y reducir el nivel de un contaminante en agua potable
Dispensa y Exención: Autorización otorgada por el Departamento de Salud (DS) o la Agencia Protección Ambiental Federal (EPA, por sus siglas en inglés) bajo ciertas condiciones que permiten no cumplir con un NMC o técnica de tratamiento
MRDL: Nivel Máximo de un Desinfectante Residual permitido en el agua potable.
MRDLG: Meta del Nivel Máximo de un Desinfectante Residual por debajo del cualno hay riesgos a la salud conocidos o esperados.
Contaminante: sustancia o materia física, química, biológica o radiológica en el agua.
N/A: No Aplica
nd: no detectable, comparado con el límite de detección de la prueba.
ppb: partes por billón o microgramos por litro.
ppm: partes por millón o miligramos por litro.
ppt: partes por trillón o nanogramos por litro.
mrem/año: milirems por año. Medida de exposición a radionucleidos.
pCi/l: picocurios por litro Medida de radioactividad.
NTU: unidad para medir el material particulado en el agua de turbidez
S/N Sistema Nuevo (se incluye información recolectada)
Max: Máximo **Min:** Mínimo **>:** signo de mayor que

EL AGUA POTABLE Y LAS CUENCAS HIDROGRÁFICAS: RESPONSABILIDAD DE TODOS

1. Las cuencas hidrográficas y las represas son partes integrales de nuestro sistema regional de suministro de agua. ¡Consérvalas!

2. Es más efectivo y económico prevenir la contaminación de los abastos del agua potable que pagar por el tratamiento o limpieza de los mismos.

3. Puedes contribuir a la conservación de los abastos de agua reciclando o desechando correctamente los residuos domésticos peligrosos no deseados.

4. El uso de pesticidas y herbicidas puede afectar la calidad del agua. Cerciórate que uses los productos más amigables para el ambiente y dispón de ellos adecuadamente.

5. No viertas aceite para motores, anticongelantes ni otros materiales tóxicos en los desagües pluviales. El agua que entra en los desagües pluviales llega directamente a nuestros ríos y quebradas. ¡No los contamines!

6. No arrojes diluyentes de pintura, insecticidas, herbicidas ni otros productos químicos nocivos por el fregadero.

MEDIDAS PREVENTIVAS

- Si experimentas interrupciones en el servicio de agua, asegura hervirla por lo menos dos (2) minutos antes de consumirla.
- Si el agua de algún grifo en particular no se ha utilizado durante seis horas o mas, deja correr el agua fría hasta que salga de la tubería tan fría como sea posible.
- Utiliza solamente el agua fría del grifo para beber, cocinar y, especialmente, para preparar la fórmula de bebé.

20 MEDIDAS PARA AHORRAR AGUA Y DINERO

¡Empieza ahora! Sigue estos consejos para reducir el consumo de agua y economiza en tu factura, ponlo en la nevera o en un lugar visible. Haz que la conservación sea parte de tu vida.

- Descongela la comida en la nevera desde la noche anterior en vez de usar la pluma para descongelar. Se desperdicia casi 3 galones de agua por minuto con la pluma totalmente abierta.
- Cuando laves los platos, no dejes el agua correr mientras enjabonas o enjuagas.
- Usa tu lavadora de platos o de ropa sólo con tandas llenas, podrías ahorrar 1,000 galones ó 3.78 m^3 al mes.
- Lava tus frutas y vegetales en un recipiente parcialmente lleno de agua en vez de hacerlo bajo la pluma.
- Verifica las llaves de paso y arréglalas. Es sencillo, barato y puedes ahorrar 140 galones a la semana o cerca de 2 m^3 al mes.
- Bota pañuelos desechables y algodones en el cesto de la basura en vez de

echarlos en el inodoro y estarás ahorrando agua por galones.

- Dúchate en menos de 5 minutos y ahorra hasta 1,000 galones ó 3.78 m^3 al mes. Una ducha abierta durante 10 minutos gasta 26 1/2 galones de agua.
- Echa colorante de comida en el tanque del inodoro. Si se colorea el agua en la taza, tu inodoro tiene un liqueo. Arréglalo y ahorra más de 600 galones ó 2.27 m^3 al mes.
- Si tu inodoro es de antes de 1980, coloca un galón plástico lleno de agua dentro del tanque para controlar la cantidad de agua que se usa en cada descarga. Asegúrate que no interfiera con los mecanismos del tanque.
- Si tu ducha llena un cubo de un galón de agua en menos de 20 segundos, instala un cabezal de ducha de flujo reducido (low flow). Te ahorra hasta 500 galones o casi 2 m^3 a la semana.
- Cierra la pluma al cepillarte los dientes y ahorra 4 galones de agua por minuto. Eso equivale a 200 galones a la semana ó 3 m^3 al mes para una familia de cuatro miembros.
- Si la cierras mientras te afeitas, ahorrarás más de 100 galones a la semana ó 1.5 m^3 al mes.
- Cierra la ducha mientras te enjabonas y te aplicas el champú o acondicionador y ahorra más de 50 galones a la semana o más de 1 m^3 al mes.
- Usa una escoba en vez de la manguera para limpiar la marquesina o la acera y ahorra 80 galones de agua cada vez.
- Pon una capa de viruta orgánica (mulch) alrededor de las plantas para reducir la evaporación y ahorrarás cientos de galones de agua al año.
- Dirige los canales y desagües del techo hacia los arbustos y árboles, o recoge esa agua y úsala para regar tus plantas.
- Minimiza la evaporación del agua regando tus plantas temprano en la mañana, cuando las temperaturas son más bajas y los vientos más livianos.
- No podes la grama demasiado. Una grama más alta protege las raíces y conserva mejor la humedad del terreno.
- Lava tu carro sobre la grama, aprovecha el agua para ambos fines.
- Usa una manguera con pistero y ahorrarás más de 100 galones cada vez. Una manguera abierta desperdicia hasta 10 galones por minuto.