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**1ST SAMPLING REPORT
SEPTEMBER 1990
TUTU WELLS SITE QUARTERLY SAMPLING
ST. THOMAS, U.S. VIRGIN ISLANDS**

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Prepared for

Tutu Environmental Investigation Committee

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FIGURE

1. Well Sampling Locations, Tutu Wells Site Sampling, Analysis, and Monitoring Plan, St. Thomas, USVI.

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ST. THOMAS, U.S. VIRGIN ISLANDS**

INTRODUCTION

The Tutu Wells Site 1st Quarter (September 1990) Sampling Report was prepared by Geraghty & Miller, Inc. for both the Tutu Environmental Investigation Committee (TEIC), which is comprised of Texaco Caribbean Inc. (Texaco) and Esso U.S. Virgin Islands (Esso), and L'Henri, Inc. (O'Henry). This report was prepared in accordance with the requirements detailed in the "Sampling, Analysis, and Monitoring Plan (SAMP) for Wells, Tutu Wells Site, St. Thomas, U.S. Virgin Islands," September 1990, which was approved by the U.S. Environmental Protection Agency (USEPA) in its September 21, 1990 letter to TEIC and the Administrative Order (Order) effective March 22, 1990.

The objectives of the SAMP are to identify, quantify, and monitor the occurrence of gasoline constituents and tetrachloroethene (commonly referred to as perchloroethylene and abbreviated as PCE), and its breakdown products, in certain wells in the vicinity of Route 38 within the Tutu Wells Site (Figure 1).

SAMPLING AND ANALYTICAL PROCEDURES

The sampling was conducted from September 24 through October 3, 1990 by Soil Tech and Geraghty & Miller. USEPA representatives were present for the sampling conducted through September 28, 1990. Additionally, representatives of the USEPA's Monitoring Management Branch (MMB) were present in an audit capacity on September 24 and 25, 1990. A representative of the Virgin Islands Department of Planning and Natural Resources (DPNR) was present throughout the sampling event.

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Sampling and analysis were performed as described in the SAMP, with the exception of the few deviations outlined in the following section. In brief, the wells were sampled and analyzed for the Target Compound List (TCL) and Target Analyte List (TAL) constituents, with the exception of polychlorinated biphenyls (PCBs), under the Contract Laboratory Program (CLP). Volatile organic compound (VOC) analyses were performed in accordance with a modified version of EPA Method 524.2 in order to achieve lower detection levels. The modifications to EPA Method 524.2 which were adopted are described in Appendix A of the SAMP.

The samples were collected in 23 of the 24 wells sampled for the September 1990 sampling event utilizing the permanent pumps and piping systems. These wells were evacuated prior to sampling by pumping the wells for a minimum of 15 minutes. One well (Gassett), which is not outfitted with a permanent pump, was evacuated and sampled using a peristaltic pump. The analytical data was validated by Geraghty & Miller in accordance with the USEPA Standard Operating Procedures (SOP) No. HW-2, February 1990 for inorganic compounds and the USEPA SOP No. HW-6, March 1990 for organic compounds. The data validation summary and the complete data set (tabulated) are provided in Appendix A.

Details of the sampling and analysis procedures, data validation requirements, and reporting requirements are provided in the SAMP.

Procedural Deviations

Deviations from the scope of work and procedures as presented in the SAMP are outlined below.

1. Four Winds Well No. 1 was not sampled during the September 1990 sampling event when it was discovered that the pump, which was thought to be in good working order, was inoperable at the start of the sampling event.

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2. The well sampled on the Gassett property (formerly Hartman 1) during the September 1990 sampling event was the same well which was formerly sampled by USEPA and was proposed to be sampled in the SAMP. The well is located near the fence on the north side of the Gassett property. When USEPA and TEIC representatives examined the well in August 1990, it became clear that the integrity of the well had been compromised based on the report of the USEPA Technical Assistance Team (TAT) member who previously sampled the well. It was decided, and approved by USEPA, to sample a newer well located on the Gassett property, in its place. The new well is located behind the building and consists of 6-inch diameter PVC which extends several feet above ground surface. However, during the September 1990 sampling event, the old well near the fence was sampled. Additionally, the sample from the well was collected using a peristaltic pump, instead of a Teflon™ bailer. Due to problems associated with sounding and evacuating the well, the well volume could not be determined, and it is unlikely that 3 well volumes were removed prior to sampling.
3. The 1:1 hydrochloric acid (HCl) used to acidify the VOC samples was reagent grade and not ultra pure grade. The sampling team attempted to obtain ultra-pure grade HCl, but was unable to do so due to shipping problems.
4. The samples for cyanide analysis were preserved by adding sodium hydroxide (NaOH). However, for some of the samples, the pH was not raised to greater than 12. While this requirement was not stated in the plan, it is recognized as a requirement and will be met in subsequent cyanide analyses.
5. One sample (Smith) was analyzed for VOCs using EPA Method 624, instead of Method 524.2 in order to perform the analysis within the holding time.

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6. Although the analysis for PCBs was not required for this project, they were analyzed for; the analytical results are provided in this report.
7. The Tillett well was pumped for a minimum of 15 minutes prior to sampling, as specified in the SAMP. However, due to logistical problems associated with containing the evacuated water, the water was pumped at a low rate and only approximately 110 gallons were removed prior to sampling. Data provided by the U.S. Geological Survey (USGS) indicates that the Tillett wells is 100 feet deep and 6 inches in diameter. Assuming a depth to water of 20 feet, it is calculated that 3 well volumes is equal to approximately 360 gallons.

RESULTS AND DISCUSSION

A summary of the organic analytical results is provided in Table 1. Table 1 includes only the organic compounds which were detected; the complete organics analytical results are provided in tabulated form in Appendix A. The inorganic analytical results are summarized in Table 2.

Data Quality Provisions

A discussion of the data validation findings is provided in Appendix A. In general, the overall quality of the data set is acceptable and meets the project data quality objectives. For some data, however, there are some provisions which should be noted.

As discussed in USEPA's MMB CERCLA Limited Technical Systems Audit for the September 1990 sampling, air bubbles were found to be present in several of the VOC sample bottles. When the VOC bottles were originally filled, no bubbles were apparent; the bubbles came out of solution later. While every effort was made to avoid this condition, a few of the samples (Eglin 1, LaPlace, Tillett, and Tillett Replicate) analyzed by the laboratory contained air bubbles. In this event, the data validation SOP requires that all

positive detections be assumed to be minimum values and that all non-detections be rejected based on the assumption that all VOCs in the water would diffuse into the air bubble, and consequently escape analysis and detection. In reality, it is likely that any volatile organic compound present would stabilize in both the air and water at concentrations related to the compound vapor pressure. In any event, the compounds which were consistently detected in the four affected samples (PCE, trichloroethene [TCE], and 1,2-dichloroethene [1,2-DCE]) were also consistently detected throughout the data set and comprise the constituents of concern at the site. It is unlikely that the undetected compounds in the four affected samples are present in ground water at the site.

Holding time violations resulted in the rejection of some of the mercury analytical results. In most instances, the mercury holding time of 28 days was exceeded by only 1 or 2 days; for one sample the holding time was exceeded significantly.

Unsatisfactory instrument calibrations resulted in the rejection of some results. For some samples, non-detection of acetone, 2-butanone, 2-hexanone, trans-1,3-dichloropropene, and vinyl acetate were rejected due to poor instrument response factors and continuing calibration performance. Poor sensitivity for acetone and similar compounds is not unusual at low detection levels. Moreover, these compounds are not constituents of concern at the site.

Spike recovery values outside of quality control limits contributed to the rejection of some data. The acid fraction of the Tillett Replicate analysis was rejected because the acid surrogate recoveries were out of control limits, and the thallium data was rejected because the matrix spike recoveries were out of control limits. The laboratory suggested that the thallium recoveries may be affected by the high natural dissolved solids concentrations in site ground water. Additionally, some of the antimony and mercury data was rejected for several samples because the recovery for the laboratory standard for one run was out of control limits.

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Many constituent concentrations are estimated due to quality control inadequacies related to holding times, sample preservation, calibration performance, spike recoveries, and quality control studies. Although many of the constituent concentrations are estimated, their identification and quantitation were subject to strict quality control requirements and therefore, the reported values are likely to be within a reasonable range of the true values. The overall quality of the data set is acceptable; there was good reproducibility between replicate samples and the chief constituents of concern were consistently detected.

Organic Analytical Results

As indicated in Table 1, VOCs constitute the chief analyte group of concern at the Tutu Wells Site. The compounds which were consistently detected in site samples are PCE, TCE, and 1,2-DCE. All three compounds were detected in the following wells: Eglin 1, 2, and 3; Hartman 2; Smith; Four Winds 2; Four Winds 2 Replicate; Steele; LaPlace; Matthias; Tillet; and the Tillett Replicate. Additionally, one or two of these compounds were detected in wells Hartman 3, Harvey, Ramsey, and VIHA 1.

VOC tentatively identified compounds (TICs) were identified in 12 out of the 24 site samples. Eight compounds were tentatively identified and unknown compounds were detected. Total estimated VOC TIC concentrations ranged from 3 to 435 micrograms per liter (ug/L).

The presence of methylene chloride and acetone in site and blank samples is attributed to laboratory contamination. Other VOC compounds which were detected in site samples include chloroform in well VIHA 3 (3 ug/L), and vinyl chloride (17 ug/L) and benzene (32 ug/l) in both the Tillett and Tillett Replicate sample.

No semi-volatile (base-neutral and acid extractable organic compounds) or pesticide organic compounds were detected in any of the site samples. One library search semi-volatile compound (penta-chlorofluorobenzene; 4 ug/l) was detected in the Tillett Replicate sample and unknown semi-volatile organic compounds were detected in several samples.

In general, the wells in which VOCs were detected are located in the central Tutu valley. No VOCs were detected in wells outside the central valley. The wells in which no VOCs were detected include: the Dimitri and Leonard wells located significantly upgradient of the central Tutu valley; the Bryan well which is located in the next drainage subbasin to the west; and the Devcon 1 and 3, Dench, and Dede wells located significantly downgradient from the central Tutu valley (see Figure 1). Additionally, no VOCs were detected in the Gassett (Hartman 1) or Rodriguez wells which are located at the southern end of the central Tutu valley.

Inorganic Analytical Results

The inorganics analytical results are provided in Table 2. The inorganic concentrations were within acceptable ranges. While some cation concentrations (calcium, magnesium, potassium, and sodium) were elevated in relation to potable water quality typical of North America, the concentrations were within the range of concentrations commonly detected in ground water pumped from domestic, commercial, and public supply wells in the U.S. Virgin Islands. The heavy metal concentrations detected were all below the Federal Primary Drinking Water Standards, where applicable. Lead concentrations, which were of particular interest due of the possibility of past gasoline releases, were all below the Federal Primary Drinking Water Standard.

RECOMMENDATIONS

The 1st Quarter results meet the prescribed objectives of the SAMP. It is recommended to continue to implement the plan with a few minor changes. First, the deviations from the sampling and analysis procedures detailed in the SAMP will be rectified for the remaining quarterly sampling events. Second, it is recommended that the analytical problems associated with the thallium and antimony analyses be reviewed so that subsequent analyses will provide acceptable data. It may be necessary to alter the analytical method in order to achieve this; if so, all revisions will be approved by USEPA before implementation. Furthermore, it is recommended to resample for mercury for the samples which were analyzed after the holding time elapsed.

Proposed analyses for the 2nd sampling event, which is tentatively scheduled to begin on February 4, 1991, are based on the results of this report. The proposed sampling effort for February 1991 is detailed in Table 3. For VOC analysis, it is proposed to sample only those wells in which VOCs other than laboratory contaminants (methylene chloride and acetone) were detected in the 1st Sampling Report. Additionally, it is proposed to sample the Gassett well for VOCs because the September 1990 sampling procedure used for this well was not in keeping with the procedures described in the SAMP. It is also proposed to sample for thallium, antimony, mercury, and selenium in the wells for which these data were rejected due to quality control inadequacies. Sampling and analysis

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for semivolatile organic compounds, pesticides, and PCBs are not proposed for the 2nd, 3rd, or 4th sampling events because these compounds were not detected in any of the wells.

Respectfully Submitted,

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Table 1. Summary of Organics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Dede	Dench	Devcon 1	Devcon 3	Eglin 1	Eglin 2	Eglin 3	Hartman 2	Hartman 3	Harvey	Leonard	Rodriguez	Rodriguez Replicate
VOLATILE ORGANIC COMPOUNDS													
Methylene chloride	ND	ND	1 ND J	8 ND J	R	5 ND J	10 ND J	1 ND J	3 ND J	150 ND J	ND	1 ND J	2 ND J
Chloromethane	ND	1 J	ND	ND	R	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	R	R	R	R	R	R	22 J	R	R	R	R	R	R
1,2-Dichloroethene	ND	ND	ND	ND	~~ND~~	~~ND~~	~~ND~~	5 J	2	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	10 J	22 J	14	1 J	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	~~ND~~	~~ND~~	~~ND~~	7 J	1 J	~~ND~~	ND	ND	ND
Tentatively Identified VOCs	ND		ND							ND	ND		ND
Propane, 2-methoxy-2-methyl unknown compound		6 JN		2 JN	6 JN 3 JN	220 JN	5 JN	3 JN	4 JN			1 JN	
SEMIVOLATILE ORGANIC COMPOUNDS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tentatively Identified SVOCs unknown compound	4 JN	ND	4 JN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PESTICIDE / PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

VOCs Volatile organic compounds.

SVOCs Semivolatile organic compounds.

ND Compound not detected.

J Estimated concentration. For tentatively identified compounds, all concentrations are estimated. For other compounds, this data qualifier indicates that either the compound is present but at concentrations lower than the contract required quantitation limit, or that due to quality control problems, the data is provisional and therefore the concentrations are estimated.

R Data rejected.

N Compound is a tentatively identified compound.

Table 1. Summary of Organics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Smith	Four Winds 2	Four Winds 2 Rep.	Trip Blank 9/24	Trip Blank 9/25	Trip Blank 9/26	Steele	Dimitri	Bryan
VOLATILE ORGANIC COMPOUNDS									
Methylene chloride	12 ND J	14 ND J	10 ND J	25 J	34 J	24 J	140 ND J	2 ND J	2 ND J
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	25 ND J	R	R	12 J	42 J	4 J	R	R	R
1,2-Dichloroethene	~~58~~	~~25 J~~	~~11 J~~	ND	ND	ND	~~ND~~	ND	ND
Trichloroethene	~~ND~~	6 J	4 J	ND	ND	ND	~~ND~~	ND	ND
Tetrachloroethene	~~ND~~	25 J	~~18 J~~	ND	ND	ND	130 J	ND	ND
Total Xylenes	ND	ND	ND	8	7	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	1	ND	ND	ND	ND
Tentatively Identified VOCs									
1,1,2-Trichloro-1,2,2-trifluoroethane				5 JN	3 JN	7 JN		ND	ND
Propane, 2-methoxy-2-methyl	88 JN		7.5 JN				42 JN		
Dichlorobenzene isomer					1 JN				
unknown compound		15 JN			7 JN				
SEMIVOLATILE ORGANIC COMPOUNDS									
Tentatively Identified SVOCs	ND	ND	ND	NA	NA	NA	ND	ND	ND
PESTICIDE / PCBs	ND	ND	ND	NA	NA	NA	ND	ND	ND

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

VOCs Volatile organic compounds.

SVOCs Semivolatile organic compounds.

ND Compound not detected.

NA Compound not analyzed.

J Estimated concentration. For tentatively identified compounds, all concentrations are estimated. For other compounds, this data qualifier indicates that either the compound is present but at concentrations lower than the contract required quantitation limit, or that due to quality control problems, the data is provisional and therefore the concentrations are estimated.

Rep. Replicate.

R Data rejected.

N Compound is a tentatively identified compound.

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Table 1. Summary of Organics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Trip Blank 9/27	Trip Blank 10/1	Trip Blank 10/2	Trip Blank 10/3	Ramsey	Laplace	Gassett (Hartman 1)	Matthias	VIHA 1	VIHA 3	Tillet	Tillet Replicate
VOLATILE ORGANIC COMPOUNDS												
Methylene chloride	16 J	13 J	14 J	ND	17 ND J	R	1 ND J	9 ND J	2 ND J	2 ND J	R	44 ND J
Acetone	R	6 J	7 J	R	R	R	R	R	R	R	ND	52 ND J
1,2-Dichloroethene	ND	ND	ND	ND	ND		ND		6 J	ND		270 J
Trichloroethene	ND	ND	ND	ND	ND		ND		ND	ND		47 J
Tetrachloroethene	ND	ND	ND	ND	3 J		ND		5 J	ND		98 J
Vinyl chloride	ND	ND	ND	ND	ND	R	ND	ND	ND	ND	17 J	12 J
Benzene	ND	ND	ND	ND	ND	R	ND	ND	ND	ND	32 J	26 J
Chloroform	ND	ND	ND	ND	ND	R	ND	ND	ND	3	R	R
Tentatively Identified VOCs	ND								ND			
1,1,2-Trichloro-1,2,2-trifluoroethane			3 JN									
Propane, 2-methoxy-2-methyl				1.5 JN		130 JN					240 JN	270 JN
Aliphatic hydrocarbon											6 JN	
C3-Benzene isomer											6 JN	
C5H12 isomer											121 JN	230 JN
C6H12 isomer											35 JN	
C9H12 isomer											6 JN	
unknown compound		1 JN			2 JN		2 JN	16 JN		1 JN	21 JN	39 JN

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

VOCs Volatile organic compounds.

ND Compound not detected.

NA Compound not analyzed.

J Estimated concentration. For tentatively identified compounds, all concentrations are estimated. For other compounds, this data qualifier indicates that either the compound is present but at concentrations lower than the contract required quantitation limit, or that due to quality control problems, the data is provisional and therefore the concentrations are estimated.

R Data rejected.

N Compound is a tentatively identified compound.

TEST 200 INL

Table 1. Summary of Organics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Trip Blank 9/27	Trip Blank 10/1	Trip Blank 10/2	Trip Blank 10/3	Ramsey	Laplace	Gassett (Hartman 1)	Matthias	VIHA 1	VIHA 3	Tillet	Tillet Replicate
SEMIVOLATILE ORGANIC COMPOUNDS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Tentatively Identified SVOCs	NA	NA	NA	NA	ND				ND	ND		
Benzene, pentachlorofluoro unknown compound						42 JN	12 JN	4 JN			37 JN	4 JN 82 JN
PESTICIDE / PCBs	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

SVOCs Semivolatile organic compounds.

ND Compound not detected.

NA Compound not analyzed.

J Estimated concentration. For tentatively identified compounds, all concentrations are estimated. For other compounds, this data qualifier indicates that either the compound is present but at concentrations lower than the contract required quantitation limit, or that due to quality control problems, the data is provisional and therefore the concentrations are estimated.

N Compound is a tentatively identified compound.

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Table 2. Summary of Inorganics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Dede	Dench	Devcon 1	Devcon 3	Eglin 1	Eglin 2	Eglin 3	Gassett (Hartman 1)	Hartman 2	Hartman 3
INORGANIC ANALYTES										
Aluminum	136 BJ	278 J	139 BJ	411	149 B	69 BJ	156 BJ	526	269 J	278
Antimony	R	R	R	R	ND	R	R	ND	R	R
Arsenic	ND	ND	ND	ND	ND	ND	3 ND	ND	ND	ND
Barium	8 B	19 B	21 B	15 B	ND	23 B	57 B	7 B	12 B	15 B
Beryllium	3 BJ	4 BJ	5 BJ	4 BJ	4 B	3 BJ	4 BJ	4 B	3 BJ	4 BJ
Cadmium	5	3 B	ND	ND	ND		ND	ND		ND
Calcium	23500	24200	41600	43800	35300	47900	81400	31200	38100	41100
Chromium (Total)	16 J	22 J	4 ND J	4 ND J	12	17 J	10 J	4 B	11 J	11 J
Cobalt	60 J	44 BJ	ND	59 J	ND	32 BJ	30 BJ	ND	30 BJ	25 BJ
Copper	32	52	ND	53	14 BJ	36	9 B	10 BJ	34	30
Iron	43 B	163	34 B	40 B	20 ND J	86 B	56 B	418J	23 B	31 B
Lead	3.7 J	7.8 J	8.2 J	11.8 J	2 BJ	2.1 BJ	1 ND J	1.4 BJ	10.4 J	1.8 BJ
Magnesium	25600	25000	39500	41000	28700	35400	54600	26300	33400	28300
Manganese	201	545	241	91	56	8 B	53	853	ND	3 B
Mercury	ND	ND	ND	ND	R	ND	ND	R	ND	ND
Nickel	ND	73	13 B	41	26 BJ	67	24 B	ND	95	52
Potassium	2000 B	1690 B	2970 B	2050 B	920 B	1620 B	2250 B	880 B	1040 B	1690 B
Selenium	1 ND J	1 ND J	1.6 BJ	1.4 BJ	10 ND J	1.2 BJ	1.2 BJ	10 ND J	1.6 BJ	1 ND J
Silver	7 ND J	7 ND J	7 ND J	7 ND J	ND	7 ND J	18 J	7 B	7 ND J	7 ND J
Sodium	324000	328000	330000	384000	190000	247000	398000	236000	285000	217000
Thallium	R	R	R	R	R	R	R	R	R	R
Vanadium	21 B	28 B	32 B	20 B	34 BJ	47 B	9 B	26 BJ	52	124
Zinc	12 BJ	41 J	6 BJ	6 BJ	13 BJ	75 J	49 J	5 BJ	9 BJ	13 BJ
Cyanide	ND	6.8 B	5 ND J	5 ND J	ND	6.8 B	7.4 B	ND	ND	ND

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

ND Compound not detected.

B Reported value obtained from a reading that was less than the contract required detection limit but greater than the instrument detection limit.

J Estimated concentration.

R Data rejected.

Table 2. Summary of Inorganics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	Smith	Four Winds 2	Four Winds 2 Rep.	Steele	Dimitri	Bryan	Leonard	Rodriguez	Rodriguez Rep.
INORGANIC ANALYTES									
Aluminum	234 J	162 BJ	304 J	492 J	163 BJ	149 B	93 BJ	58 BJ	431
Antimony	R	R	R	R	52 ND J	ND	R	R	R
Arsenic	ND	ND	ND	ND	3 ND J	3 ND J	ND	ND	ND
Barium	15 B	15 B	11 B	27 B	3 ND J	ND	11 B	8 B	ND
Beryllium	3 BJ	3 BJ	4 BJ	3 BJ	4 BJ	3 B	3 BJ	3 BJ	3 BJ
Cadmium	ND	5	6	4 B	3 BJ	4 BJ	ND	ND	ND
Calcium	50200	46100	54300	44000	37500 J	54300	38300	40000	47400
Chromium (Total)	14 J	32 J	14 J	9 BJ	4 BJ	7 B	15 J	14 J	40 J
Cobalt	ND	29 BJ	43 BJ	55 J	18 ND J	ND	37 BJ	34 BJ	39 BJ
Copper	13 B	37	5 B	21 B	17 BJ	17 BJ	31	22 B	29
Iron	158	55 B	57 B	26 B	115 J	63 BJ	37 BJ	50 B	45 B
Lead	10.9 J	8 J	8.7 J	13.2 J	2.6 BJ	4.6 J	1.8 BJ	2 BJ	12.1 J
Magnesium	45500	34000	38800	40500	27800 J	49100	24400	38700	41400
Manganese	41	28	31	23	7 BJ	2 B	ND	122	129
Mercury	ND	ND	ND	ND	R	R	ND	ND	ND
Nickel	57	36 B	44	45	14 BJ	ND	ND	22 B	39 B
Potassium	1540 B	2190 B	2060 B	1180 B	2000 BJ	1000 B	1210 B	1610 B	1730 B
Selenium	R	1.2 BJ	1 ND J	1.4 BJ	10 ND J	2 ND J	1.4 BJ	1 ND J	1 ND J
Silver	7 ND J	7 ND J	7 ND J	7 ND J	7 ND J	ND	17 J	7 ND J	7 ND J
Sodium	410000	215000	249000	313000	328000 J	283000	318000	281000	298000
Thallium	R	R	R	R	R	R	R	R	R
Vanadium	ND	75	83	27 B	92 J	37 BJ	135	19 B	8 B
Zinc	179 J	85 J	88J	12 BJ	4 ND J	30	7 BJ	17 BJ	16 BJ
Cyanide	ND	8.5 B	ND	6.3 B	5 ND J	ND	6.3 B	21 J	5 ND J

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

ND Compound not detected.

B Reported value obtained from a reading that was less than the contract required detection limit but greater than the instrument detection limit.

Rep. Replicate.

J Estimated concentration.

R Data rejected.

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Table 2. Summary of Inorganics Analysis of Ground-Water Samples Collected from Water Supply Wells, September 1990 Sampling Event, Tutu Well Site, St. Thomas, USVI.

Sample Identification:	VIHA 1	VIHA 3	Laplace	Matthias	Ramsey	Harvey	Tillett	Tillett Replicate
INORGANIC ANALYTES								
Aluminum	154 B	182 BJ	146 B	227	187 B	1280	153 BJ	159 B
Antimony	54 BJ	R	57 B	ND	ND	R	52 ND J	ND
Arsenic	ND	ND	ND	3 ND J	3 ND J	ND	3 ND J	4.4 B
Barium	5 B	14 B	ND	6 B	ND	35 B	43 BJ	40 B
Beryllium	3 B	3 BJ	4 B	3 B	3 B	3 BJ	4 BJ	4 B
Cadmium	4 BJ	ND	4 BJ	ND	3 BJ	ND	4 BJ	3 BJ
Calcium	49400	43300	41000	36300	43100	53700	54800J	48600
Chromium (Total)	10	5 BJ	8 B	5 B	11	18 J	8 BJ	7 B
Cobalt	ND	ND	ND	ND	ND	38 BJ	18 ND J	ND
Copper	10 B	29	49 J	18 BJ	15 BJ	59	48 J	32 J
Iron	29 BJ	149	55 BJ	20 ND J	20 BJ	3360	953 J	2660 J
Lead	9 J	3.7 J	23 BJ	1.8 BJ	2.6 BJ	32.6 J	1.5 BJ	8.5 J
Magnesium	33900	28000	32600	34900	34400	46200	38300 J	34500
Manganese	ND	11 B	2 B	ND	ND	191	1260 J	1100
Mercury	R	ND	R	R	R	ND	R	R
Nickel	15 B	43	18 BJ	20 BJ	21 BJ	58	33 BJ	15 BJ
Potassium	2000 B	1030 B	1140 B	1410 B	1140 B	2000 B	760 BJ	1190 B
Selenium	1.4 BJ	1.5 BJ	10 ND J	2 ND J	10 ND J	1.2 BJ	10 ND J	10 ND J
Silver	16 J	7 ND J	ND	ND	ND	11 J	7 ND J	ND
Sodium	252000	162000	250000	379000	209000	233000	192000 J	169000
Thallium	R	R	R	R	R	R	R	R
Vanadium	67J	33 B	39 BJ	21 BJ	43 BJ	59	25 BJ	50J
Zinc	16 B	17 BJ	13 BJ	4 BJ	7 BJ	248 J	162 J	124 J
Cyanide	9.7 B	8 BJ	ND	ND	ND	7.4 B	52 ND J	ND

Analytical results are reported in micrograms per liter (ug/l); equivalent to parts per billion.

ND Compound not detected.

B Reported value obtained from a reading that was less than the contract required detection limit but greater than the instrument detection limit.

J Estimated concentration.

R Data rejected.

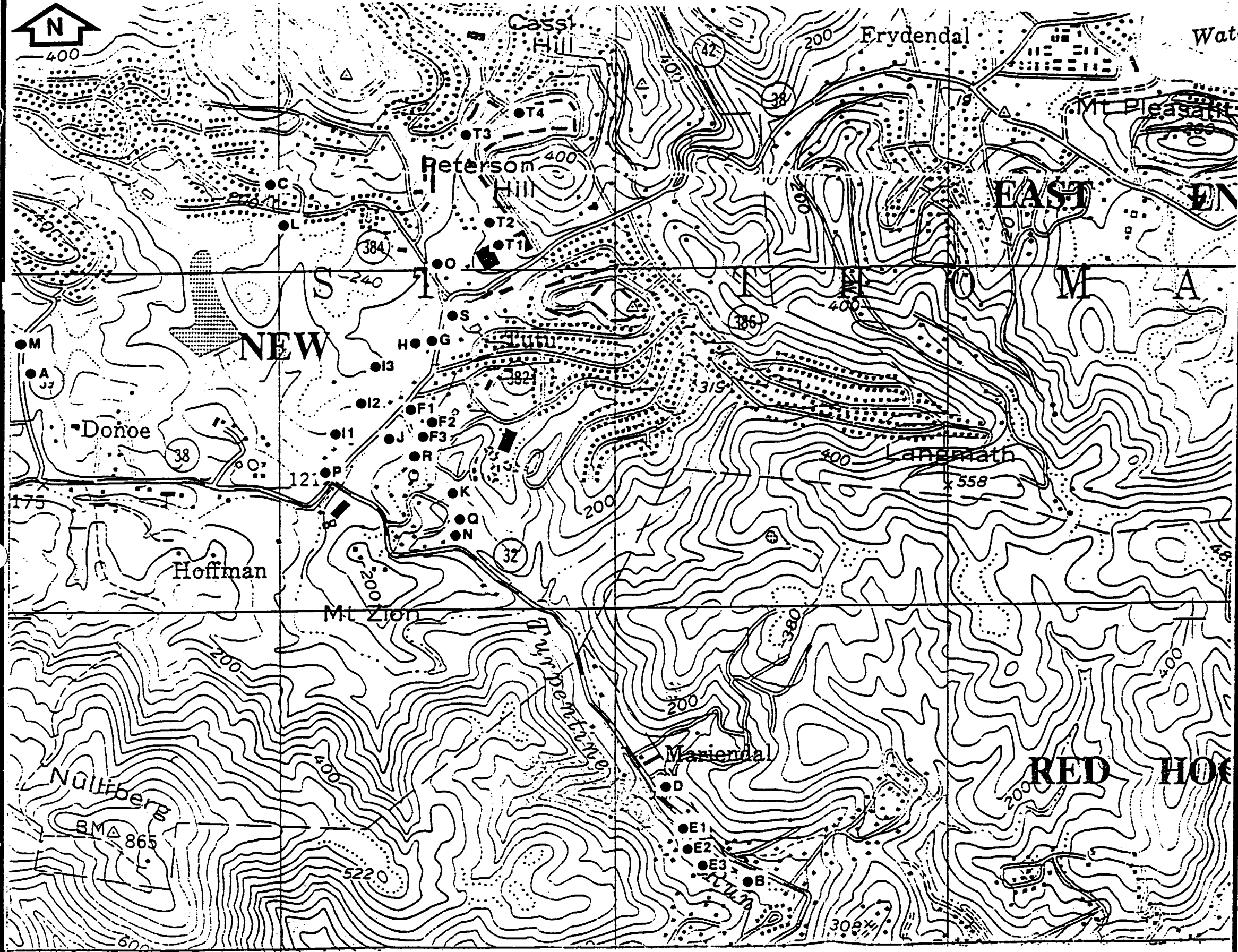
101 002 1845

Table 3. Proposed Sampling Effort for the 2nd Sampling Event (February 1991), Tutu Wells Site, St. Thomas, USVI.

<u>Well</u>	<u>Proposed Analytes</u>
Bryan	thallium, mercury
Dede	antimony, thallium
Dimitri	thallium, mercury
Dench	VOCs, antimony, thallium
Devcon 1	antimony, thallium
Devcon 3	antimony, thallium
Eglin 1	VOCs, thallium, mercury
Eglin 2	VOCs, antimony, thallium
Eglin 3	VOCs, antimony, thallium
Four Winds No. 1	VOCs
Four Winds No. 2	VOCs, antimony, thallium
Gassett	VOCs, thallium, mercury
Hartman 2	VOCs, antimony, thallium
Hartman 3	VOCs, antimony, thallium
Harvey	VOCs, antimony, thallium
LaPlace	VOCs, thallium, mercury
Leonard	antimony, thallium
Matthias	VOCs, thallium, mercury
Ramsey	VOCs, thallium, mercury
Rodriguez	antimony, thallium
Smith	VOCs, antimony, thallium, selenium
Steele	VOCs, antimony, thallium
Tillett	VOCs, thallium, mercury
VIHA 1	VOCs, thallium mercury
VIHA 3	antimony, thallium

MF:gv
#PR00801/1stqtr.rpt

TUT 002 1846



LEGEND

- RESIDENTIAL WELL
- A BRYAN
- B DEDE
- C DEMITRI
- D DENCH
- E1 DEVCON 1
- E2 DEVCON 2 (ALTERNATE)
- E3 DEVCON 3
- F1 EGLIN 1
- F2 EGLIN 2
- F3 EGLIN 3
- G FOUR WINDS No.1
- H FOUR WINDS No.2
- I1 GASSETT
- I2 HARTMAN CRUSHER
- I3 HARTMAN ESTATE
- J HARVEY
- K LaPLACE
- L LEONARD
- M LOCKHART (ALTERNATE)
- N MATTHIAS
- O RAMSEY
- P RODRIGUES
- Q SMITH
- R STEELE
- S TILLET
- T1 VIHA No.1
- T2 VIHA No.2 (ALTERNATE)
- T3 VIHA No.3
- T4 VIHA No.4 (ALTERNATE)

WELL SAMPLING LOCATIONS,
TUTU WELLS SITE SAMPLING
ANALYSIS, AND MONITORING PLAN,
ST. THOMAS, USVI

TEIC

Geraghty & Miller, Inc.	COMPILED BY PADULA	SCALE SHOWN DATE 5/90	FIGURE 1
	PREPARED BY PADULA		
	PROJECT NO. FINLAY		

SOURCE: USGS QUADRANGLE EASTERN ST. THOMAS, V.I. (1954)

0 1000 2000 3000
SCALE FEET

TUT 002 1847

DATA VALIDATION SUMMARY REPORT

for the

TUTU WELLS SITE

September 1990 Quarterly Sampling

USEPA REGION II

Standard Operating Procedures HW-2 and HW-6

for the

Contract Laboratory Program

Organic and Inorganic

Data Review

Sample Delivery Group 900731 (Dede)

January 1991

Prepared for

Tutu Environmental Investigation Committee

Geraghty & Miller, Inc.
International Group
290 Vincent Avenue
Hackensack, New Jersey 07601

TUT 002 1848

GERAGHTY & MILLER, INC.

SOP NO. HW-6
Revision #7

CLP ORGANICS DATA REVIEW
AND PRELIMINARY REVIEW

BY:

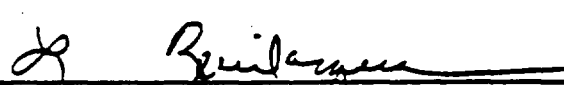


Leon Lazarus, Environmental Scientist
Toxic and Hazardous Waste Section

Date:

3-22-90

CONCURRED BY:



Louis Bevilacqua, Chief
Toxic and Hazardous Waste Section

Date:

3/23/90

APPROVED BY:



Gerard F. McKenna, Chief
Monitoring Management Branch

Date:

3-26-90

INTRODUCTION TO DATA VALIDATION

.0 Scope

- 1.1 This procedure is applicable to organic data obtained from contractor laboratories working for the Contract Laboratory Program (CLP).
- 1.2 The data validation is based upon analytical and quality assurance requirements specified in the Statement of Work (SOW).

.0 Responsibilities

Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

- 2.1 Data Assessment - The reviewer must answer every question on the checklist. All response shall be in ink.
 - 2.2 Data Assessment Narrative (Attachment 1) - Data reviewer is required to use these forms and must match the action in the narrative with the action taken on the Form I(s).
 - 2.3 Rejection Summary Form (Attachment 2) - Fill in the total number of analytes measured by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in the boxes where analyses were not performed or criteria do not apply.
 - 2.4 Organic Regional Data Assessment - Data reviewer is also required to fill out Organic Regional Data Assessment Form (Attachment 3).
 - 2.5 Telephone Record Log - The data reviewer should enter the bare facts of inquiry before initiating any authorized telephone conversation with a CLP laboratory. After the case review has been completed, mail the white copy of the Telephone Record Log to the laboratory and the pink copy to SMD. File the yellow copy in the Telephone Record Log folder and attach a photocopy of the Telephone Record Log to the completed Data Assessment Narrative.
 - 2.6 Forwarded Paperwork - Upon completion of the review, the following are to be forwarded to the Regional Sample Control Center (RSOC) located in the Surveillance and Monitoring Branch:
 - a. data package
 - b. completed assessment checklist
 - c. SMD Contract Compliance Screening (CCS)
- Forward four (4) copies of the completed Data Assessment Narrative along with four (4) copies of the Organic Data Assessment Form: one each for the appropriate Regional DPO, the Sample Management Office (SMD), and to the last two addresses of the Data Reviewers Mailing List.
- 2.7 Filed Paperwork - Upon completion of the review, the following are to be filed within the Monitoring and Management Branch (MMB) files:
 - a. Telephone record Log (copy)
 - b. Record of Communication (original)
 - c. Rejection Summary Form

- Y.0 Rejection of Data - All values determined to be unacceptable on the Organic Analysis Data Sheet (Form I) must be flagged with an "R". As soon as review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.
- ..0 Acceptance Criteria - In order that the reviews be consistent among reviewers, this Standard Operating Procedure (SOP) should be used. Additional guidance can be found in the Functional Guidelines.
- ..0 SMD Contract Compliance Screening (CCS) - This is intended to aid the reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from the laboratory in response to CCS must be used by the reviewer.

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 900731LAB: CEIMIC CORPSITE: TUTU WELLS, ST. THOMAS.0 Data Completeness and Deliverables

YES NO N/A

1.1 Have any missing deliverables been received and added to the data package.

☒ ☐ ☐

ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.

1.2 Was SMD CCS checklist included with package?

☐ ☐ ☒.0 Cover Letter/Case Narrative

2.1 Is the Narrative or Cover Letter present?

☒ ☐ ☐

2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?

☒ ☐ ☐.0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any ENA analyses and Part C for Pesticide/PCBs.

Does this package contain:

VA data?

☒ ☐

ENA data?

☒ ☐

Pesticide/PCB data?

☒ ☐

ACTION: Complete corresponding parts of checklist.

PART A: VOA ANALYSES

YES NO N/A

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?



—

—

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?



—

—

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

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

2.0 Holding Times

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



—

—

If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended.

Table of Holding Time Violations

Sample	Sample Matrix	Preserved ?	(See Traffic Report)		Date Analyzed
			Date Sampled	Date Lab Received	
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("U"), and document in the narrative that holding times were exceeded.

YES	NO	N/A
-----	----	-----

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒
☐
☐

b. Med Water

☐
☐
☒

c. Low Soil

☐
☐
☒

d. Med Soil

☐
☐
☒

3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒
☐
☐

b. Med Water

☐
☐
☒

c. Low Soil

☐
☐
☒

d. Med Soil

☐
☐
☒

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒
☐
☐

ACTION: Circle all outliers in red.

3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?

☒
☐
☐

If yes, were samples reanalyzed?

☐
☒
☐

Were method blanks reanalyzed?

☐
☒
☐

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("U").

If any surrogate has a recovery of <10% :

YES NO N/A

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as unusable ("R").

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?

— ☒ —

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒ — —

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water

☒ — —

b. Med Water

☐ — ☒

c. Low Soil

☐ — ☒

d. Med Soil

☐ — ☒

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water

Soils

2 out of 10

N/A out of 10

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

0 out of 5

N/A out of 5

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.

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YES	NO	N/A
-----	----	-----

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").

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

Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

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

6.0 Contamination

NOTE: "water 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 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

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

NOTE: Only field/rinse blanks taken the same day as the samples are 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. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

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ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

YES NO N/A

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Methylene chloride	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
Acetone			
Toluene			
2-butanone			
	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
Contaminants			

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).

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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.

6.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration 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 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? ☒ ☐ ☐

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

	YES	NO	N/A
DATE			
TIME			
INSTRUMENT			
SAMPLE NUMBERS			

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 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 tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

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

— ☒ —

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)

☒ — —

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable?

☒ — —

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

3.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate

☒ — —

b. Matrix spikes and matrix spike duplicates

☒ — —

c. Blanks

☒ — —

	YES	NO	N/A
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. Matrix spikes and matrix spike duplicates (Mass spectra not required)	☒	—	—
c. Blanks	☒	—	—
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	☐	☒	—
8.4 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.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	☒	—	—
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	☒	—	—
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	☒	—	—
8.8 Do sample and standard relative ion intensities agree 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, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).

	YES	NO	N/A
--	-----	----	-----

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" 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

☒	—	—
-------------------------------------	---	---

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?

—	☒	—
---	-------------------------------------	---

ACTION: Flag with "R" any TCL compound listed as a TIC.

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 TIC and "best match" standard relative ion intensities agree within 20%?

☒	—	—
-------------------------------------	---	---

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

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 standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

—	☒	—
---	-------------------------------------	---

10.2 Are the CRLs adjusted to reflect sample dilutions and, for soils, sample moisture?

☒	—	—
-------------------------------------	---	---

YES NO N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

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

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?

☒ ☐ ☐

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction?

☒ ☐ ☐

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)?

☐ ☒ ☐

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average RRF < 0.05?

☒ ☐ ☐

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)

YES NO N/A

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?

☒ — —

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

☒ — —

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

☒ ☐ —

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

☒ ☐ —

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE			YES	NO	N/A
25-50	50-90	>90			
'J' positive results, no action for non detects	'J' positive results, 'U' non detects	'J' positive results, "R" non detects		☒	

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.)

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

15.0 Field Duplicates

YES

NO

N/A

15.1 Were any field duplicates submitted for VOA analysis?☒

—

—

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART B: BNA ANALYSES

YES NO N/A

..0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?

☒

—

—

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

—

☒

—

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

..0 Holding Times

2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded?

—

☒

—

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

Sample	Sample Matrix	Date Sampled	(See Traffic Report)		Date Analyzed
			Date Lab Received	Date Extracted	
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A
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If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒	—	—
-------------------------------------	---	---

b. Med Water

☐	—	☒
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c. Low Soil

☐	—	☒
--------------------------	---	-------------------------------------

d. Med Soil

☐	—	☒
--------------------------	---	-------------------------------------

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒	—	—
-------------------------------------	---	---

b. Med Water

☐	—	☒
--------------------------	---	-------------------------------------

c. Low Soil

☐	—	☒
--------------------------	---	-------------------------------------

d. Med Soil

☐	—	☒
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ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒	—	—
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ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?

—	☒	—
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If yes, were samples reanalyzed?

☐	—	☒
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Were method blanks reanalyzed?

☐	—	☒
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ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("U").

If any base-neutral or acid surrogate has a recovery of <10% :

1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J".
2. Flag all non-detects for that fraction "R".

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?

YES NO N/A

☒

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water

☒

b. Med Water

☐

c. Low Soil

☐

d. Med Soil

☐

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water

Soils

0 out of 22

N/A out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

0 out of 11

N/A out of 11

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

YES	NO	N/A
☒	☐	☐

5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?

☒	☐	☐
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5.3 Has a BNA instrument blank been analyzed for each GS/MS system used.

☐	☐	☒
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ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all associated positive data ("R").

5.4 Chromatography: review the blank raw data - chromatograms (RIGs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?

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

6.0 ContaminationNOTE: "Water 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 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BVAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.

☐	☒	☐
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6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?

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

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning 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.

	YES	NO	N/A
Common Phthalate Esters	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & > 10x blank value
	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
Other Contaminants	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

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).

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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 Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? ☒ ☐ ☐

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☒ ☐ ☐

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? ☒ ☐ ☐

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

				YES	NO	N/A
DATE	TIME	INSTRUMENT	SAMPLE NUMBERS			

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

- 7.4 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 tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

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

☐ ☒ ☐

- 7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)

☒ ☐ ☐

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

- 7.7 Are the spectra 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

- 8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

- a. Samples and/or fractions as appropriate
b. Matrix spikes and matrix spike duplicates
c. Blanks

☒ ☐ ☐
☒ ☐ ☐
☒ ☐ ☐

	YES	NO	N/A
8.2 Are the EGA 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. Matrix spikes and matrix spike duplicates (Mass spectra not required)	☒	—	—
c. Blanks	☒	—	—
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	☐	☒	—
8.4 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.			
8.5 Are the lab-generated standard mass spectra of the identified EGA compounds present for each sample?	☐	—	☒
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	☐	—	☒
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	☐	—	☒
8.8 Do sample and standard relative ion intensities agree 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, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

YES	NO	N/A
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9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?

☒	☐	☐
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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

☒	☐	☐
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b. Blanks

☐	☐	☒
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ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?

☐	☒	☐
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ACTION: Flag with "R" any TCL compound listed as a TIC.

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?

☐	☐	☒
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9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?

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

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 standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

☐	☐	☒
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10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

☐	☐	☒
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YES NO N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CQLs are used (unless a QC exceedance dictates the use of the higher CQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?

☒

—

—

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction?

☒

—

—

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD <30%)?

☐☒

—

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05?

—

☒

—

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)

YES NO N/A

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?

☒ — —

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

☐ — —

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

— ☒ —

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

☒ ☐ —

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE			YES	NO	N/A
25-50	50-90	>90			
'J' positive results, no action for non detects	'J' positive results, 'U' non detects	'J' positive results, "R" non detects			

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.)

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

☒ — —

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

☒ — —

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

15.0 Field Duplicates

YES NO N/A

15.1 Were any field duplicates submitted for BVA analysis?

☒ YES ☐ NO ☐ N/A

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART C: PESTICIDE/PCB ANALYSES

YES NO N/A

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?

☒ ☐ ☐

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

☐ ☒ ☐

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

2.0 Holding Times

2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?

☐ ☒ ☐

Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

3.0 Surrogate Recovery (Form II)

3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒ ☐ ☐

b. Med Water

☐ ☐ ☒

c. Low Soil

☐ ☐ ☒

d. Med Soil

☐ ☐ ☒

3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒ ☐ ☐

b. Med Water

☐ ☐ ☒

c. Low Soil

☐ ☐ ☒

d. Med Soil

☐ ☐ ☒

	YES	NO	N/A
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ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒	☐	☐
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ACTION: Circle all outliers in red.

3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank?

☒	☐	☐
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ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).

3.5 Are there any transcription/calculation errors between raw data and Form II?

☐	☒	☐
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ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒	☐	☐
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4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

b. Med Water

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

c. Low Soil

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

d. Med Soil

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water

Soils

0 out of 12

N/A out of 12

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

YES NO N/A

WaterSoils

0 out of 6

N/A out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

☒ ☐ ☐

5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?

☒ ☐ ☐

5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?

☒ ☐ ☐

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

5.0 Contamination

NOTE: "Water 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 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.

☐ ☒ ☐

6.2 Do any field/rinse blanks have positive PEST/PCB results?

☐ ☐ ☒

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

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning 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.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A

☒ ☐ ☐

b. Evaluation Standard Mix B

☒ ☐ ☐

c. Evaluation Standard Mix C

☒ ☐ ☐

d. Individual Standard Mix A

☒ ☐ ☐

e. Individual Standard Mix B

☒ ☐ ☐

f. Multi-component Pesticides Toxaphene & Chlordane

☒ ☐ ☐

g. Aroclors 1016/1260

☒ ☐ ☐

h. Aroclors 1221, 1232, 1242, 1248, and 1254

☒ ☐ ☐

ACTION: If no, take action specified in 3.2 above

	YES	NO	N/A
7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?	☒	☐	☐

ACTION: If no, take action specified in 3.2 above.

7.3 Are there any transcription/calculation errors between raw data and Form VIII?	☐	☒	☐
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ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?	☐	☒	☐
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- for Endrin?

or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?	☐	☒	☐
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ACTION:

a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	☒	☐	☐

ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.

7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	☒	☐	☐
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ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.

7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	☒	☐	☐
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ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

3.0 Pesticide/PCB Standards Summary

8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	☒	☐	☐
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ACTION: If no, take action specified in 3.2 above.

8.2 Are there any transcription/calculation errors between raw data and Form IX?	☐	☒	☐
--	--------------------------	-------------------------------------	--------------------------

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	☒	☐	☐
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ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".

8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	☒	☐	☐
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YES NO N/A

ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".

8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?

☒ ☐ ☐

ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.

1.0 Pesticide/PCB Identification

9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?

☐ ☐ ☒

ACTION: If no, take action specified in 3.2 above.

9.2 Are there any transcription errors between raw data and Form X?

☐ ☐ ☒

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?

☐ ☐ ☒

Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?

☐ ☐ ☒

ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).

9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?

☐ ☐ ☒

ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".

10.0 Compound Quantitation and Reported Detection Limits

YES NO N/A

- 10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Were any errors found?

— ☐ ☒

NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.

- 10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

— ☐ ☒

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

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

1.0 Chromatogram Quality

- 11.1 Were baselines stable?

☒ — —

- 11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?

— ☒ —

- 11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?

☒ — —

ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.

12.0 Field Duplicates

12.1 Were any field duplicates submitted for PEST/PCB analysis?

YES NO N/A

☒

—

—

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

SDG # 900731 Dede
Tutu Wells Site

Contaminated Volatile Method Blanks and Their Associated Samples

<u>Method Blank</u>	<u>Associated Samples</u>
VBLK01	Devcon I, Hartman II, Rodriguez (P)
VBLK02	Eglin III, Four Winds II, Harvey, Tutu
VBLK03	Smith
VBLK04	Rodriguez (PD)
VBLK05	Eglin II
VBLK06	Hartman III, Leonard, Steele, Trip Blank 9/26, VIHA III, Steele MS, Steele MSD
VBLK07	Dede, Dench, Devcon III, Trip Blank 9/24, Trip Blank 9/25

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SDG # 900731 Dede
Tutu Wells Site

Contaminated Trip Blanks and Their Associated Samples

<u>Trip Blank</u>	<u>Associated Samples</u>
Trip Blank 9/26 (770-15)	Eglin II, Eglin III
Trip Blank 9/24 (731-05)	Devcon I, Devcon III, Rodriguez (P), Rodriguez (PD)
Trip Blank 9/25 (731-10)	Dede, Dench, Smith, Steele, Steele MD, Steele MSD
Trip Blank 9/26 (731-18)	Hartman II, Hartman III, Four Winds II, Tutu, Harvey, Leonard, VIHA III

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TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case No. 900731 SDG No. Tutu LABORATORY CEMIC SITE Tutu Well Site

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's
Signature: Donna M. Lesch Date: 01/07/1991

Verified By: Tom E. Spyer Date: 1/14/1991

DATA ASSESSMENT:

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, "UJ", 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.

The volatile and semivolatile organic compounds and pesticides/PCBs were analyzed within holding times for all samples.

DATA ASSESSMENT:

2. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, rinse, and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activities. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common lab contaminants), the analytes are qualified as non-detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination

Volatile Organic Compounds

Method blank VBLK01 is reported to contain a tentatively identified compound (TIC) with a retention time (RT) of 3.78 minutes at a concentration of 8.0 micrograms per liter (ug/L). The samples Devcon I, Hartman II, and Rodriguez(P) are associated with this method blank and contain the same TIC contamination. These TIC concentration values are qualified as non-detects because they are less than 5 times the contamination in the method blank and therefore the values are not reported.

Method blank VBLK02 is reported to contain methylene chloride at a concentration of 3 ug/L and a TIC with a RT of 3.83 at a concentration of 4 ug/L. The samples Eglin III, Four Winds II, Harvey, and Tutu are associated with this method blank and have methylene chloride concentrations above the CRQL and the same TIC contamination. The methylene chloride concentration values are qualified with "U" because they are less than 10 times the common contaminant concentration in the method blank. The TIC values are not reported for reasons stated above.

Method blank VBLK03 is reported to contain methylene chloride at a concentration of 5 ug/L. Sample Smith, which has a dilution factor of 2.5, is associated with this method blank and has a methylene chloride concentration of 11 ug/L. This concentration value is raised to 12 ug/L, the CRQL, and qualified with "U" because the value is less than 10 times the common contaminant concentration in the method blank. Please note that this sample

DATA ASSESSMENT:

was analyzed using Method 624 due to high compound concentrations and as a result the CRQL is higher for this sample.

Method blank VBLK04 is reported to contain methylene chloride at a concentration of 3 ug/L and a TIC with a RT of 3.83 at a concentration of 4 ug/L. Sample Rodriguez(PD) is associated with this method blank and contains 2 ug/L of methylene chloride and 3 ug/L of the same TIC. The methylene chloride concentration value is qualified with "U" and the TIC value is not reported for reasons previously stated.

Method blank VBLK05 is reported to contain 5 ug/L of methylene chloride, 2 ug/L of acetone, and 2 ug/L of a TIC with a RT of 3.78. Sample Eglin II is associated with this method blank and has a 5 ug/L of methylene chloride. This value is qualified with "U".

Method blank VBLK06 is reported to contain 5 ug/L of methylene chloride, and 7 ug/L of a TIC with a RT of 3.83. Samples Hartman III, Leonard, Steele, and VIHA III are associated with this method blank and have methylene chloride concentrations above the CRQL and the same TIC contamination. The methylene chloride concentration values are qualified with "U" and the TIC values are not reported for reasons stated above.

Method blank VBLK07 is reported to contain 3 ug/L of methylene chloride and 2 ug/L of a TIC with a RT of 3.83. Samples Dede, Dench, and Devcon III are associated with this method blank and have the same TIC contamination. These TIC values are not reported for reasons stated above. Samples Dede and Devcon III have methylene chloride concentrations above the CRQL. These values are qualified with "U".

Semivolatile Organic Compounds

No contaminants are detected in the method blank.

Pesticides/PCBs

No contaminants are detected in the method blank.

DATA ASSESSMENT:

- B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample).

All samples were taken directly from a drinking water tap into a collection bottle, therefore no field blanks were necessary.

- C) Trip blank contamination (VOCs only).

Trip blank 9/24 is reported to contain 25 ug/L of methylene chloride, 12 ug/L of acetone, 8 ug/L of xylenes, and 5 ug/L of a TIC with a RT of 3.83. The samples Devcon I, Devcon III, Rodriguez(P), and Rodriguez(PD) are associated with this trip blank. Devcon I and Rodriguez(P) have methylene chloride concentrations above the CRQL and the same TIC contamination. The methylene chloride concentration values are qualified with "U" because they are less than 10 times the concentration in the trip blank. The methylene chloride concentration values are already qualified in Devcon III and Rodriguez(PD) due to method blank contamination. The TIC concentration values for the four samples are already qualified due to method blank contamination. Devcon III and Rodriguez(PD) have acetone concentrations above the CRQL. These values are qualified with "U" because they are less than 10 times the common contaminant concentration in the trip blank.

Trip blank 9/25 is reported to contain 34 ug/L of methylene chloride, 42 ug/L of acetone, 1 ug/L of toluene, 7 ug/L of xylenes, 3 ug/L of a TIC with a RT of 3.82, 7 ug/L of a TIC with a RT of 8.7, and 1 ug/L of a TIC with a RT of 21.52. Samples Steele, Smith, Dede, and Dench are associated with this trip blank. Sample Smith contains 25 ug/L of acetone. This value is qualified with "U" for reasons stated above. All four samples have methylene chloride concentration values above the CRQL which are qualified with "U" for reasons stated above. Samples Steele, Dede, and Dench contain the same TIC contamination. The TIC values are not reported for reasons stated above.

Trip blank 9/26 is reported to contain 24 ug/L of methylene chloride, 4 ug/L of acetone, and 7 ug/L of a TIC with a RT of 3.82. The samples Hartman III, Hartman II, Four Winds II, Tutu, Leonard, Harvey, and VIHA III are

DATA ASSESSMENT:

associated with this trip blank. Sample Hartman II contains methylene chloride at a concentration above the CRQL. This value is qualified "U" for reasons stated above. Samples Fourwinds II and Leonard both contain acetone at concentrations above the CRQL. These values are qualified with "U" for reasons stated above. Hartman III, Fourwinds II, Tutu, Leonard, Harvey, and VIHA III have methylene chloride concentration values above the CRQL which are already qualified due to method blank contamination. The TIC concentration values for the above samples are already qualified due to method blank contamination.

Trip blank 9/27 is reported to contain 16 ug/L of methylene chloride. Samples Eglin II and Eglin III are associated with this trip blank and have methylene chloride concentrations at or above the CRQL. These values are qualified as "U" for reasons stated above.

DATA ASSESSMENT:

3. 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 bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl-phosphine (DFTPP).

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

All mass calibrations are acceptable for both the volatile and semivolatile analyses.

Two BFB tunes have a sample out of the 12-hour limit by less than 12 minutes. Each succeeding tune is acceptable, therefore, in this reviewer's professional judgement, no qualifiers are necessary.

DATA ASSESSMENT:

4. 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:

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 (a ratio of areas) in both the initial and continuing calibrations. A value < 0.05 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").

Volatile Organic Compounds

The initial calibration performed on 9/19 has response factors > 0.05 for all compounds. Sample Smith is associated with this calibration. No qualifiers are necessary.

The initial calibration performed on 9/28 has response factors < 0.05 for acetone, 2-butanone, and 2-hexanone. All samples except Smith are associated with this calibration and are qualified with "R" for the compounds stated above.

The continuing calibrations performed on 9/29, 10/03, and 10/09 have response factors < 0.05 for acetone, 2-butanone, and 2-hexanone. The continuing calibration performed on 10/01 has response factors < 0.05 for acetone and 2-butanone. The continuing calibration performed on 10/08 has a response factor < 0.05 for 2-butanone and 2-hexanone. These compounds are already qualified in the samples associated with the above continuing calibrations as a result of deficient initial calibration response factors.

The continuing calibration performed on 10/06 has a response factor < 0.05 for acetone, 2-butanone, vinyl acetate, and 2-hexanone. The associated

DATA ASSESSMENT:

samples are Devcon III, Trip blank 9/24, Dede, Dench, and Trip blank 9/25. The acetone, 2-butanone, and 2-hexanone concentration values are already qualified as a result of deficient initial calibration response factors. The vinyl acetate concentration values are qualified with "R" based on this continuing calibration.

Semivolatile Organic Compounds

All response factors are greater than or equal to 0.05 in both the initial and continuing calibrations.

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DATA ASSESSMENT:

5. CALIBRATION:

A) 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 from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. 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 %D or RSD > 50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column.

Volatile Organic Compounds

The initial calibration performed on 9/19 has a %RSD greater than 30% for chloromethane(35%). Smith is the only sample associated with this initial calibration. Chloromethane is a non-detect in this sample, therefore no action is necessary.

The initial calibration performed on 9/28 has a %RSD greater than 30% for methylene chloride(66.948%) and acetone(71.280%). All samples except Smith are associated with this initial calibration. The methylene chloride concentration values are qualified with "J" for all positive hits and "UJ" for all non-detects. The acetone concentration values are already qualified as a result of deficient response factors.

DATA ASSESSMENT:

The continuing calibration performed on 10/02 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Methylene Chloride	-52.4
2-Butanone	44.4
Vinyl Acetate	-36.7
trans-1,3-Dichloropropene	-99.9
4-Methyl-2-pentanone	39.1
2-Hexanone	-58.0

Sample Smith is associated with this calibration. The trans-1,3-dichloropropene concentration is qualified with "R" because it is a non-detect and the %D is greater than 90%. The 2-butanone, vinyl acetate, and 4-methyl-2-pentanone are non-detects, therefore no qualifiers are necessary. 2-Hexanone is a non-detect, but the %D is greater than 50%, therefore the quantitation limit is qualified with "UJ". The methylene chloride concentration is already qualified due to deficient initial calibration %RSD.

The continuing calibration performed on 9/29 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Methylene Chloride	43.38
Acetone	27.13
Carbon Tetrachloride	28.68
Bromoform	25.15

The samples Devcon I, Rodriguez(P), and Hartman II are associated with this calibration. Carbon tetrachloride and bromoform are not detected in these samples, therefore no action is necessary. Methylene chloride concentration values are already qualified due to a deficient initial calibration %RSD. Acetone is already qualified due to a deficient response factor.

DATA ASSESSMENT:

The continuing calibration performed on 10/01 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
1,2-Dichloroethane	42.31
2-Butanone	47.03
Bromodichloromethane	25.24
trans-1,3-Dichloropropene	28.28
Dibromochloromethane	41.51
1,1,2-Trichloroethane	39.96
Bromoform	26.97
2-Hexanone	34.13
4-Methyl-2-Pentanone	56.49
1,1,2,2-Tetrachloroethane	39.33

Rodriguez(PD) is the only sample associated with this calibration. 4-Methyl-2-pentanone concentration value is qualified with "UJ" because it is a non-detect and the %D is greater than 50%. The 2-butanone and 2-hexanone concentration values are already qualified due to deficient response factors. The remaining compounds are non-detects and have %Ds less than 50%, therefore no qualifiers are necessary.

The continuing calibration performed on 10/03 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Chloromethane	26.36
Methylene Chloride	39.16
Acetone	34.95
2-Hexanone	29.35

Samples Four Winds II, Tutu, Harvey, and Eglin III are associated with this calibration. Chloromethane is not detected in any of these samples, therefore no action is necessary. Methylene chloride concentration values are already qualified due to deficient initial calibration %RSD. Acetone and 2-hexanone concentration values are already qualified due to deficient initial calibration

DATA ASSESSMENT:

response factors.

The continuing calibration performed on 10/06 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Vinyl Chloride	33.45
Methylene Chloride	44.78
Acetone	48.44
Vinyl Acetate	66.87
1,1,2,2-Tetrachloroethane	30.11

Samples Devcon III, Trip blank 9/24, Dede, Dench, and Trip blank 9/25 are associated with this calibration. Vinyl chloride and 1,1,2,2-Tetrachloroethane are not detected in these samples, therefore no qualifiers are necessary. The methylene chloride concentration values are already qualified due to a deficient initial calibration %RSD. Acetone and vinyl acetate are already qualified due to deficient initial response factors.

The continuing calibration performed on 10/08 has a %D greater than 25% for the acetone(93.97) and 2-butanone(82.37). Samples Steele, Hartman III, Leonard, VIHA III, and Trip blank 9/26 are associated with this calibration. These compounds are already qualified as a result of deficient initial calibration response factors.

The continuing calibration performed on 10/09 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Chloromethane	28.83
Bromomethane	27.13
Methylene Chloride	33.67
2-Butanone	75.79
Vinyl Acetate	46.25
4-Methyl-2-Pentanone	38.55

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DATA ASSESSMENT:

Sample Eglin II is associated with this calibration. Methylene chloride is already qualified due to deficient initial calibration %RSD. 2-Butanone is already qualified due to a deficient initial calibration response factor. The remaining compounds are non-detects and have %Ds less than 50%, therefore no qualifiers are necessary.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected in any of the samples. Therefore, the CRQLs will be qualified with "UJ" only when calibrations have %RSDs or %Ds greater than 50%.

The continuing calibration performed on 10/13 has a %D greater than 25% for 2,4-dinitrophenol(61.8%). The sample Steele is associated with this calibration. The non-detect value is qualified with "UJ".

Pesticides/PCBs

The %RSD for aldrin, endrin, DDT, and dibutylchlorodate did not exceed 10%. The %D was within 15% on the quantitation column.

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds 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.

Volatile Organic Compounds

For the Method 624 analysis, all surrogate recoveries are within quality (QC) limits.

As specified in Method 524.2, only two surrogate compounds were used, bromofluorobenzene (BFB) and trans-1,2-dichlorobenzene-d4 (t-DCB). The recovery of BFB is outside the QC limits (86-115%) in the following sample analyses:

<u>Sample</u>	<u>%BFB Recovered</u>
Dench	60
Eglin II	84
Four Winds II	128
Leonard	118
Rodriguez(PD)	68
TUTU	126
VLK01	84
VLK04	68
VLK06	120

These samples were not re-analyzed. For each affected sample, the concentration values for all compounds are qualified "J" for positive hits, and "UJ" for all non-detects. No QC limits are established for the recovery of t-DCB; however, when the BFB recovery is within QC limits, the t-DCB recovery is in the range of 84% to 122%.

DATA ASSESSMENT:

Semivolatile Organic Compounds

The surrogate compound 2-fluorophenol is out of QC limits (21-100%) in the sample analysis of Dench. No action is necessary when only one surrogate is out of QC limits.

Pesticides/PCBs

The Dibutylchlorandate (DBC) recovery was high for all samples except Leonard. No pesticides or PCBs were found in any of the samples, therefore no qualifiers are necessary.

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DATA ASSESSMENT:

7. INTERNAL STANDARDS PERFORMANCE:

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 +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than ± 30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) 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 judgement to determine either partial or total rejection of the data for that sample fraction.

All internal standard area counts and retention times are within QC limits for both volatile and semivolatile compound analyses.

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

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.

Volatile organic compounds are properly identified on the GC/MS and all TICs accurately match their ion spectra.

No semivolatile target compounds were found in any sample.

B) PESTICIDE FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 nanograms per liter (ng/ml) in the final sample extract.

No pesticides or PCBs were found in any sample.

DATA ASSESSMENT:

9. 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 CC criteria for some additional qualification of the data.

All MS/MSD % recoveries are within QC limits for volatile, semivolatile organic compounds and pesticides and PCBs.

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION:

A) Method Detection Limit Study

Method 524.2 state that a method detection limit (MDL) study must be performed prior to sample analyses.

The MDL study consists of seven repeat analyses of target compounds at concentrations of 1 ppb. The QC limits for mean accuracy (% recovery) and %RSD are 80-120% and 20%, respectively. The MDL study must be repeated if these standards are not met. The MDL study associated with SDG Dede results was performed in April 1990 and has the following deficiencies (*):

<u>Compound</u>	<u>Mean Accuracy, %</u>	<u>% RSD</u>
1,1-Dichloroethene	72*	7.2
Methylene Chloride	148*	12.0
1,2-Dichloroethane	121*	7.9
Tetrachloroethene	76*	9.5
Bromoform	88	28.0 *
1,1,2,2-Tetrachloroethane	122*	7.3

In addition, the following compounds were not included in the MDL study: acetone, carbon disulfide, 2-butanone, vinyl acetate, 4-methyl-2-pentanone, 2-hexanone. The above compounds are flagged "J" for all samples, except where compounds are qualified "R" for other deficiencies.

B) Laboratory Fortified Blanks

QC requirements established in Method 524.2 and the Sampling, Analysis, and Monitoring Plan (Appendix A) state that laboratory fortified blanks (LFBs) must be analyzed immediately following each continuing calibration and the accuracy must be between 80% to 120% recovery. The provided data indicate that the recoveries were out of QC limits for volatile compounds in each LFB. The LFBs were not always analyzed immediately after the calibrations. The affected samples and compounds are qualified "J" to reflect these deficiencies.

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

The compounds of primary importance in this project are the volatile organics. SDG Tutu has several QC criteria out of specification.

The MDL study had % recoveries out of QC limits as well as compounds which were not included in the study at all. The FLBs also had several compounds out of QC Limits and twice was not run immediately after the continuing calibrations. All target compounds were present in the FLBs. These MDL and FLB deficiencies indicate that the laboratory instrumentation has difficulties recovering certain compounds at such low concentrations (1 ppb). As a result, the affected compounds are qualified with "J" in the associated samples.

The volatile surrogate recoveries are out of QC limits in several samples as well as three (out of seven) method blanks. For the affected samples, the identification of the compounds is acceptable, but for positive hits and non-detects the quantitation must be considered as estimated only. The concentration values and quantitation limits for the six affected samples have been qualified as such.

The volatile calibrations are deficient for compounds which were either common lab contaminants or compounds not detected in any sample. The majority of the data is not seriously affected by these deficiencies.

During the process of validation, the compound quantitation performed by the reviewer did not agree with the quantitation performed by the lab. The lab was notified and the laboratory personnel determined that the incorrect response factors were used to quantitate the compound concentrations for samples Hartman III, Leonard, Steele, and VIHA III. The lab corrected the problem and sent revised Form I(s) and quantitation reports. These revisions are included with the data package.

Overall, the volatile organic data is consistent although QC problems do exist as discussed above.

The semivolatile data is acceptable. One qualifier was needed due to calibration deficiencies.

TUT 002 1908

DATA ASSESSMENT:

The pesticide/PCB data is acceptable. The surrogate recovery was high for all but one sample, but no pesticides or PCBs were found, therefore it has no effect on the data.

DATA ASSESSMENT:

12. CONTRACT PROBLEMS

The MDL study failed to include six target compounds. Several results were out of QC limits established in Method 524.2 and the Sampling, Analysis, and Monitoring Plan.

The LFBs were not analyzed immediately after the calibrations and many % recoveries are not within QC limits.

The volatile organic analyses have several samples and three blanks with the surrogate BFB out of QC limits. The lab has failed to perform satisfactorily because there is no evidence of reanalysis for any sample or blank.

Sample Smith was originally analyzed using Method 524.2. The compound concentration values were not within the calibration range of the instrumentation. In order to analyze the sample within holding time the laboratory defaulted to Method 624. This was a breach of contract. The Sampling, Analyses, and Monitoring Plan calls for all samples to be analyzed using Method 524.2 in order to reach low detection limits.

DATA ASSESSMENT:

13. This package contains sample re-extractions, re-analyses or dilutions. Upon reviewing the QA results, the appropriate following form I(s) have been used.

Form I(s) for sample re-extraction, re-analysis, or multiple dilutions are not included in this package because all original analyses were accepted.

TUT 002 1911

SOP NO. HW-2

Evaluation of Metals Data for the Contract Laboratory Program (CLP)
based on

SCW. 7/88
REV. 2/89

(SOP Revision X)

PREPARED BY: Hanif Sheikh DATE: 2-16-90
Hanif Sheikh, Quality Assurance Chemist
Toxic and Hazardous Waste Section

CONCURRED BY: Louis Bevilacqua DATE: 2/16/90
Louis Bevilacqua, Section Chief
Toxic and Hazardous Waste Section

APPROVED BY: G. Bevilacqua for (H11) DATE: 2/16/90
Gerard F. McKenna, Chief
Monitoring Management Branch

Title: Evaluation of Inorganic Data for the
Contract Laboratory Program

Date: Feb. 1990
Number: H-2
Revision: 10

1.0 Scope

- 1.1 This procedure is applicable to inorganic data obtained from contractor laboratories working for Hazardous Waste Site Contract Laboratory Program (CLP).
- 1.2 The data validation is based upon analytical and quality assurance requirements specified in Statement of Work (SOW) 7/88.

2.0 Responsibilities - Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1. For a total review:

- 2.1.1 Data Assessment - "Total Review-Inorganics" Checklist Appendix (A.1).
The reviewer must answer every question on the checklist.

- 2.1.2 Data Assessment - Data Assessment Narrative (Appendix A.2)
The answer on the checklist must match the action in the narrative (appendix A.2) and on Form I's. Do not use pencil to write the narrative.

- 2.1.3 Contract Non-Compliance - SMO Report (Appendix A.3)
This report is to be completed only when a serious contract violation is encountered, or upon the request of the Data Review Manager or Deputy Project Officer (DPO). Forward 5 copies: one each for internal files, appropriate Regional DPO, Sample Management Office (SMO) and last two addresses of Mailing List for Data Reviewers (Appendix A.4). In other cases, all contract violations should be appended to end of Data Assessment Narrative (Sec. A.2.2).

- 2.1.4 Data Summary Sheet - Summary of Inorganic Quality Control Data (Appendix A.5).
Enter in ink on Data Summary Sheet required QC values from Forms I through IX. Circle all values that require data qualification "Action".

2.1.5 CLP Data Assessment Summary Forms

2.1.5.1 Appendix A.6

Fill in the total number of analytes analyzed by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in boxes where analyses were not performed, or criteria do not apply.

2.1.5.2 Appendix A.7

Data reviewer is also required to fill out Inorganic Regional Data Assessment form (Appendix A.7) provided by EPA Headquarters. Codes listed on the form will be used to describe the Data Assessment Summary.

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-
- 2.1.6 Data Review Log: It is recommended that each data reviewer should maintain a log of reviews completed to include:
- a. date of start of case review
 - b. date of completion of case review
 - c. site
 - d. case number
 - e. contract laboratory
 - f. number of samples
 - g. matrix
 - h. hours worked
 - i. reviewer's initials

- 2.1.7 Telephone Record Log - the data reviewer should enter the bare facts of inquiry, before initiating any phone conversation with CLP laboratory. After the case review has been completed, mail white copy of Telephone Record Log to the laboratory and pink copy to SMD. File yellow copy in the Telephone Record Log folder, and attach a xerox copy of the Telephone Record Log to the completed Data Assessment Narrative (Appendix A.2).

2.1.8 Forwarded Paperwork

- 2.1.8.1 Upon completion of review, the following are to be forwarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:
- a. data package
 - b. completed data assessment checklist (Appendix A.1, original)
 - c. SMD Contract Compliance Screening (CCS)
 - d. Data Summary Sheet (Appendix A.5) along with completed Data Assessment Narrative (Appendix A.2)
 - e. Record of Communication (copy)
 - f. CLP Reanalysis Request/Approval Record (original + 3 copies)
 - g. Appendix A.7 (original).
- 2.1.8.2 Forward 4 copies of completed Data Assessment Narrative (Appendix A.2) along with 2 copies of the Inorganic Data Assessment Form (Appendix A.7) and Telephone Record Log, if any, one each for appropriate Regional DFO, Sample Management Office (SMD), and last two addressees of Mailing List for Data Reviewers (Appendix A.4) (the Inorganic Data Assessment form does not go to the last two addressees).

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2.1.9 Filed Paperwork - Upon completion of review, the following are to be filed within M-E files:

- a. Four copies of completed Data Assessment Narrative (Appendix A.2) each carrying Appendix A.7.
- b. Telephone Record Log (copy)
- c. S-D Report (copy Appendix A-3)
- d. CLP Data Assessment Summary Form (Appendix A.6).
- e. CLP Reanalysis Request/Approval Record (copy)

3.0 Data Completeness

Indicate incomplete data package on the computer tracking sheet located in M-E office. Authorized contractor personnel may contact the laboratory after discovery of an incomplete data package. If a laboratory will not return phone calls or does not respond to request, notify M-E coordinator of Region II for resolution.

4.0 Rejection of Data - All values determined to be unacceptable on the Inorganic Analysis Data Sheet (Form I) must be lined over with a red pencil. As soon as any review criteria cause data to be rejected, that data can be eliminated from any further review or consideration.

5.0 Acceptance Criteria - In order that reviews be consistent among reviewers, acceptance criteria as stated in Appendix A.1 (pages 4-25) should be used. Additional guidance can be found in the National Inorganic Functional Guidelines of October 1, 1989.

6.0 SPO Contract Compliance Screening (CCS) - This is intended to aid reviewer in locating a problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from laboratory in response to CCS must be used by the reviewer.

7.0 Request for Reanalysis - Data reviewers must note all items of contract non-compliance within Data Assessment Narrative. If holding times and sample storage times have not been exceeded, DPO may request reanalysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record".

8.0 Record of Communication - Provided by the Regional Sample Control Center (RSCC) to indicate which data packages have been received and are ready to be reviewed.

9.0 Rounding off numbers - The data reviewer will follow the standard practice.

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Contract Laboratory Program
Appendix A.1: Data Assessment - Contract
Compliance (Total Review - Inorganics)

Date: Feb. 1993
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	YES	NO	NA
A.1.1 <u>Contract Compliance Screening Report (CCS)</u> - Present?	☐	--	☒
ACTION: If no, contact RSOC.			
A.1.2 <u>Record of Communication (from RSOC)</u> - Present?	☐	--	☒
ACTION: If no, request from RSOC.			
A.1.3 <u>Trip Report</u> - Present and complete?	☐	--	☒
ACTION: If no, contact RSOC for trip report.			
A.1.4 <u>Sample Traffic Report</u> - Present or on file?	☒	--	--
Legible?	☒	--	--
ACTION: If no, request from Regional Sample Control Center (RSOC).			
A.1.5 <u>Cover Page</u> - Present?	☒	--	--
Is cover page properly filled in and signed by the lab manager or the manager's designee?	☒	--	--
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	☒	--	--
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	☒	--	--
(b) Form I's?	☒	--	--
ACTION: If no for any of the above, contact RSOC for clarification.			

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	YES	NO	N/A
A.1.6 <u>Form I (Final Data)</u> - Are all Form I's present and complete?	☒	☐	☐
<u>ACTION:</u> If no, prepare telephone record log and contact laboratory for submittal.			
Are correct units (ug/l for waters and mg/kg for soils) indicated on Form I's?	☒	☐	☐
Are soil sample results for each parameter corrected for percent solids?	☐	☐	☒
Are EPA sample # s and corresponding laboratory sample ID # s the same as on the Cover Page, Form I's and in the raw data?	☒	☐	☐
Are computation/transcription errors less than 10% of reported values?	☒	☐	☐
Are all "less than IDL" values properly coded with "U"?	☒	☐	☐
Was a brief physical description of samples given on Form I's?	☒	☐	☐
Were the result qualifiers used correctly with final data?	☒	☐	☐
<u>ACTION:</u> If no for any of the above, prepare Telephone Record Log, and contract laboratory for corrected data.			
Were any samples diluted beyond requirements of contract?	☐	☒	☐
If yes, were dilutions noted on Form I's?	☐	☐	☒
<u>ACTION:</u> If no, note under Contract-Problem/Non-Compliance of the "Data Assessment Narrative".			

A.1.7 Holding Times - (aqueous and soil samples)

(Examine sample traffic reports and digestion/distillation logs.)

Mercury analysis (28 days) exceeded?	☐	☒	☐
Cyanide distillation (14 days) exceeded?	☐	☒	☐

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	YES	NO	RE
--	-----	----	----

Other Metals analysis (6 months). . . . exceeded? ☐ ☒ ☐

NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist.

ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.

A.1.8 Raw Data

A.1.8.1 Digestion Log* for flame AA/ICP (Form XIII) present? ☒ ☐ ☐

Digestion Log for furnace AA Form XIII present? ☒ ☐ ☐

Distillation Log for mercury Form XIII present? ☒ ☐ ☐

Distillation Log for cyanides Form XIII present? ☒ ☐ ☐

Are pH values (pH<2 for all metals, pH>12 for cyanide) present in Digestion/Distillation Logs? ☐ ☒ ☐

*Weights, dilutions and volumes used to obtain values.

Percent solids calculation present for soils/sediments? ☐ ☐ ☒

Are preparation dates present on Digestion Log? ☒ ☐ ☐

A.1.8.2 Measurement read out record present?

ICP

☒ ☐ ☐

Flame AA

☐ ☐ ☒

Furnace AA

☒ ☐ ☐

Mercury

☒ ☐ ☐

Cyanides

☒ ☐ ☐

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	YES	NO	NA
A.1.8.3 Are all raw data to support all sample analyses and QC operations present?	☒	--	--
Legible?	☒	--	--
Properly Labeled?	☒	--	--

ACTION: If no for any of the above, write Telephone Record Log and contact laboratory. Flag metal data as estimated if pH of sample is greater than 2. Flag cyanide data as estimated if pH sample is less than 12.

A.1.9 Data Validation and VerificationA.1.9.1 Calibration

A.1.9.1.1 Is record of at least 2 point calibration present for ICP analysis?

☒ -- --

Is record of 5 point calibration present for Hg analysis?

☒ -- --

ACTION: If no for any of the above, write in the Contract Problem/Non-Compliance section of the "Data Assessment Narrative".

A.1.9.1.2 Is record of 4 point calibration present for:

Flame AA?

☐ -- ☒

Furnace AA?

☒ -- --

Cyanides?

☒ -- --

NOTE: 1. If less than 4 standards are measured in absorbance mode, then the remaining standards in concentration mode must be run immediately after calibration and be within $\pm 10\%$ of true value.
2. For all AA (except Hg) and Cyanide analyses, one calibration standard is at CRL level. If not, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".

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YES NO N/A

ACTION: Flag associated data as estimated if standards are not within $\pm 10\%$ of true values (except CRDL calibration standard). Do not flag the data as estimated in linear range indicated by good recovery of standard.

A.1.9.1.3 Is correlation coefficient less than 0.995 for:

Mercury Analysis?

— ☒ —

Cyanide Analysis?

— ☒ —

Atomic Absorption Analysis?

— ☒ —

ACTION: If yes, flag the associated data as estimated.

A.1.9.2 Form II A (Initial and Continuing Calibration Verification)-

A.1.9.2.1 Present and complete for every metal and cyanide?

☒ — —

Present and complete for AA and ICP when both are used for same analyte?

☐ — ☒

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.9.2.2 Circle all values on data summary sheet that are outside contract windows. Are all calibration standards (initial and continuing) within control limits?

Metals 90-110%

☒ — —

Hg - 80-120%

☒ — —

Cyanides 85-115%

☒ — —

- The reviewer will calculate correlation coefficient.

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YES NO

ACTION: Flag as estimated (J) all positive data (not flagged with a "U") analyzed between a calibration standard with %R between 75-89% (65-79% for Hg; 70-84% for CN) or 111-125% (121-135% for Hg; 116-130% for CN) recovery and nearest good calibration standard. Qualify results <IDL as estimated (UJ), if the ICV or CCV %R is 75-89% (CN, 70-84% ; Hg, 65-79%). Reject (red-line) as unacceptable data if recovery of the ICV or CCV is outside the range 75-125% (CN, 70-130%; Hg, 65-135%). Qualify five samples on either side of verification standard out of control limits.

Was continuing calibration performed every 10 samples or every 2 hours?

[✓]

ACTION: If no, flag the excess samples (eleventh and up) data as estimated (J).

Was ICV for cyanides distilled?

[✓]

ACTION: If no, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".

A.1.9.3 Form II B (CRDL Standards for AA and ICP) -

A.1.9.3.1 Was a CRDL standard (CRA) analyzed after initial calibration for all AA metals (except Hg)?

[✓]

*Was a mid-range calib. verification standard distilled and analyzed for cyanide analysis?

[✓]

Was a 2xCRDL (or 2xIDL when IDL > CRDL) analyzed (CRI) for each ICP run?

[✓]

(Note: CRI for AL, Ba, Ca, Fe, Mg, Na, or K is not required.)

ACTION: If no for any of the above, flag as estimated all data falling within the affected ranges.
The affected ranges are:

AA Analysis - **True Value $\pm$ CRDL

ICP Analysis - **True Value $\pm$ 2CRDL

CN Analysis - **True Value $\pm$ 0.5 x True Value.

Find the results of mid-range standard in the raw data.

**True value of CRA, CRI or mid-range standard. Substitute IDL for CRDL when IDL > CRDL.

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	YES	NO	NA
A.1.9.3.2 Was CRI analyzed after ICV/ICB and before the final OCV/CCB, and for every four hours of ICP run?	☒	☐	☐

ACTION: If no, write in Contract Problem/Non-Compliance
Section of the "Data Assessment Narrative".

A.1.9.3.3 Circle all values on summary sheet that are outside
acceptance windows.

Are CRA and CRI standards within control limits:
Metals 80 - 120%R? ☐ ☒ ☐

Is mid-range standard within control limits:
Cyanide 80 - 120%R? ☒ ☐ ☐

ACTION: Flag as estimated all data within the affected
ranges if the recovery of the standard is
between 50-79%; flag only positive data if
the recovery is between 121-150%; reject
(red line) all data if the recovery is less
than 50%; reject only positive data if the
recovery is greater than 150%.

A.1.9.4 Form III (Initial and Continuing Calibration Blanks)

A.1.9.4.1 Present and complete? ☒ ☐ ☐

For both AA and ICP when both are used for same analyte? ☒ ☐ ☐

Was an initial calibration blank analyzed? ☒ ☐ ☐

Was a continuing calibration blank analyzed after
every 10 samples or every 2 hours (whichever is more
frequent)? ☒ ☐ ☐

ACTION: If no, prepare Telephone Record Log, contact
laboratory and write in the contract-problems/
non-compliance section of the Data Assessment
Narrative.

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YES NO N/A

A.1.9.4.2 Circle all calibration blank values on Data Summary Sheet that are above CRDL (or $2 \times IDL$ when $IDL > CRDL$). Are all calibration blanks (when $IDL < CRDL$) less than or equal to Contract Required Detection Limits (CRDL)?

[☒] ☐ ☐

Are all calibration blanks less than two times Instrument Detection Limit (when $IDL > CRDL$)?

[☐] ☐ [☒

ACTION: If no for any of the above, flag as estimated (J) all positive data less than or equal to calibration blank values analyzed between calibration blank with value over CRDL (or $2 \times IDL$) and nearest good calibration blank. Flag five samples on either side of the calibration blank.

A.1.9.5 FORM III (Preparation Blank) -

(Note: The preparation blank for mercury is the same as the calibration blank.)

A.1.9.5.1 Was one prep. blank analyzed for: each 20 samples?

[☒] ☐ ☐

each batch?

[☒] ☐ ☐

each matrix type?

[☐] ☐ [☒

both AA and ICP when both are used for same analyte?

[☒] ☐ ☐

ACTION: If no for any of the above, flag as estimated (J) all associated positive data $< 10 \times IDL$ s for which prep. blank was not analyzed.

NOTE: If only one blank was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).

A.1.9.5.2 Is concentration of prep. blank greater than CRDL when IDL is less than or equal to CRDL?

☐ [☒] ☐

If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank value?

☐ [☐] [☒

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	YES	NO	N/A
ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value found in the raw data.			
A.1.9.5.3 Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	[]	--	✓
ACTION: If no, reject (red-line) all positive data that has a concentration less than 10 times the prep. blank value in the raw data.			
A.1.9.5.4 Is concentration of prep. blank below the negative CRDL?	--	[✓]	--
ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.9.6 <u>Form IV (ICP Interference Check Sample)</u>			
1.9.6.1 Present and complete?	[✓]	--	--
(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[✓]	--	--
ACTION: If no, flag as estimated (J) all samples for which Al, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.6.2 Circle all values on Data Summary Sheet that are more than + 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (+ 20%)?	[✓]	--	--
If no, is concentration of Al, Ca, Fe, or Mg lower than in ICS?	[]	--	✓
ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			

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YES NO NA

A.1.9.7 Form V A (Spiked Sample Recovery - Pre-Digestion/Pre-Distillation)-
(Note: Not required for Ca, Mg, K, and Na (both matrices), Al, and Fe
(soil only.)

A.1.9.7.1 Present and complete for:	each 20 samples?	☒	--	--
	each matrix type?	☐	--	☒
	each conc. range (i.e. low, med., high)?	☐	--	☒
For both AA and ICP when both are used for same analyte?		☐	--	☒

ACTION: If no for any of the above, flag as
estimated (J) all positive data less
than four times spiking level for
which spiked sample was not analyzed.

NOTE: If one spiked sample was analyzed for more
than 20 samples, then first 20 samples
analyzed do not have to be flagged as
estimated (J).

A.1.9.7.2 Was field blank used for spiked sample? ☐ ☒ ☐

ACTION: If yes, flag all positive data less than
4 x spike added as estimated (J) for which
field blank was used as spiked sample.

NOTE: Matrix spike analysis should be performed on a
field blank when it is the only aqueous sample in SDG.

A.1.9.7.3 Circle all values on Data Summary Sheet that are outside
control limits (75% to 125%). Are all recoveries
within control limits? ☐ ☒ ☐

If no, is sample concentration greater than or equal
to four times spike concentration? ☐ ☒ ☐

ACTION: If yes, disregard spike recoveries for analytes
whose concentrations are greater than or equal
to four times spike added. If no, circle those
analytes on Form V for which sample concentration
is less than four times the spike concentration.

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	YES	NO	REMARKS
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	☒	☐	

ACTION: If no, write in the Contract - Problem/Non -
Compliance section of "Data Assessment Narrative".

A.1.9.7.4 Aqueous

Are any spike recoveries:

(a) less than 30%?	☒	☐	
(b) between 30-74%?	☒	☐	
(c) between 126-150%?	☐	☒	
(d) greater than 150%?	☐	☒	

ACTION: If less than 30%, reject all associated aqueous
data; if between 30-74%, flag all associated
aqueous data as estimated (J); if between
126-150%, flag as estimated (J) all associated
aqueous data not flagged with a "U"; if
greater than 150%, reject (red-line) all
associated aqueous data not flagged with a "U".

NOTE: If pre-digestion spike result is rejectable
due to coefficient of correlation of MSA,
analytical spike recovery, or duplicate injections
criteria, disregard spike recovery on Form V.
Flag the associated data as estimated(J).

A.1.9.7.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	☐	☐	☒
(b) between 10-74%?	☐	☐	☒
(c) between 126-200%?	☐	☐	☒
(d) greater than 200%?	☐	☐	☒

ACTION: If less than 10%, reject all associated data; if
between 10-74%, flag all associated data as estimated;
if between 126-200%, flag as estimated all associated
data was not flagged with a "U"; if greater than 200%,
reject all associated data not flagged with a "U".

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	YES	NO	IDL
1.9.8 Form VI (Lab Duplicates)			
1.9.8.1 Present and complete for: each 20 samples?	☒	—	—
each matrix type?	☐	—	☒
each concentration range (i.e. low, med., high)?	☐	—	☒
both AA and ICP when both are used for same analyte?	☐	—	☒
ACTION: If no for any the above, flag as estimated (J) all data >CRDL* for which duplicate sample was not analyzed. Note: 1. If one duplicate sample was analyzed for more than 20 samples, then first 20 samples do not have to be flagged as estimated. 2. If percent solids for soil sample and its duplicate differ by more than 1%, prepare a Form VI for each duplicate pair, report concentrations in Hg/L on wet weight basis and calculate RPD or Difference for each analyte.			
A.1.9.8.2 Was field blank used for duplicate analysis?	—	☒	—
ACTION: If yes, flag all data >CRDL* as estimated (J) for which field blank was used as duplicate. NOTE: Duplicate analysis should be performed on a field blank when it is the only aqueous sample in SDG.			
A.1.9.8.3 Are all values within control limits (RPD 20% or difference < $\pm$ CRDL)?	☐	☒	—
If no, are all results outside the control limits flagged with an * on Form I's and VI?	☒	—	—
ACTION: If no, write in the Contract - Problems/Non-Compliance section of "Data Assessment Narrative". NOTE: 1. RPD is not calculable for an analyte of the sample - duplicate pair when both values are less than IDL.			
* Substitute IDL for CRDL when IDL > CRDL.			

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YES NO NA

2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria.

1.9.8.4 Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL? [✓]

ACTION: If yes, flag the associated data as estimated (J).

A.1.9.8.5 Aqueous

Circle all values on Data Summary Sheet that are:
RPD > 50%, or
Difference > ± CRDL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL? [✓]

Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL? [✓]

ACTION: If yes, flag the associated data as estimated.

A.1.9.8.6 Soil/Sediment

Circle all values on Data Summary Sheet that are:
RPD > 100%, or
Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) :

> 100%? [✓]

Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) :

> 2x*CRDL? [✓]

* Substitute IDL for CRDL when IDL > CRDL.

** Use absolute values of sample and duplicate to calculate the difference.

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YES NO N/A

ACTION: If yes, flag the associated data as estimated.

A.1.9.9 Field Duplicates

A.1.9.9.1 Were field duplicates analyzed?

ACTION: If yes, prepare a Form VI for each aqueous field duplicate pair. Prepare a Form VI for each soil duplicate pair, if percent solids for sample and its duplicate differ by more than 1%; report concentrations of soils in ug/l on wet weight basis and calculate RPDs or Difference for each analyte.

- NOTE:**
1. Do not calculate RPD when both values are less than IDL.
 2. Flag all associated data only for field duplicate pair.

A.1.9.9.2 Is any value for sample duplicate pair less than *CRDL and other value greater than or equal to 10 x *CRDL?

ACTION: If yes, flag the associated data as estimated.

A.1.9.9.3 Aqueous

Circle all values on Form VI for field duplicates that are:
RPD > 50%, or
Difference > $\pm$ CRDL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?

Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?

ACTION: If yes, flag the associated data as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

** Use absolute values of sample and duplicate to calculate the difference.

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YES NO NA

A.1.9.9.4 Soil/Sediment

Circle all values on Form VI for field duplicates that are:
RPD >100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both
greater than 5 times *CRDL) :

>100%?

___ [] ☒

Is any **difference between sample and duplicate
(where sample and/or duplicate is less than 5x *CRDL) :

>2x *CRDL?

___ [] ☒

ACTION: If yes, flag the associated data as estimated.

A.1.9.10 Form VII (Laboratory Control Sample) (Note: LCS - not
required for aqueous Hg and cyanide analyses.)

A.1.9.10.1 Was one LCS prepared and analyzed for:

every 20 water samples?

[☒] ___ ☒

every 20 solid samples?

[] ___ ☒

both AA and ICP when both are used for same analyte?

[] ___ ☒

ACTION: If no for any of the above, prepare Telephone
Record Log and contact laboratory for submittal
of results of LCS. Flag as estimated (J) all
data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20
samples, then first 20 samples close to LCS
do not have to be flagged as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

**Use absolute values of sample and duplicate to calculate the difference.

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A.1.9.10.2 Aqueous LCS

Circle all LCS values outside control limits
(80 - 120% except aqueous Ag and Sb).

Is any LCS recovery: less than 50%?
 between 50% and 79%?
 between 121% and 150%?
 greater than 150%?

YES NO N/A

— [✓] —
— [✓] —
— [✓] —
— [✓] —

ACTION: Less than 50%, reject (red-line) all data;
between 50% and 79%, flag all associated data
as estimated (J); between 121% and 150%, flag
all positive (not flagged with a "U") results
as estimated; greater than 150%, reject all
positive results.

A.1.9.10.3 Solid LCS

- NOTE:** 1. If "Found" value of LCS is rejectable due to duplicate
injections or analytical spike recovery criteria,
regardless of LCS recovery, flag the associated data
as estimated (J).
2. If IDL of an analyte is equal to or greater than
true value of LCS, disregard the "Action" below even
though LCS is out of control limits.

Is LCS "Found" value higher than the control
limits on Form VII?

— [] ✓

ACTION: If yes, qualify all associated positive data
as estimated.

Is LCS "Found" value lower than the Control
limits on Form VII?

— [] ✓

ACTION: If yes, qualify all associated data as
estimated.

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YES NO N/A

A.1.9.11 Form IX (ICP Serial Dilution) -

NOTE: Serial dilution analysis is required only
for initial concentrations equal to or
greater than 10 x IDL.

A.1.9.11.1 Was Serial Dilution analysis performed for:

each 20 samples? ☒ ☐ ☐each matrix type? ☐ ☐ ☒each concentration range (i.e. low, med.)? ☐ ☐ ☒

ACTION: If no for any of the above, flag all positive
data greater than or equal to 10xIDLs as
estimated (J) for which Serial Dilution Analysis
was not performed, and summarize the deficiency
on the DPO report.

A.1.9.11.2 Was field blank(s) used for Serial Dilution Analysis? ☐ ☒ ☐

ACTION: If yes, flag all associated data $\geq 10 \times \text{IDL}$
as estimated (J).

NOTE: Serial dilution analysis should be performed
on a field blank when it is the only aqueous
sample in SDG.

A.1.9.11.3 Are results outside control limit flagged with an "E"
on Form I's and Form IX when initial concentration on
Form IX is equal to 50 times IDL or greater. ☐ ☐ ☒

ACTION: If no, write in the contract-problem/non-
compliance section of the "Data Assessment
Narrative".

A.1.9.11.4 Circle all values on Data Summary Sheet that are outside
control limit for initial concentrations equal to or greater
than 10 x IDLs only. Are any % difference values:> 10%? ☒ ☐ ☐ $\geq 100\%$? ☐ ☒ ☐

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YES NO NA

ACTION: Flag as estimated (J) all associated equal to or greater than 10xIDLs for which percent difference is greater than 10% but less than 100%. Reject (red-line) all associated sample results equal to or greater than 10xIDLs for which PD is greater than or equal to 100%.

A.1.9.12 Furnace Atomic Absorption (AA) OC Analysis

A.1.9.12.1 Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed by GFAA?

[✓] _ _

ACTION: If no, reject the data on Form I's for which duplicate injections were not performed.

A.1.9.12.2 Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or Coefficient of Variation (CV) for concentration greater than CROL?

[✓] _ _

Was a dilution analyzed for sample with post digestion spike recovery less than 40%?

[] _ _ ✓

ACTION: If no for any of the above, flag all the associated data as estimated (J).

A.1.9.12.3 Is *post digestion spike recovery less than 10% or greater than 150% for any result?

_ [✓] _

ACTION: If yes, reject (red-line) the affected data if recovery is <10%; reject data not flagged with "U" if spike recovery is >150%.

NOTE: Reject the data only if the affected sample was not subsequently analyzed by Method of Standard Addition.

* Post digestion spike is not required on the pre-digestion spiked sample when predigestion spike recovery is within control limits of 75-125% or when SR>4xSA.

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	YES	NO	N/A
A.1.9.13 <u>Form VIII (Method of Standard Addition Results)</u>			
A.1.9.13.1 Present?	☒	☐	☐
If no, is any Form I result coded with "S" or a "+"?	☐	☐	☒
ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.9.13.2 Is coefficient of correlation for MSA less than 0.990 for any sample?	☒	☐	☐
ACTION: If yes, reject (red-line) affected data.			
A.1.9.13.3 Was *MSA required for any sample but not performed?	☐	☒	☐
Is coefficient of correlation for MSA less than 0.995?	☐	☐	☒
Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	☐	☐	☒
ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.9.13.4 Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	☒	☐	☐
ACTION: If no, note exception under contract problem/non-compliance of data assessment narrative, or prepare a separate list.			
A.1.9.14 <u>Dissolved/Total or Inorganic/Total Analytes -</u>			
A.1.9.14.1 Were any analyses performed for dissolved as well as total analytes on the same sample(s).	☐	☒	☐
Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	☐	☒	☐

* MSA is not required on LCS and prep. blank.

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	YES	NO	N/A
NOTE: 1. If yes, prepare a list comparing differences between all dissolved (or inorganic) and total analytes. Compute the differences as a percent of the total analyte only when dissolved concentration is greater than CRDL as well as total concentration.			
2. Apply the following questions only if inorganic (or dissolved) results are (i) above CRDL, and (ii) greater than total constituents.			
3. At least one preparation blank, ICS, and LCS should be analyzed in each analytical run.			
A.1.9.14.2 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%?	—	[]	✓
A.1.9.14.3 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?	—	[]	✓
ACTION: If more than 10%, flag both dissolved (or inorganic) and total values as estimated (J); if more than 50%, reject (red-line) the data for both values.			
A.1.9.15 <u>Form I to IX</u>			
A.1.9.15.1 Are all the Form I through Form IX labeled with:			
Laboratory name?	[✓]	—	—
Case/SAS number?	[✓]	—	—
EPA sample No.?	[✓]	—	—
SDG No.?	[✓]	—	—
Contract No.?	[✓]	—	—
Correct units?	[✓]	—	—
Matrix?	[✓]	—	—
ACTION: If no for any of the above, note under contract problem/non-compliance section of the "Data Assessment Narrative".			

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YES NO NE

A.1.9.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:

(NOTE: Check all forms against raw data.)

(a) all analytes analyzed by ICP?	—	[☒]	—
(b) all analytes analyzed by GFAA?	—	[☒]	—
(c) all analytes analyzed by AA Flame?	—	[☐]	☒
(d) Mercury?	—	[☒]	—
(e) Cyanide?	—	[☒]	—

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

A.1.9.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than CRDL, 2 x IDL when IDL > CRDL.

Do concentrations of field blank(s) fall below CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?

[☐] -- ☒

If no, was field blank value already rejected due to other QC criteria?

[☐] -- ☒

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value.

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YES NO N/A

A.1.9.17 Form X, XI, XII (Verification of Instrumental Parameters).

A.1.9.17.1 Is verification report present for:

Instrument Detection Limits (quarterly)?	☒	--	--
ICP Interelement Correction Factors (annually)?	☒	--	--
ICP Linear Ranges (quarterly)?	☒	--	--

ACTION: If no, contact DFO of the lab.

A.1.9.17.2 Form X (Instrument Detection Limits) - (Note: IDL is not required for Cyanide.)

Are IDLs present for:	all the analytes?	☒	--	--
	all the instruments used?	☒	--	--
For both AA and ICP when both are used for same analyte?		☐	-	☒

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

Is IDL greater than CRDL for any analyte? ☐ ☒ ☐

If yes, is the concentration on Form I of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL? ☐ -- ☒

ACTION: If no, flag as estimated all values less than five times IDL of the instrument whose IDL exceeds CRDL.

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YES NO NA

A.1.9.17.3 Form XI (Linear Ranges)

Was any sample result higher than high linear range
of ICP.

— [✓] —

Was any sample result higher than the highest
calibration standard for non-ICP parameters?

— [✓] —

If yes for any of the above, was the
sample diluted to obtain the result on Form I?

[] — ✓

ACTION: If no, flag the result reported on Form I
as estimated(J).

A.1.9.18 Percent Solids of Sediments

Is soil content in sediment(s) less than 50%?

— [] ✓

ACTION: If yes, qualify as estimated all data
not previously rejected or flagged due
to other QC criteria.

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

Lab Name: CEIMICContract: 9000731Rodriguez (PD)Lab Code: CEIMICCase No.: 9007

SAS No.: _____

SDG No.: DedeMatrix (soil/water): WATERLevel (low/med): Low‡ Solids for Sample: 0.0‡ Solids for Duplicate: 0.0Concentration Units (ug/L or mg/kg dry weight): ug/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		58.00	B	431.00		(152.6)		
Antimony		52.00	U	59.00	B			
Arsenic		3.00	U	3.00	U			
Barium		8.00	B	3.00	U			
Beryllium		3.00	B	3.00	B			
Cadmium		3.00	U	3.00	U			
Calcium		40000.00		47400.00		16.9		
Chromium		14.00		40.00		(96.3)		
Cobalt		34.00	B	39.00	B			
Copper		22.00	B	29.00		29.5		
Iron		50.00	B	45.00	B			
Lead		2.00	B	12.10		(143.3)		
Magnesium		38700.00		41400.00		6.7		
Manganese		122.00		129.00		5.6		
Mercury		0.20	U	0.20	U			
Nickel		22.00	B	39.00	B			
Potassium		1610.00	B	1720.00	B			
Selenium		1.00	U	1.00	U			
Silver		7.00	U	7.00	U			
Sodium		281000.00		298000.00		5.9		
Thallium		15.00	U	15.00	U			
Vanadium		19.00	B	8.00	B			
Zinc		17.00	B	16.00	B			
Cyanide		21.00		5.00	U			

FORM VI - IN

7/88

TUT 002 1939

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Case #	<u>900731</u>	Site	<u>Tutu Well Site</u>	Matrix:	Soil	<u> </u>
SDG#	<u>Dede</u>	Lab	<u>Ceimic</u>		Water	<u>X</u>
Contractor	<u>Geraghty & Miller</u>	Reviewer	<u>Donna Lesch</u>		Other	<u> </u>

A.2.1 The case description and exceptions, if any, are noted below with reason(s) for rejection or qualification as estimated values(s) J.

This data package includes the analysis of the samples for SDG Dede. These
samples originated from St. Thomas on the 24, 25, 26 and 27 of September, 1990.

There are seventeen low level water samples for metals analysis including one
duplicate and one matrix spike QC sample.

Cyanide concentration values for samples Devcon I, Devcon III, Rodriguez (P),
Rodriguez (PD), and VIHA III are flagged "J" because the pH of the samples was
less than 12.

Thallium concentration values for all samples are flagged "R" because the matrix
spike recovery is less than 30% (10.5%). Aluminum, Lead and Selenium
concentration values are flagged as estimated ("J") because the spike
recoveries are between 30–74% (Al 70.6%, Pb 72.0%, Se 54.0%).

The post digestion spike recoveries are low for Selenium and Thallium in all
samples. These concentration values are already qualified due to poor
recovery in the matrix spike.

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A.2.1 (continuation)

For sample Smith, the Selenium concentration value is qualified with "R" because the coefficient of correlation for the Method of Standard Additions is less than 0.990. This qualifier supercedes all others.

The sample Steele was used for the sample duplicate analysis. The % Difference is out for QC limits for Aluminum, Chromium, and Lead, therefore all sample data are qualified with "J" for all positive values and "UJ" for all non-detects.

The % Difference for Aluminum, Chromium, and Lead are also out of QC limits in the field duplicate; the sample concentration values are already qualified for these analytes.

One CRDL standard has several metals with recoveries out of control limits (80-120 % recovery). The CRI run on 10/11 has the following deficiencies:

<u>Metal</u>	<u>% Recovery</u>
Antimony	49.2
Beryllium	130.0
Cobalt	121.0
Silver	60.0
Zinc	135.0

All samples are associated with the above deficiencies. All Antimony concentration values are rejected because the recovery is less than 50%.

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Positive hits for Cobalt, Beryllium and Zinc are qualified with a "J". Silver
concentration values are qualified "J" for positive hits and "UJ" for non-detects.

In the ICP serial dilution analysis, the initial concentration of Aluminum is
greater than 10 times the IDL and the % Difference is out of QC limits. As a
result, all Aluminum concentration values are qualified with "J".

A.2.2 Contract Problems/Non Compliance:

There were 2-hours and six minutes between independent check samples for the
ICAP run on October 11, 1990. This is six minutes greater than the two hour
required maximum.

Devcon I, Devcon III, Rodriguez (P), Rodriguez (PD), and VIHA III were not
correctly preserved for Cyanide.

MMB Reviewer: _____ Date: _____
Signature

Contractor Reviewer: Donna M. Lesch Date: 01/07/91
Signature

Verified by: (see next page for verification signature) Date: _____

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A.2.2 Contract-Problems/Non-Compliance

MMB Reviewer: _____ Date: _____

Signature

Contractor Reviewer: Donna M. Lesch Date: 01/07/91

Signature

Verified by: James E. Speyer Date: 1/14/91

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-01	731-02	731-03	731-04	731-05 9/24	731-06
file Organic Compounds (VOCs)	Devcon I	Devcon III	Rodriguez (P)	Rodriguez (PD)	Trip Blank	Dede
Chloromethane	2 UJ	2 U	2 UJ	2 UJ	2 U	2 U
Bromomethane	2 U	2 U	2 U	2 UJ	2 U	2 U
Vinyl Chloride	2 U	2 U	2 U	2 UJ	2 U	2 U
Chloroethane	2 UJ	2 U	2 UJ	2 UJ	2 U	2 U
Methylene Chloride	1 UJ	8 UJ	1 UJ	2 UJ	25 J	2 UJ
Acetone	R	R	R	R	12 J	R
Carbon Disulfide	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,2-Dichloroethene (total)	1 U	1 UJ	1 U	1 UJ	1 UJ	1 UJ
Chloroform	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,2-Dichloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
2-Butanone	R	R	R	R	R	R
1,1,1-Trichloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Vinyl Acetate	2 UJ	R	2 UJ	2 UJ	R	R
Bromodichloromethane	1 U	1 U	1 U	1 UJ	1 U	1 U
1,2-Dichloropropane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
cis-1,3-Dichloropropene	1 UJ	1 U	1 UJ	1 UJ	1 U	1 U
Trichloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Dibromochloromethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1,2-Trichloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,2,3-Trichloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
trans-1,3-Dichloropropene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Bromoform	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
4-Methyl-2-Pentanone	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
2-Hexanone	R	R	R	R	R	R
Tetrachloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1,2,2-Tetrachloroethane	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Toluene	1 UJ	1 U	1 UJ	1 UJ	1 U	1 U
Chlorobenzene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Ethylbenzene	1 U	1 U	1 U	1 UJ	1 U	1 U
Styrene	1 U	1 UJ	1 U	1 UJ	1 UJ	1 UJ
Total Xylenes	1 U	1 U	1 U	1 UJ	8	1 U
Tentatively Identified VOCs						
Ethane, 1,1,2-Trichloro-1,2, 2-trifluoro					5 JN	
Unknown		2 JN	1 JN			
Propane-2-Methoxy-2-Methyl						
Dichlorobenzene isomer						

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

TUT 002 1944

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-07	731-08	731-09	731-10 9/25	731-11	731-12
Stable Organic Compounds (VOCs)	Dench	Smith	Steele	Trip Blank	Hartman II	Hartman III
Chloromethane	1 J	25 U	17 UJ	2 U	2 UJ	2 UJ
Bromomethane	2 UJ	25 U	17 UJ	2 U	2 U	2 UJ
Vinyl Chloride	2 UJ	25 U	17 UJ	2 U	2 U	2 UJ
Chloroethane	2 UJ	25 U	17 UJ	2 U	2 UJ	2 UJ
Methylene Chloride	1 UJ	12 UJ	140 UJ	34 J	1 UJ	3 UJ
Acetone	R	25 UJ	R	42 J	R	R
Carbon Disulfide	1 UJ	12 UJ	8 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene	1 UJ	12 UJ	8 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
1,2-Dichloroethene (total)	1 UJ	58	120	1 UJ	5 J	2
Chloroform	1 UJ	12 U	8 UJ	1 UJ	1 UJ	1 UJ
1,2-Dichloroethane	1 UJ	12 UJ	8 UJ	1 UJ	1 UJ	1 UJ
2-Butanone	R	25 UJ	R	R	R	R
1,1,1-Trichloroethane	1 UJ	12 U	8 UJ	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
Vinyl Acetate	R	25 UJ	17 UJ	R	2 UJ	2 UJ
Bromodichloromethane	1 UJ	12 U	8 U	1 U	1 U	1 U
1,2-Dichloropropane	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
cis-1,3-Dichloropropene	1 UJ	12 U	8 UJ	1 U	1 UJ	1 UJ
Trichloroethene	1 UJ	20	48	1 UJ	1 J	1 U
Dibromochloromethane	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
1,2,2-Trichloroethane	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
1,1,1,2-Tetrachloroethane	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
trans-1,3-Dichloropropene	1 UJ	R	8 UJ	1 UJ	1 UJ	1 UJ
Bromoform	1 UJ	12 UJ	8 UJ	1 UJ	1 UJ	1 UJ
4-Methyl-2-Pentanone	2 UJ	25 UJ	17 UJ	2 UJ	2 UJ	2 UJ
2-Hexanone	R	25 UJ	R	R	R	R
Tetrachloroethene	1 UJ	330 J	130 J	1 UJ	7 J	1 J
1,1,1,2,2-Pentachloroethane	1 UJ	12 UJ	8 UJ	1 UJ	1 UJ	1 UJ
Toluene	1 UJ	12 U	8 U	1 J	1 UJ	1 U
Chlorobenzene	1 UJ	12 U	8 U	1 UJ	1 UJ	1 U
Ethylbenzene	1 UJ	12 U	8 U	1 U	1 U	1 U
Styrene	1 UJ	12 U	8 UJ	1 UJ	1 U	1 UJ
Total Xylenes	1 UJ	12 U	8 UJ	7	1 U	1 UJ
Tentatively Identified VOCs						
Ethane, 1,1,2-Trichloro-1,2, 2-trifluoro				3 JN		
Unknown	6 JN			7 JN	3 JN	4 JN
Propane, 2-Methoxy-2-methyl		88 JN	42 JN			
Dichlorobenzene isomer				1 JN		

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

JN - Compound is a tentatively identified compound.

TUT 002 1945

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-13	731-14	731-15	731-16	731-17	731-18 9/26
Volatile Organic Compounds (VOCs)	Four Winds II	Tutu (Four Winds II Replicate)	Harvey	Leonard	VIHA III	Trip Blank
Chloromethane	5 UJ	5 UJ	100 U	2 UJ	2 UJ	2 UJ
Bromomethane	5 UJ	5 UJ	100 U	2 UJ	2 UJ	2 UJ
Vinyl Chloride	5 UJ	5 UJ	100 UJ	2 UJ	2 UJ	2 UJ
Chloroethane	5 UJ	5 UJ	100 U	2 UJ	2 UJ	2 UJ
Methylene Chloride	14 UJ	10 UJ	150 UJ	2 UJ	2 UJ	24J
Acetone	R	R	R	R	R	4 J
Carbon Disulfide	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
1,2-Dichloroethene (total)	75 J	61 J	50 UJ	1 UJ	1 U	1 U
Chloroform	2 UJ	2 UJ	50 U	1 UJ	3 J	1 UJ
1,2-Dichloroethane	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
2-Butanone	R	R	R	R	R	R
1,1,1-Trichloroethane	2 UJ	2 UJ	50 U	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
Vinyl Acetate	5 UJ	5 UJ	100 UJ	2 UJ	2 UJ	2 UJ
Bromodichloromethane	2 UJ	2 UJ	50 UJ	1 UJ	1 U	1 U
1,2-Dichloropropane	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
cis-1,3-Dichloropropene	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
1,1,2-Trichloroethene	6 J	4 J	50 U	1 UJ	1 U	1 U
Dibromochloromethane	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
1,1,2-Trichloroethane	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
Benzene	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
trans-1,3-Dichloropropene	2 UJ	2 UJ	50 U	1 UJ	1 UJ	1 UJ
Bromoform	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
4-Methyl-2-Pentanone	5 UJ	5 UJ	100 UJ	2 UJ	2 UJ	1 UJ
2-Hexanone	R	R	R	R	R	R
Tetrachloroethene	25 J	18 J	890 J	1 UJ	1 UJ	1 UJ
1,1,2,2-Tetrachloroethane	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
Toluene	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
Chlorobenzene	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
Ethylbenzene	2 UJ	2 UJ	50 U	1 UJ	1 U	1 U
Styrene	2 UJ	2 UJ	50 U	1 UJ	1 UJ	1 UJ
Total Xylenes	2 UJ	2 UJ	50 UJ	1 UJ	1 UJ	1 UJ
<u>Tentatively Identified VOCs</u>						
Ethane, 1,1,2-Trichloro-1,2,2-trifluoro						7 JN
Unknown	15 JN				1 JN	
Propane, 2-Methoxy-2-methyl		7.5 JN				

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

JN - Compound is a tentatively identified compound.

TUT 002 1946

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-19	731-20
Volatile Organic Compounds (VOCs)	Eglin II	Eglin III
Chloromethane	10 UJ	10 UJ
Bromomethane	10 UJ	10 UJ
Vinyl Chloride	10 UJ	10 UJ
Chloroethane	10 UJ	10 UJ
Methylene Chloride	5 UJ	10 UJ
Acetone	R	22 J
Carbon Disulfide	5 UJ	5 UJ
1,1-Dichloroethene	5 UJ	5 UJ
1,1-Dichloroethane	5 UJ	5 U
1,2-Dichloroethene (total)	120 J	52 J
Chloroform	5 UJ	5 U
1,2-Dichloroethane	5 UJ	5 UJ
2-Butanone	R	R
1,1,1-Trichloroethane	5 UJ	5 U
Carbon Tetrachloride	5 UJ	5 U
Vinyl Acetate	10 UJ	10 UJ
Bromodichloromethane	5 UJ	5 UJ
1,2-Dichloropropane	5 UJ	5 UJ
cis-1,3-Dichloropropene	5 UJ	5 UJ
Trichloroethene	22 J	14
Dibromochloromethane	5 UJ	5 UJ
1,1,2-Trichloroethane	5 UJ	5 UJ
Benzene	5 UJ	5 UJ
trans-1,3-Dichloropropene	5 UJ	5 UJ
Bromoform	5 UJ	5 UJ
4-Methyl-2-Pentanone	10 UJ	10 UJ
2-Hexanone	R	R
Tetrachloroethene	71 J	44 J
1,1,2,2-Tetrachloroethane	5 UJ	5 UJ
Toluene	5 UJ	5 UJ
Chlorobenzene	5 UJ	5 UJ
Ethylbenzene	5 UJ	5 UJ
Styrene	5 UJ	5 UJ
Total Xylenes	5 UJ	5 UJ
<u>Tentatively Identified VOCs</u>		
Ethane, 1,1,2-Trichloro-1,2,2-trifluoro		
Unknown	220 JN	5 JN
Propane, 2-Methoxy-2-methyl		

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

TUT 002 1947

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-01	731-02	731-03	731-04	731-06	731-07
Semivolatile Organic Compounds (SVOCs)	Devcon I	Devcon III	Rodriguez (P)	Rodriguez (PD)	Dede	Dench
Phenol	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
1-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	50 U	50 U	50 U	50 U	50 U	50 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1948

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-01	731-02	731-03	731-04	731-06	731-07
Semivolatile Organic Compounds (SVOCs)	Devcon I	Devcon III	Rodriguez (P)	Rodriguez (PD)	Dede	Dench
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U	10 U

Tentatively Identified SVOCs

No tentatively identified compounds found.

concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1949

Table 2. Tutu Residential Wells Sampling Results, September 1990. Sample Delivery Group 900731

Sample Identification:	731-08	731-09	731-11	731-12	731-13
Semivolatile Organic Compounds (SVOCs)	Smith	Steele	Hartman II	Hartman III	Four Winds II
Phenol	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U
1-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 UJ	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 UJ	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	50 U	50 U	50 U	50 U	50 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

TUT 002 1950

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-08	731-09	731-11	731-12	731-13
Semivolatile Organic Compounds (SVOCs)	Smith	Steele	Hartman II	Hartman III	Four Winds II
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)Phthalate	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U

Tentatively Identified SVOCs

No tentatively identified compounds found.

All concentrations are reported in micrograms per liter (ug/L).

— / value is estimated.

U - Compound is not detected.

TUT 002 1951

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-14	731-15	731-16	731-17	731-19	731-20
Semivolatile Organic Compounds (SVOCs)	Tutu (Four Winds II Replicate)	Harvey	Leonard	VIHA III	Eglin II	Eglin III
Phenol	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	50 U	50 U	50 U	50 U	50 U	50 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1952

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-14	731-15	731-16	731-17	731-19	731-20
Semivolatile Organic Compounds (SVOCs)	Tutu (Four Winds II Replicate)	Harvey	Leonard	VIHA III	Eglin II	Eglin III
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U	10 U

Tentatively Identified SVOCs

tentatively identified compounds found.

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1993

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-01	731-02	731-03	731-04	731-06	731-07
Pesticide/PCBs	Devcon I	Devcon III	Rodriguez (P)	Rodriguez (PD)	Dede	Dench
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1954

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-08	731-09	731-11	731-12	731-13
Pesticide/PCBs	Smith	Steele	Hartman II	Hartman III	Four Winds II
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 1955

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-14	731-15	731-16	731-17	731-19	731-20
Pesticide/PCBs	Tutu (Four Winds II Replicate)	Harvey	Leonard	VIHA III	Eglin II	Eglin III
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-01	731-02	731-03	731-04	731-06	731-07	731-08	731-09
Inorganic Analyses	Devcon I	Devcon III	Rodriguez (P)	Rodriguez (PD)	Dede	Dench	Smith	Steele
Aluminum	139 BJ	411 J	58 BJ	431 J	136 BJ	278 J	234 J	492 J
Antimony	R	R	R	R	R	R	R	R
Arsenic	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Barium	21 B	15 B	8 B	3 U	8 B	19 B	15 B	27 B
Beryllium	5 BJ	4 BJ	3 BJ	3 BJ	3 BJ	4 BJ	3 BJ	3 BJ
Cadmium	3 U	3 U	3 U	3 U	5	3 B	3 U	4 B
Calcium	41600	43800	40000	47400	23500	24200	50200	44000
Chromium	4 UJ	4 UJ	14 J	40 J	16 J	22 J	14 J	9 BJ
Cobalt	18 U	59 J	34 BJ	39 BJ	60 J	44 BJ	18 U	55 J
Copper	4 U	53	22 B	29	32	52	13 B	21 B
Iron	34 B	40 B	50 B	45 B	43 B	163	158	26 B
Lead	8.2 J	11.8 J	2 BJ	12.1 J	3.7 J	7.8 J	10.9 J	13.2 J
Magnesium	39500	41000	38700	41400	25600	25000	45500	40500
Manganese	241	91	122	129	201	545	41	23
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	13 B	41	22 B	39 B	11 U	73	57	45
Potassium	2970 B	2050 B	1610 B	1730 B	2000 B	1690 B	1540 B	1180 B
Selenium	1.6 BJ	1.4 BJ	1 UJ	1 UJ	1 UJ	1 UJ	R	1.4 BJ
Silver	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ
Sodium	330000	384000	281000	298000	324000	328000	410000	313000
Thallium	R	R	R	R	R	R	R	R
Vanadium	32 B	20 B	19 B	8 B	21 B	28 B	5 U	27 B
Zinc	6 BJ	6 BJ	17 BJ	16 BJ	12 BJ	41 J	179 J	12 BJ
Cyanide	5 UJ	5 UJ	21 J	5 UJ	5 U	6.8 B	5 U	6.3 B

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Analyte is not detected.

R - Value is rejected.

B - Value is between instrument detection limit and contract required detection limit.

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Page 2 of 3

Sample Identification:	731-11	731-12	731-13	731-14	731-15	731-16	731-17
Inorganic Analyses	Hartman 2	Hartman 3	Four Winds II	Tutu (Four Winds II Replicate)	Harvey	Leonard	VIHA III
Aluminum	269 J	278 J	162 BJ	304 J	1280 J	93 BJ	182 BJ
Antimony	R	R	R	R	R	R	R
Arsenic	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Barium	12 B	15 B	15 B	11 B	35 B	11 B	14 B
Beryllium	3 BJ	4 BJ	3 BJ	4 BJ	3 BJ	3 BJ	3 BJ
Cadmium	8	3 U	5	6	3 U	3 U	3 U
Calcium	38100	41100	46100	54300	53700	38300	43300
Chromium	11 J	11 J	32 J	14 J	18 J	15 J	5 BJ
Cobalt	30 BJ	25 BJ	29 BJ	43 BJ	38 BJ	37 BJ	18 U
Copper	34	30	37	5 B	59	31	29
Iron	23 B	31 B	55 B	57 B	3360	37 BJ	149
Lead	10.4 J	1.8 BJ	8 J	8.7 J	32.6 J	1.8 BJ	3.7 J
Magnesium	33400	28300	34000	38800	46200	24400	28000
Manganese	2 U	3 B	28	31	191	2 U	11 B
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	95	52	36 B	44	58	11 U	43
Potassium	1040 B	1690 B	2190 B	2060 B	2000 B	1210 B	1030 B
Selenium	1.6 BJ	1 UJ	1.2 BJ	1 UJ	1.2 BJ	1.4 BJ	1.5 BJ
Silver	7 UJ	7 UJ	7 UJ	7 UJ	11 J	17 J	7 UJ
Sodium	285000	217000	215000	249000	233000	318000	162000
Thallium	R	R	R	R	R	R	R
Vanadium	52	124	75	83	59	135	33 B
Zinc	9 BJ	13 BJ	85 J	88 J	248 J	7 BJ	17 BJ
Cyanide	5 U	5 U	8.5 B	5 U	7.4 B	6.3 B	8 BJ

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Analyte is not detected.

R - Value is rejected.

B - Value is between instrument detection limit and contract required detection limit.

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GERAGHTY & MILLER, INC.

Table 2. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900731

Sample Identification:	731-19	731-20
Inorganic Analyses	Eglin II	Eglin III
Aluminum	69 BJ	156 BJ
Antimony	R	R
Arsenic	3 U	3 U
Barium	23 B	57 B
Beryllium	3 BJ	4 BJ
Cadmium	11	3 U
Calcium	47900	81400
Chromium	17 J	10 J
Cobalt	32 BJ	30 BJ
Copper	36	9 B
Iron	86 B	56 B
Lead	2.1 BJ	1 UJ
Magnesium	35400	54600
Manganese	8 B	53
Mercury	0.2 U	0.2 U
Nickel	67	24 B
Potassium	1620 B	2250' B
Selenium	1.2 BJ	1.2 BJ
Silver	7 UJ	18 J
Sodium	247000	398000
Thallium	R	R
Vanadium	47 B	9 B
Zinc	75 J	49 J
Cyanide	6.8 B	7.4 B

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Analyte is not detected.

R - Value is rejected.

B - Value is between instrument detection limit and contract required detection limit.

6961 200 JUL

DATA VALIDATION SUMMARY REPORT

for the

TUTU WELLS SITE

September 1990 Quarterly Sampling

USEPA REGION II

**Standard Operating Procedures HW-2 and HW-6
for the**

Contract Laboratory Program

Organic and Inorganic

Data Review

Sample Delivery Group 900770 (VIHA I)

January 1991

Prepared for

Tutu Environmental Investigation Committee

**Geraghty & Miller, Inc.
International Group
290 Vincent Avenue
Hackensack, New Jersey 07601**

TUT 002 1960

GERAGHTY & MILLER, INC.

SOP NO. HW-6
Revision #7

CLP ORGANICS DATA REVIEW
AND PRELIMINARY REVIEW

BY: Leon Lazarus Date: 3-22-90
Leon Lazarus, Environmental Scientist
Toxic and Hazardous Waste Section

CONCURRED BY: Louis Bevilacqua Date: 3/23/90
Louis Bevilacqua, Chief
Toxic and Hazardous Waste Section

APPROVED BY: Gerard F. McKenna Date: 3-26-90
Gerard F. McKenna, Chief
Monitoring Management Branch

TUT 002 1981

INTRODUCTION TO DATA VALIDATION

.0 Scope

- 1.1 This procedure is applicable to organic data obtained from contractor laboratories working for the Contract Laboratory Program (CLP).
- 1.2 The data validation is based upon analytical and quality assurance requirements specified in the Statement of Work (SOW).

.0 Responsibilities

Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

- 2.1 Data Assessment - The reviewer must answer every question on the checklist. All response shall be in ink.
 - 2.2 Data Assessment Narrative (Attachment 1) - Data reviewer is required to use these forms and must match the action in the narrative with the action taken on the Form I(s).
 - 2.3 Rejection Summary Form (Attachment 2) - Fill in the total number of analytes measured by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in the boxes where analyses were not performed or criteria do not apply.
 - 2.4 Organic Regional Data Assessment - Data reviewer is also required to fill out Organic Regional Data Assessment Form (Attachment 3).
 - 2.5 Telephone Record Log - The data reviewer should enter the bare facts of inquiry before initiating any authorized telephone conversation with a CLP laboratory. After the case review has been completed, mail the white copy of the Telephone Record Log to the laboratory and the pink copy to SMD. File the yellow copy in the Telephone Record Log folder and attach a photocopy of the Telephone Record Log to the completed Data Assessment Narrative.
 - 2.6 Forwarded Paperwork - Upon completion of the review, the following are to be forwarded to the Regional Sample Control Center (RSOC) located in the Surveillance and Monitoring Branch:
 - a. data package
 - b. completed assessment checklist
 - c. SMD Contract Compliance Screening (CCS)
- Forward four (4) copies of the completed Data Assessment Narrative along with four (4) copies of the Organic Data Assessment Form: one each for the appropriate Regional DPO, the Sample Management Office (SMD), and to the last two addresses of the Data Reviewers Mailing List.
- 2.7 Filed Paperwork - Upon completion of the review, the following are to be filed within the Monitoring and Management Branch (MMB) files:
 - a. Telephone record Log (copy)
 - b. Record of Communication (original)
 - c. Rejection Summary Form

TUT 002 1962

- 4.0 Rejection of Data - All values determined to be unacceptable on the Organic Analysis Data Sheet (Form I) must be flagged with an "R". As soon as review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.
- ..0 Acceptance Criteria - In order that the reviews be consistent among reviewers, this Standard Operating Procedure (SOP) should be used. Additional guidance can be found in the Functional Guidelines.
- ..0 SMD Contract Compliance Screening (CCS) - This is intended to aid the reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from the laboratory in response to CCS must be used by the reviewer.

TUT 002 1963

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: # 900 770LAB: CEIMIL CORPSITE: TUTU WELLS, ST. THOMAS.0 Data Completeness and Deliverables

YES NO N/A

1.1 Have any missing deliverables been received and added to the data package.

☒ ☐ ☐

ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.

1.2 Was SMD OCS checklist included with package?

☐ ☐ ☒.0 Cover Letter/Case Narrative

2.1 Is the Narrative or Cover Letter present?

☒ ☐ ☐

2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?

☒ ☐ ☐.0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticide/PCBs.

Does this package contain:

VOA data?

☒ ☐

BNA data?

☒ ☐

Pesticide/PCB data?

☒ ☐

ACTION: Complete corresponding parts of checklist.

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PART A: VOA ANALYSES

YES

NO

N/A

.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?

☒☐☐

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

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ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

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

.0 Holding Times

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

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If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended. -

Table of Holding Time Violations

Sample	Sample Matrix	Preserved ?	(See Traffic Report)		Date Analyzed
			Date Sampled	Date Lab Received	
Trip Blank 900770-05	Aqueous	Not indicated	10/01/90	10/02/90	10/13/90
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("LJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A
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If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒	—	—
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b. Med Water

☐	—	☒
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c. Low Soil

☐	—	☒
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d. Med Soil

☐	—	☒
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3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒	—	—
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b. Med Water

☐	—	☒
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c. Low Soil

☐	—	☒
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d. Med Soil

☐	—	☒
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ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒	—	—
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ACTION: Circle all outliers in red.

3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?

☒	☐	—
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If yes, were samples reanalyzed?

☐	☒	—
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Were method blanks reanalyzed?

☐	☒	—
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ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("U").

If any surrogate has a recovery of <10% :

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as unusable ("R").

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?

YES NO N/A

— ☒ —

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒ — —

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

- a. Low Water
- b. Med Water
- c. Low Soil
- d. Med Soil

☒ — —
☐ — — ☒
☐ — — ☒
☐ — — ☒

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water

Soils

0 out of 10

N/A out of 10

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

2 out of 5

N/A out of 5

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?



NO

N/A

5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?



NO

N/A

5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?



NO

N/A

ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").

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

Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?



NO

N/A

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

6.0 Contamination

NOTE: "Water 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 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.



NO

N/A

6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?



NO

N/A

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

NOTE: Only field/rinse blanks taken the same day as the samples are 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. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Methylene chloride	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
Acetone			
Toluene			
2-butanone			
	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

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).

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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.

6.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration 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 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? ☒ ☐ ☐

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

				YES	NO	N/A
DATE	TIME	INSTRUMENT	SAMPLE NUMBERS			

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

- 7.4 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 tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

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

— ☒ —

- 7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)

☒ — —

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

- 7.7 Are the spectra of the mass calibration compound acceptable?

☒ — —

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

3.0 Target Compound List (TCL) Analytes

- 8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:

- a. Samples and/or fractions as appropriate
b. Matrix spikes and matrix spike duplicates
c. Blanks

☒ — —
☒ — —
☒ — —

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	YES	NO	N/A
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. Matrix spikes and matrix spike duplicates (Mass spectra not required)	☒	—	—
c. Blanks	☒	—	—
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	☐	☒	—
8.4 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.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	☒	—	—
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	☒	—	—
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	☒	—	—
8.8 Do sample and standard relative ion intensities agree 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, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?

☒ YES ☐ NO ☐ N/A

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

☒ YES ☐ NO ☐ N/A

b. Blanks

☒ YES ☐ NO ☐ N/A

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?

☐ YES ☒ NO ☐ N/A

ACTION: Flag with "R" any TCL compound listed as a TIC.

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?

☒ YES ☐ NO ☐ N/A

9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?

☒ YES ☐ NO ☐ N/A

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

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 standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

☐ YES ☒ NO ☐ N/A

10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

☒ YES ☐ NO ☐ N/A

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YES NO N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CROLs are used (unless a QC exceedance dictates the use of the higher CROL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?



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ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction?



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—

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)?



—

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average RRF < 0.05?



—

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

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- 12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)

YES NO N/A

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

- 13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?

☒ — —

- 13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

☒ — —

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

- 13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

☒ ☐ —

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

- 13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

☒ ☐ —

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE			YES	NO	N/A
25-50	50-90	>90			
'J' positive results, no action for non detects	'J' positive results, 'U' non detects	'J' positive results, "R" non detects			

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.)

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

☒ — —

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

☒ — —

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

15.0 Field Duplicates

YES	NO	N/A
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15.1 Were any field duplicates submitted for VOA analysis?

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART B: BVA ANALYSES

YES

NO

N/A

..0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?

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ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

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ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

.0 Holding Times

2.1 Have any BVA holding times, determined from date of collection to date of extraction, been exceeded?

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Samples for BVA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

		(See Traffic Report)			
Sample	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
Tillet(-)RE	Aqueous	10/02/90	10/03/90	11/07/90	11/08/90 [*]
Tillet(D)RE	Aqueous	10/02/90	10/03/90	11/09/90	11/09/90
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

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	YES	NO	N/A
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If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒	—	—
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b. Med Water

☐	—	☒
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c. Low Soil

☐	—	☒
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d. Med Soil

☐	—	☒
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3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒	—	—
-------------------------------------	---	---

b. Med Water

☐	—	☒
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c. Low Soil

☐	—	☒
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d. Med Soil

☐	—	☒
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ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒	—	—
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ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?

☒	☐	—
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If yes, were samples reanalyzed?

☒	—	—
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Were method blanks reanalyzed?

☐	—	☒
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ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("U").

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YES NO N/A

If any base-neutral or acid surrogate has a recovery of <10% :

1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J".
2. Flag all non-detects for that fraction "R".

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?

— ☒ —

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒ — —

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water

☒ — —

b. Med Water

☐ — ☒

c. Low Soil

☐ — ☒

d. Med Soil

☐ — ☒

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BVA spike recoveries are outside QC limits?

Water

Soils

0 out of 22

N/A out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

0 out of 11

N/A out of 11

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

YES NO N/A

☒ ☐ ☐

5.2 Frequency of Analysis: for the analysis of BNA
TCL compounds, has a reagent/method blank been
analyzed for each set of samples or every 20 samples
of similar matrix (low water, med water, low soil,
medium soil), whichever is more frequent?

☒ ☐ ☐

5.3 Has a BNA instrument blank been analyzed for each GS/MS system used.

☒ ☐ ☐

ACTION: If any method blank data are missing, call lab
for explanation/resubmittal. If not available,
reject all associated positive data ("R").

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

Is the chromatographic performance (baseline stability)
for each instrument acceptable for VOAs?

☒ ☐ ☐

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

6.0 Contamination

NOTE: "Water 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 Do any method/instrument/reagent blanks have positive
results (TCL and/or TIC) for BNAs? When applied as
described below, the contaminant concentration in
these blanks are multiplied by the sample Dilution
Factor.

☐ ☒ ☐

6.2 Do any field/rinse blanks have positive BNA results
(TCL and/or TIC)?

☐ ☐ ☒

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

NOTE: Only field/rinse blanks taken the same day
as the samples are used to qualify data. Blanks
may not be qualified because of contamination
in another blank. Blanks may be qualified for
surrogate, spectral, tuning 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.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & > 10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

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).

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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 Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? ☒ ☐ ☐

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☒ ☐ ☐

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? ☒ ☐ ☐

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

	YES	NO	N/A
DATE			
TIME			
INSTRUMENT			
SAMPLE NUMBERS			

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

- 7.4 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 tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

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

☐ ☒ ☐

- 7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)

☒ ☐ ☐

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

- 7.7 Are the spectra 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

- 8.1 Are the Organic Analysis Data Sheets (Form I BIA) present with required header information on each page, for each of the following:

TUT 002 1982

- a. Samples and/or fractions as appropriate
b. Matrix spikes and matrix spike duplicates
c. Blanks

☒ ☐ ☐
☒ ☐ ☐
☒ ☐ ☐

	YES	NO	N/A
8.2 Are the BNA 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. Matrix spikes and matrix spike duplicates (Mass spectra not required)	☒	—	—
c. Blanks	☒	—	—
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	☐	☒	—
8.4 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.			
8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample?	☐	—	☒
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	☐	—	☒
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	☐	—	☒
8.8 Do sample and standard relative ion intensities agree 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, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do Listed TICs include scan number or retention time, estimated concentration and "J" qualifier?

YES ☒ NO ☐ N/A ☐

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

YES ☒ NO ☐ N/A ☐

b. Blanks

YES ☐ NO ☐ N/A ☒

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?

YES ☐ NO ☒ N/A ☐

ACTION: Flag with "R" any TCL compound listed as a TIC.

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?

YES ☒ NO ☐ N/A ☐

9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?

YES ☒ NO ☐ N/A ☐

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

10.0 Compound Quantitation and Reported Detection Limits

TUT 002 1984

10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

YES ☐ NO ☒ N/A ☐

10.2 Are the CROIs adjusted to reflect sample dilutions and, for soils, sample moisture?

YES ☐ NO ☐ N/A ☒

YES NO N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CROLs are used (unless a QC exceedance dictates the use of the higher CROL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?



—

—

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

2.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BVA fraction?



—

—

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BVAs over the concentration range of the calibration (RSD <30%)?



—

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05?

—



—

ACTION: Circle all outliers in red.

ACTION: If any BVA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

- 12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)

YES NO N/A

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

- 13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BVA fraction?

☒ — —

- 13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

☒ — —

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

- 13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

— ☒ —

ACTION: Circle all outliers in red.

ACTION: If any BVA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

- 13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

☒ ☐ —

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE			YES	NO	N/A
25-50	50-90	>90			
'J' positive results, no action for non detects	'J' positive results, 'U' non detects	'J' positive results, "R" non detects			

- 13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.)

— ☒ —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

- 14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

☒ — —

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

- 14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

☒ — —

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
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15.0 Field Duplicates

15.1 Were any field duplicates submitted for BVA analysis?



—

—

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART C: PESTICIDE/PCB ANALYSES

YES NO N/A

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples?

☒ ☐ ☐

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

☐ ☒ ☐

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

2.0 Holding Times

2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?

☐ ☒ ☐

Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

3.0 Surrogate Recovery (Form II)

3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water

☒ ☐ ☐

b. Med Water

☐ ☐ ☒

c. Low Soil

☐ ☐ ☒

d. Med Soil

☐ ☐ ☒

3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water

☒ ☐ ☐

b. Med Water

☐ ☐ ☒

c. Low Soil

☐ ☐ ☒

d. Med Soil

☐ ☐ ☒

	YES	NO	N/A
--	-----	----	-----

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☒	☐	☐
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ACTION: Circle all outliers in red.

3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).

3.5 Are there any transcription/calculation errors between raw data and Form II?

☐	☒	☐
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ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

b. Med Water

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

c. Low Soil

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

d. Med Soil

☐	☐	☒
--------------------------	--------------------------	-------------------------------------

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water

Soils

0 out of 12

N/A out of 12

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

YES NO N/A

Water

Soils

1 out of 6

N/A out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?



—

—

5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?



—

—

5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?



—

—

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

5.0 Contamination

NOTE: "Water 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 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.

—



—

6.2 Do any field/rinse blanks have positive PEST/PCB results?

—



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

YES NO N/A

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning 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.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, 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 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A	☒	—	—
b. Evaluation Standard Mix B	☒	—	—
c. Evaluation Standard Mix C	☒	—	—
d. Individual Standard Mix A	☒	—	—
e. Individual Standard Mix B	☒	—	—
f. Multi-component Pesticides Toxaphene & Chlordane	☒	—	—
g. Aroclors 1016/1260	☒	—	—
h. Aroclors 1221, 1232, 1242, 1248, and 1254	☒	—	—

ACTION: If no, take action specified in 3.2 above.

- 7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?

YES	NO	N/A
☒	☐	☐

ACTION: If no, take action specified in 3.2 above.

- 7.3 Are there any transcription/calculation errors between raw data and Form VIII?

YES	NO	N/A
☐	☒	☐

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

- 7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?

YES	NO	N/A
☐	☒	☐
☐	☒	☐

- for Endrin?

or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?

YES	NO	N/A
☐	☐	☒

ACTION:

- a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

- b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

- c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	☒	☐	☐

ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.

7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	☒	☐	☐
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ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.

7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	☒	☐	☐
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ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

3.0 Pesticide/PCB Standards Summary

8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	☒	☐	☐
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ACTION: If no, take action specified in 3.2 above.

8.2 Are there any transcription/calculation errors between raw data and Form IX?	☐	☒	☐
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ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	☒	☐	☐
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ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".

8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	☒	☐	☐
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	YES	NO	N/A
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ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".

8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?

☒	—	—
-------------------------------------	---	---

ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.

9.0 Pesticide/PCB Identification

9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?

☐	—	☒
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ACTION: If no, take action specified in 3.2 above.

9.2 Are there any transcription errors between raw data and Form X?

—	☐	☒
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ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?

☐	—	☒
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Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?

☐	—	☒
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ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).

9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?

—	☒	—
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ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis flag the appropriate data with an "R".

0.0 Compound Quantitation and Reported Detection Limits

YES NO N/A

- 10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Were any errors found?

— ☐ ☒

NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.

- 10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

— ☐ ☒

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

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

1.0 Chromatogram Quality

- 11.1 Were baselines stable?

☒ — —

- 11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?

— ☒ —

- 11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?

☒ — —

ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.

YES

NO

N/A

12.0 Field Duplicates

12.1 Were any field duplicates submitted for PEST/PCB analysis?

☒

—

—

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

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

SDG # 900770 VIHA I
Tutu Wells Site

Contaminated Volatile Method Blanks and Their Associated Samples

Method Blank

Associated Samples

VBLK01

Matthias

VBLK02

Tillet, Hartman I (Gassett), Tillet(D), Trip
Blank 10/03, Trip Blank 9/27, VIHA I

VBLK03

Trip Blank 10/01, H₂O Blk Tutu, Trip
Blank 10/02, Dimitri, Dimitri MS

VBLK04

Ramsey, Dimitri MSD, LaPlace, Bryan,
Eglin I

SDG # 900770 VIHA I
Tutu Wells Site

Contaminated Trip Blanks and Their Associated Samples

Trip Blank

Associated Samples

Trip Blank 10/01
(770-05)

Bryan, Dimitri, Dimitri MS, Dimitri MSD,
Matthias, Ramsey

Trip Blank 10/02
(770-11)

Eglin I, LaPlace, Tillet, Tillet(D)

Trip Blank 10/03
(770-13)

Hartman I (Gassett)

Trip Blank 9/27
(770-15)

VIHA I

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case No. 900770 SDG No. VIHA I LABORATORY Cemic SITE Tutu Well Site

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's
Signature: Donna M. Besch Date: 01/07/1991

Verified By: Lane E. Spayser Date: 1/14/1991

DATA ASSESSMENT:

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.

All samples were analyzed within the holding time for volatile organic compounds except the trip blank dated 10/01/90. The chain of custody does not indicate whether or not this sample was preserved, therefore it is assumed that it wasn't. The trip blank 10/01 was analyzed 5 days over the 7 day aromatic volatile holding time; all aromatic volatile compound concentration values (hits and non-detects) are qualified with "J".

All samples were analyzed within the holding time for semivolatile organic compounds except Tillet (RE) and Tillet(D)-RE (RE - re-extracted and reanalyzed). These samples are re-extractions which exceeded the 7 day holding time by 29 days and 31 days, respectively. All compound concentration values (hits and non-detects) are rejected for Tillet (RE) and Tillet(D)-RE. Note: The -RE suffix is used in this report to make a distinction between the first (original) extraction and second (re-extraction) extraction. All first extraction data are labelled "original" and the re-extraction data have the suffix -RE.

The pesticides and PCBs were analyzed within holding times for all samples.

DATA ASSESSMENT:

2. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, trip, field, rinse, and water 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 blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common laboratory contaminants), the analytes are qualified as non-detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination

Volatile Organic Compounds

Method blank VBLK01 is reported to contain methylene chloride at a concentration of 5 micrograms per liter (ug/L) and a tentatively identified compound (TIC) with a retention time (RT) of 3.83 minutes at a concentration of 7 ug/L. The sample Matthias is associated with this method blank and contains 9 ug/L of methylene chloride and 5 ug/L of the same TIC. The methylene chloride concentration value is qualified with "U" because it is less than 10 times the common contaminant concentration in the method blank. The TIC concentration value is qualified as a non-detect because it is less than 5 times the contamination in the method blank and therefore it is not reported.

Method blank VBLK02 is reported to contain methylene chloride at a concentration of 5 ug/L, acetone at a concentration of 2 ug/L, and a TIC with a RT of 3.78 at a concentration of 5 ug/L. The sample Tillet, which had a dilution factor of 5, is associated with this method blank and has a methylene chloride concentration of 40 ug/L and the same TIC at a concentration of 42 ug/L. The methylene chloride concentration value is qualified with "U" and the TIC concentration value is not reported for the same reasons stated above. The samples Tillet(D) and VIHA I are also associated with this method blank and have methylene chloride and acetone concentrations at or above the contract required quantitation limits (CRQLs) as well as the same TIC contamination. The methylene chloride and acetone concentration values

DATA ASSESSMENT:

are qualified with "U" and the TIC concentration values are not reported for reasons stated above.

Method blank VBLK03 is reported to contain methylene chloride at a concentration of 2 ug/L and a TIC with a RT of 3.93 at a concentration of 6 ug/L. The sample Dimitri and the H₂O Blk Tutu are associated with this method blank and have methylene chloride concentrations above the CRQL and the same TIC contamination. The methylene chloride concentration values are qualified with "U" and the TIC values are not reported for reasons stated above.

Method blank VBLK04 is reported to contain methylene chloride at a concentration of 2 ug/L and a TIC with a RT of 3.97 at a concentration of 5 ug/L. The samples Bryan, Eglin I, Ramsey, and LaPlace are associated with this method blank and have methylene chloride concentrations at or above the CRQL and the same TIC contamination. The methylene chloride concentration values are qualified with "U" and the TIC concentration values are not reported for reasons stated above.

Semivolatile Organic Compounds

No contaminants are detected in the method blank.

Pesticides/PCBs

No contaminants are detected in the method blank.

- B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample).

All samples were taken directly from a drinking water tap into a collection bottle, therefore no field blanks were necessary.

- C) Trip blank contamination

Only volatile organic compounds were analyzed for in trip blanks.

DATA ASSESSMENT:

Trip blank 9/27 is reported to contain methylene chloride at a concentration of 16 ug/L. Sample VIHA I is associated with this trip blank and contains 3 ug/L of methylene chloride. This value is already qualified due to method blank contamination.

Trip blank 10/01 is reported to contain methylene chloride at a concentration of 13 ug/L, acetone at a concentration of 6 ug/L, and a TIC with a RT of 3.95 at a concentration of 4 ug/L. The samples Bryan, Dimitri, Matthias, and Ramsey are associated with this trip blank. The methylene chloride and same TIC concentration values for these samples have already been qualified due to method blank contamination. Acetone is not detected in any of the associated samples.

Trip blank 10/02 is reported to contain methylene chloride at a concentration of 14 ug/L, acetone at a concentration 7 ug/L, and a TIC with a RT of 3.95 at a concentration of 3 ug/L. The samples Eglin I and LaPlace are associated with this trip blank. The methylene chloride and same TIC concentration values for these samples have already been qualified due to method blank contamination. These samples also have acetone concentrations above the CRQL. These values are qualified with "U" because they are less than 10 times the common contaminant concentration in the trip blank.

DATA ASSESSMENT:

3. 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 bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl-phosphine (DFTPP).

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

All mass calibrations are acceptable for both the volatile and semivolatile analyses.

DATA ASSESSMENT:

4. 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:

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 (a ratio of areas) in both the initial and continuing calibrations. A value < 0.05 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").

Volatile Organic Compounds

The initial calibration performed on 9/28/90 has response factors < 0.05 for acetone, 2-butanone, and 2-hexanone. All samples are associated with this calibration and are qualified as stated above.

The continuing calibration performed on 10/08 has response factors < 0.05 for 2-butanone and 2-hexanone. The continuing calibrations performed on 10/09, 10/13, and 10/14 have response factors < 0.05 for acetone, 2-butanone, and 2-hexanone. These compounds are already qualified in the associated samples as a result of deficient initial calibration response factors.

Semivolatile Organic Compounds

All response factors are greater than or equal to 0.05 in both the initial and continuing calibrations.

DATA ASSESSMENT:

5. CALIBRATION:

A) 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 <30% and %D must be <25%. 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 %D or RSD > 50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column.

Volatile Organic Compounds

The initial calibration performed on 9/28/90 has a %RSD greater than 30% for methylene chloride (66.948%) and acetone (71.280%). All samples are associated with this initial calibration. The methylene chloride concentration values will be qualified as stated above. The acetone concentration values are already qualified as a result of deficient response factors.

The continuing calibration performed on 10/08 has a %D greater than 25% for 2-butanone (82.37%) and acetone (93.97%). The sample Matthias is associated with this calibration. These compounds are already qualified as a result of deficient response factors.

The continuing calibration performed on 10/09 has a %D greater than 25% for the following compounds:

DATA ASSESSMENT:

<u>Compound</u>	<u>%D</u>
Chloromethane	28.83
Bromomethane	27.18
Methylene Chloride	33.67
2-Butanone	75.79
Vinyl Acetate	46.25
4-Methyl-2-Pentanone	38.55

The samples Tillet, Tillet(D), Hartman I, Trip Blank 10/03, VIHA I, and Trip Blank 9/27 are associated with this calibration. The concentration values of the above compounds are qualified with "J" for positive hits. No action is taken for non-detects, except for 2-butanone, which are already qualified as a result of deficient response factors.

The continuing calibration performed on 10/13 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Bromomethane	39.46
1,1-Dichloroethane	28.41
trans-1,2,-Dichloroethene	30.42
Chloroform	40.08
1,2-Dichloroethane	48.71
1,1,1-Trichloroethane	37.61
Carbon Tetrachloride	34.44
Bromodichloromethane	40.12
1,2-Dichloropropane	31.95
trans-1,3-Dichloropropene	108.79
Trichloroethene	26.37
Dibromochloromethane	40.43
1,1,2-Trichloroethane	34.86
Benzene	33.19
Bromoform	27.06
4-Methyl-2-Pentanone	31.53
Chlorobenzene	27.12

DATA ASSESSMENT:

The samples Dimitri, Trip Blank 10/01, H₂O Blk Tutu and Trip Blank 10/02 are associated with this calibration. The concentration values of the above compounds are qualified with "J" for positive hits in the affected samples. No action is taken for non-detects, except for trans-1,3-dichloropropene, which will be qualified with "R" because the %D is greater than 90%.

The continuing calibration performed on 10/14 has a %D greater than 25% for the following compounds:

<u>Compound</u>	<u>%D</u>
Acetone	36.79
1,1,1-Trichloroethane	29.70
Vinyl Acetate	26.53
trans-1,3-Dichloropropene	38.95
cis-1,3-Dichloropropene	29.80

The samples Bryan, Ramsey, Eglin I, and La Place are associated with this calibration. The concentration values of the above compounds are qualified with "J" for positive hits. No action is taken for non-detects, except for acetone, which is already qualified as a result of deficient response factors.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected in any of the samples. Therefore, the CRQLs will be qualified with "UJ" only when calibrations have %RSDs or %Ds greater than 50%.

The continuing calibration performed on 10/27 has a %D greater than 50% for hexachlorocyclopentadiene (66.0%). Samples La Place, Tillet (original), and Tillet(D) (original) are associated with this calibration. The non-detect values will be qualified with "UJ".

The continuing calibration performed on 11/08 has a %D greater than 50% for benzoic acid (55.0%), 2,4-dinitrophenol (65.0%), and 2,4,6-tribromophenol (-55.0%). Sample Tillet(RE) is associated with this calibration. All semivolatile concentration values are already flagged with "R" due to holding time exceedence.

DATA ASSESSMENT:

Pesticides/PCBs

The %RSD for aldrin, endrin, DDT, and dibutylchlorendate did not exceed 10%. The %D was within 15% on the quantitation column and within 20% on the confirmation column.

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds 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.

Volatile Organic Compounds

As specified in Method 524.2, only two surrogate compounds were used, bromofluorobenzene (BFB) and trans-1,2-dichlorobenzene-d4 (t-DCB). The recovery of BFB is outside the quality control (QC) limits (86-115%) in the following sample analyses:

<u>Sample</u>	<u>%BFB Recovered</u>
Dimitri	82
H2O BLK Tutu	76
Trip Blank 10/03	82
Trip Blank 10/01	70
Trip Blank 10/02	74
VIHA I	82
DimitriMS	80
VBLK01	118
VBLK03	78

These samples were not re-analyzed. For each affected sample, the concentration values for compounds are qualified "J" for positive hits, and "UJ" for all non-detects. No QC limits are established for the recovery of t-DCB; however, when the BFB recovery is within QC limits, the t-DCB recovery is in the range of 80% to 120%.

Semivolatile Organic Compounds

The laboratory narrative states that in the original analyses of sample Tillet and Tillet(D) the recovery of the surrogates phenol-d5 (PHL) and 2-fluorophenol (2FP) were low, which lead to a re-extraction and re-analysis of

DATA ASSESSMENT:

both samples. After the re-extraction, the Tillet (RE) surrogate recoveries were all within QC limits and the laboratory reported only this set of results. This re-extraction was performed out of holding time, therefore those results are qualified with "R" and are not reported. The original Tillet results were requested from the laboratory. The recoveries for PHL and 2FP were 8% and 11%, respectively, in the original Tillet analysis. Both PHL and 2FP are surrogates for the acid fraction, therefore only the acid fraction concentration values are qualified with "R" in the original Tillet sample as a result of one surrogate having less than a 10% recovery.

After re-extraction, the Tillet (D)RE recoveries of the surrogates PHL and 2FP remained out of QC limits. The lab reported both sets of Tillet(D) results. The following are the recoveries for both Tillet(D) (original) and Tillet(D) RE analyses:

<u>Sample</u>	<u>%PHL</u>	<u>%2FP</u>
Tillet(D) - original	7	9
Tillet(D)RE	9	15

Only the acid fraction will be qualified "R" in each sample as a result of at least one acid fraction surrogate having less than a 10% recovery.

Pesticides/PCBs

The Dibutylchlorandate (DBC) recovery was high for sample VIHA I (191%, QC limits 24-154%). No pesticides or PCBs were found in this sample, therefore no qualifiers are necessary.

DATA ASSESSMENT:

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (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 +100%) 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 +100%) 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 judgement to determine either partial or total rejection of the data for that sample fraction.

All internal standard area counts and retention times are within QC limits for VOC analyses.

The internal standard area count for Phenanthrene-d10 is extremely low for sample Tillet (original). All associated sample data quantitated using this internal standard are rejected. Sample Tillet (original) is reported to contain 20 ug/L of Di-n-Butylphthalate. This concentration was quantitated using the Phenanthrene-d10 internal standard area count. In the reviewer's professional judgement, this value is rejected because the quantitation is greatly altered by the low internal standard area count. If the area count were within QC limits, the reported value would be dramatically lower and would most likely be a non-detect. The internal standard area counts are within QC limits for the remaining volatile compound analyses.

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

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 negative proofs.

Volatile organic compounds are properly identified on the GC/MS and all TICs accurately match their ion spectra.

No semivolatile target compounds were found in any sample. TICs accurately match their ion spectra.

B) PESTICIDE/PCB FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 nanograms per milliliter (ng/ml) in the final sample extract.

No pesticides or PCBs were found in any sample.

DATA ASSESSMENT:

9. 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 some additional qualification of the data.

All MS/MSD % recoveries are within QC limits for volatile, semivolatile organic compounds and pesticides/PCBs.

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION:

A) Sample Receipt

The chains of custody indicate that the lab received several vials which contained bubbles. As a result, all volatile organic data is assumed to be biased low and additional qualifiers are necessary. Bubbles were found in both vials for samples Tillet(D), LaPlace, and Eglin I. All positive hits for these samples are qualified with "J" and all non-detects are qualified with "R". These qualifiers supercede all others. Bubbles were found in only one vial for sample Tillet, but the lab was not able to distinguish which vial was used for the volatile organic analysis. Therefore, we must assume the vial with bubbles was used and additional qualifiers are necessary. All positive hits are qualified with "J" and all non detects are qualified with "R".

B) Method Detection Limit Study

Method 524.2 state that a method detection limit (MDL) study must be performed prior to sample analyses.

The MDL study consists of seven repeat analyses of target compounds at concentrations of 1 ppb. The QC limits for mean accuracy (% recovery) and %RSD are 80-120% and 20%, respectively. The MDL study must be repeated if these standards are not met. The MDL study associated with SDG VIHAI results were performed in April 1990 and has the following deficiencies (*):

<u>Compound</u>	<u>Mean Accuracy, %</u>	<u>% RSD</u>
1,1-Dichloroethene	72*	7.2
Methylene Chloride	148*	12.0
1,2-Dichloroethane	121*	7.9
Tetrachloroethene	76*	9.5
Bromoform	88	28.0 *
1,1,2,2-Tetrachloroethane	122*	7.3

DATA ASSESSMENT:

In addition, the following compounds were not included in the MDL study: acetone, carbon disulfide, 2-butanone, vinyl acetate, 4-methyl-2-pentanone and 2-hexanone. The above compounds are flagged "J" for all samples, except where compounds are qualified "R" for other deficiencies.

C) Laboratory Fortified Blanks

QC requirements established in Method 524.2 and the Sampling, Analysis, and Monitoring Plan (Appendix A) state that laboratory fortified blanks (LFBs) must be analyzed immediately following each continuing calibration and the accuracy must be between 80% to 120% recovery. The provided data indicate that the recoveries were out of QC limits for volatile compounds in each LFB. The LFBs were not always analyzed immediately after the calibrations. The affected samples and compounds are qualified "J" to reflect these deficiencies.

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT:

The compounds of primary importance in this project are the volatile organics. SDG VIHA I has several volatile QC criteria out of specification.

The MDL study had % recoveries out of QC limits as well as compounds which were not included in the study at all. The FLBs also had several compounds out of QC Limits and in two instances was not run immediately after the continuing calibrations. All target compounds were present in the FLBs. These MDL and FLB deficiencies indicate that the laboratory instrumentation has difficulties recovering certain compounds at low concentrations (1 ppb). As a result, the data is assumed to be biased low and the affected compounds are qualified with "J" in the associated samples.

The volatile surrogate recoveries are out of QC limits in several samples as well as two (out of four) method blanks. For the affected samples, the identification of the compounds is acceptable, but for positive hits and non-detects the quantitation must be considered as estimated only. The concentration values and quantitation limits for the six affected samples have been qualified as such.

The volatile calibrations are deficient for compounds which were either common lab contaminants or compounds not detected in any sample. The majority of the data is not seriously affected by these deficiencies.

During the process of validation, the compound quantitation performed by the reviewer did not agree with the quantitation performed by the lab. The lab was notified and the laboratory personnel determined that the incorrect response factors were used to quantitate the compound concentrations for sample Matthias. The lab corrected the problem and sent a revised Form I(s) and quantitation report. These revisions are included with the data package.

The bubbles in the vials have an impact on the quality of the volatile organic data for the affected samples. In samples Eglin I, LaPlace, Tillet, and Tillet(D), all non-detects in the affected samples are rejected "R" and all positive hits are qualified with "J".

DATA ASSESSMENT:

Overall, the volatile organic data is consistent although QC problems exist as discussed above.

The semivolatile acid fraction surrogate recoveries for the samples Tillet and Tillet(D) were originally out of QC limits. Both samples were re-extracted and re-analyzed. Although the re-analysis presented some surrogate recoveries within QC limits, the re-extractions far exceeded the holding time, making the re-analysis data unusable (qualified "R"). The original Tillet sample results were received from the laboratory, and are reported in the table with the acid fraction concentration values rejected. In addition, several compounds are rejected because the associated internal standard area count was out of QC limits. The original Tillet(D) results are acceptable except for the acid fraction concentration values, which are rejected. All other semivolatile data is acceptable.

The pesticide/PCB data is acceptable. The surrogate recovery was high for one sample, but no pesticides or PCBs were found, therefore it has no effect on the data.

DATA ASSESSMENT:

12. CONTRACT PROBLEMS:

The MDL study failed to include six target compounds. Several results were out of QC limits established in Method 524.2 and the Sampling, Analysis, and Monitoring Plan.

The laboratory fortified blanks were not analyzed immediately after the calibrations and many % recoveries are not within QC limits.

The volatile organic analyses have several samples and two blanks with the surrogate BFB out of QC limits. The lab has failed to perform satisfactorily because there is no evidence of reanalysis for any sample or blank.

13. This package contains sample re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following form I(s) are identified to be used.

The Form I(s) for the original analyses of samples Tillet and Tillet(D) are to be used because they were performed within the holding time.

TUT 002 2020

SCP NO. HW-2

Evaluation of Metals Data for the Contract Laboratory Program (CLP)

based on

SOW. 7/88

REV. 2/89

(SCP Revision X)

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DATE: 2-16-90

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STANDARD OPERATING PROCEDURE

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Title: Evaluation of Inorganic Data for the
Contract Laboratory Program

Date: Feb. 1990
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1.0 Scope

1.1 This procedure is applicable to inorganic data obtained from contractor laboratories working for Hazardous Waste Site Contract Laboratory Program (CLP).

1.2 The data validation is based upon analytical and quality assurance requirements specified in Statement of Work (SOW) 7/88.

2.0 Responsibilities - Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1. For a total review:

2.1.1 Data Assessment - "Total Review-Inorganics" Checklist Appendix (A.1).
The reviewer must answer every question on the checklist.

2.1.2 Data Assessment - Data Assessment Narrative (Appendix A.2)
The answer on the checklist must match the action in the narrative (appendix A.2) and on Form I's. Do not use pencil to write the narrative.

2.1.3 Contract Non-Compliance - SMO Report (Appendix A.3)
This report is to be completed only when a serious contract violation is encountered, or upon the request of the Data Review Manager or Deputy Project Officer (DPO). Forward 5 copies: one each for internal files, appropriate Regional DPO, Sample Management Office (SMO) and last two addresses of Mailing List for Data Reviewers (Appendix A.4). In other cases, all contract violations should be appended to end of Data Assessment Narrative (Sec. A.2.2).

2.1.4 Data Summary Sheet - Summary of Inorganic Quality Control Data (Appendix A.5).
Enter in ink on Data Summary Sheet required QC values from Forms I through IX. Circle all values that require data qualification "Action".

2.1.5 CLP Data Assessment Summary Forms

2.1.5.1 Appendix A.6
Fill in the total number of analytes analyzed by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in boxes where analyses were not performed, or criteria do not apply.

2.1.5.2 Appendix A.7
Data reviewer is also required to fill out Inorganic Regional Data Assessment form (Appendix A.7) provided by EPA Headquarters. Codes listed on the form will be used to describe the Data Assessment Summary.

Title: Evaluation of Inorganic Data for the
Contract Laboratory Program

Date: Feb. 1990
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- 2.1.6 Data Review Log: It is recommended that each data reviewer should maintain a log of reviews completed to include:
- a. date of start of case review
 - b. date of completion of case review
 - c. site
 - d. case number
 - e. contract laboratory
 - f. number of samples
 - g. matrix
 - h. hours worked
 - i. reviewer's initials
- 2.1.7 Telephone Record Log - the data reviewer should enter the bare facts of inquiry, before initiating any phone conversation with CLP laboratory. After the case review has been completed, mail white copy of Telephone Record Log to the laboratory and pink copy to SMD. File yellow copy in the Telephone Record Log folder, and attach a xerox copy of the Telephone Record Log to the completed Data Assessment Narrative (Appendix A.2).
- 2.1.8 Forwarded Paperwork
- 2.1.8.1 Upon completion of review, the following are to be forwarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:
- a. data package
 - b. completed data assessment checklist (Appendix A.1, original)
 - c. SMD Contract Compliance Screening (CCS)
 - d. Data Summary Sheet (Appendix A.5) along with completed Data Assessment Narrative (Appendix A.2)
 - e. Record of Communication (copy)
 - f. CLP Reanalysis Request/Approval Record (original + 3 copies)
 - g. Appendix A.7 (original).
- 2.1.8.2 Forward 4 copies of completed Data Assessment Narrative (Appendix A.2) along with 2 copies of the Inorganic Data Assessment Form (Appendix A.7) and Telephone Record Log, if any, one each for appropriate Regional DFO, Sample Management Office (SMD), and last two addressees of Mailing List for Data Reviewers (Appendix A.4) (the Inorganic Data Assessment form does not go to the last two addressees).

STANDARD OPERATING PROCEDURE

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- 2.1.9 Filed Paperwork - Upon completion of review, the following are to be filed within M-B files:
- Four copies of completed Data Assessment Narrative (Appendix A.2) each carrying Appendix A.7.
 - Telephone Record Log (copy)
 - S-D Report (copy Appendix A-3)
 - CLP Data Assessment Summary Form (Appendix A.6).
 - CLP Reanalysis Request/Approval Record (copy)
- 3.0 Data Completeness
Indicate incomplete data package on the computer tracking sheet located in M-B office. Authorized contractor personnel may contact the laboratory after discovery of an incomplete data package. If a laboratory will not return phone calls or does not respond to requests, notify M-B coordinator of Region II for resolution.
- 4.0 Rejection of Data - All values determined to be unacceptable on the Inorganic Analysis Data Sheet (Form I) must be lined over with a red pencil. As soon as any review criteria cause data to be rejected, that data can be eliminated from any further review or consideration.
- 5.0 Acceptance Criteria - In order that reviews be consistent among reviewers, acceptance criteria as stated in Appendix A.1 (pages 4-25) should be used. Additional guidance can be found in the National Inorganic Functional Guidelines of October 1, 1989.
- 6.0 SMD Contract Compliance Screening (CCS) - This is intended to aid reviewer in locating a problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from laboratory in response to CCS must be used by the reviewer.
- 7.0 Request for Reanalysis - Data reviewers must note all items of contract non-compliance within Data Assessment Narrative. If holding times and sample storage times have not been exceeded, DFO may request reanalysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record".
- 8.0 Record of Communication - Provided by the Regional Sample Control Center (RSCC) to indicate which data packages have been received and are ready to be reviewed.
- 9.0 Rounding off numbers - The data reviewer will follow the standard practice.

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	YES	NO	N/A
A.1.1 <u>Contract Compliance Screening Report (CCS)</u> - Present?	[]	--	✓
ACTION: If no, contact RSOC.			
A.1.2 <u>Record of Communication (from RSOC)</u> - Present?	[]	--	✓
ACTION: If no, request from RSOC.			
A.1.3 <u>Trip Report</u> - Present and complete?	[]	--	✓
ACTION: If no, contact RSOC for trip report.			
A.1.4 <u>Sample Traffic Report</u> - Present or on file?	[✓]	-	—
Legible?	[✓]	--	—
ACTION: If no, request from Regional Sample Control Center (RSOC).			
A.1.5 <u>Cover Page</u> - Present?	[✓]	--	—
Is cover page properly filled in and signed by the lab manager or the manager's designee?	[✓]	--	—
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[✓]	—	—
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[✓]	--	—
(b) Form I's?	[✓]	--	—
ACTION: If no for any of the above, contact RSOC for clarification.			

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	YES	NO	NA
A.1.6 <u>Form I (Final Data)</u> - Are all Form I's present and complete?	☒	—	—
ACTION: If no, prepare telephone record log and contact laboratory for submittal.			
Are correct units (ug/l for waters and mg/kg for soils) indicated on Form I's?	☒	—	—
Are soil sample results for each parameter corrected for percent solids?	☐	—	☒
Are EPA sample # s and corresponding laboratory sample ID # s the same as on the Cover Page, Form I's and in the raw data?	☒	—	—
Are computation/transcription errors less than 10% of reported values?	☒	—	—
Are all "less than IDL" values properly coded with "U"?	☒	—	—
Was a brief physical description of samples given on Form I's?	☒	—	—
Were the result qualifiers used correctly with final data?	☒	—	—
ACTION: If no for any of the above, prepare Telephone Record Log, and contract laboratory for corrected data.			
Were any samples diluted beyond requirements of contract?	—	☒	—
If yes, were dilutions noted on Form I's?	☐	—	☒
ACTION: If no, note under Contract-Problem/Non-Compliance of the "Data Assessment Narrative".			

A.1.7 Holding Times - (aqueous and soil samples)

(Examine sample traffic reports and digestion/distillation logs.)

Mercury analysis (29 days) exceeded?	☒	☐	—
Cyanide distillation (14 days) exceeded?	—	☒	—

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	YES	NO	NA
Other Metals analysis (6 months) exceeded?	—	☒	—
NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist. ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.			
A.1.8 Raw Data			
A.1.8.1 Digestion Log* for flame AA/ICP (Form XIII) present?	☒	—	—
Digestion Log for furnace AA Form XIII present?	☒	—	—
Distillation Log for mercury Form XIII present?	☒	—	—
Distillation Log for cyanides Form XIII present?	☒	—	—
Are pH values (pH<2 for all metals, pH>12 for cyanide) present in Digestion/Distillation Logs?	☒	—	—
*Weights, dilutions and volumes used to obtain values.			
Percent solids calculation present for soils/sediments?	☐	—	☒
Are preparation dates present on Digestion Log?	☒	—	—
A.1.8.2 Measurement read out record present?			
ICP	☒	—	—
Flame AA	☐	—	☒
Furnace AA	☒	—	—
Mercury	☒	—	—
Cyanides	☒	—	—

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	YES	NO	N/A
A.1.8.3 Are all raw data to support all sample analyses and QC operations present?	☒	--	--
Legible?	☒	--	--
Properly Labeled?	☒	--	--

ACTION: If no for any of the above, write Telephone Record Log and contact laboratory. Flag metal data as estimated if pH of sample is greater than 2. Flag cyanide data as estimated if pH sample is less than 12.

A.1.9 Data Validation and Verification

A.1.9.1 Calibration

A.1.9.1.1 Is record of at least 2 point calibration present for ICP analysis?	☒	--	--
Is record of 5 point calibration present for Hg analysis?	☒	--	--

ACTION: If no for any of the above, write in the Contract Problem/Non-Compliance section of the "Data Assessment Narrative".

A.1.9.1.2 Is record of 4 point calibration present for:			
Flame AA?	☐	--	☒
Furnace AA?	☒	--	--
Cyanides?	☒	--	--

NOTE: 1. If less than 4 standards are measured in absorbance mode, then the remaining standards in concentration mode must be run immediately after calibration and be within $\pm 10\%$ of true value.
2. For all AA (except Hg) and Cyanide analyses, one calibration standard is at CRL level. If not, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".

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YES NO NA

ACTION: Flag associated data as estimated if standards are not within $\pm 10\%$ of true values (except CRDL calibration standard). Do not flag the data as estimated in linear range indicated by good recovery of standard.

A.1.9.1.3 Is correlation coefficient less than 0.995 for:

Mercury Analysis?	—	[☒]	—
Cyanide Analysis?	—	[☒]	—
Atomic Absorption Analysis?	☒	[]	—

ACTION: If yes, flag the associated data as estimated.

A.1.9.2 Form II A (Initial and Continuing Calibration Verification)-

A.1.9.2.1 Present and complete for every metal and cyanide?	[☒]	--	—
Present and complete for AA and ICP when both are used for same analyte?	[]	--	☒

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.9.2.2 Circle all values on data summary sheet that are outside contract windows. Are all calibration standards (initial and continuing) within control limits?

Metals 90-110%	[☒]	—	—
Hg - 80-120%	[☒]	—	—
Cyanides 85-115%	[☒]	—	—

- The reviewer will calculate correlation coefficient.

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YES NO

ACTION: Flag as estimated (J) all positive data (not flagged with a "U") analyzed between a calibration standard with %R between 75-89% (65-79% for Hg; 70-84% for CN) or 111-125% (121-135% for Hg; 116-130% for CN) recovery and nearest good calibration standard. Qualify results <IDL as estimated (UJ), if the ICV or CCV %R is 75-89% (CN, 70-84%; Hg, 65-79%). Reject (red-line) as unacceptable data if recovery of the ICV or CCV is outside the range 75-125% (CN, 70-130%; Hg, 65-135%). Qualify five samples on either side of verification standard out of control limits.

Was continuing calibration performed every 10 samples or every 2 hours?

[]

✓

ACTION: If no, flag the excess samples (eleventh and up) data as estimated (J).

Was ICV for cyanides distilled?

[✓]

ACTION: If no, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".

A.1.9.3 Form II B (CRDL Standards for AA and ICP) -

A.1.9.3.1 Was a CRDL standard (CRA) analyzed after initial calibration for all AA metals (except Hg)?

[✓]

*Was a mid-range calib. verification standard distilled and analyzed for cyanide analysis?

[✓]

Was a 2xCRDL (or 2xIDL when IDL > CRDL) analyzed (CRI) for each ICP run?

[✓]

(Note: CRI for AL, Ba, Ca, Fe, Mg, Na, or K is not required.)

ACTION: If no for any of the above, flag as estimated all data falling within the affected ranges. The affected ranges are:

AA Analysis - **True Value $\pm$ CRDL

ICP Analysis - **True Value $\pm$ 2CRDL

CN Analysis - **True Value $\pm$ 0.5 x True Value.

Find the results of mid-range standard in the raw data.

**True value of CRA, CRI or mid-range standard. Substitute IDL for CRDL when IDL > CRDL.

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	YES	NO	NA
A.1.9.3.2 Was CRI analyzed after ICP/ICB and before the final CCV/CCB, and for every four hours of ICP run?	☒	☐	☐
ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.9.3.3 Circle all values on summary sheet that are outside acceptance windows.			
Are CRA and CRI standards within control limits:			
Metals 80 - 120%R?	☐	☒	☐
Is mid-range standard within control limits:			
Cyanide 80 - 120%R?	☒	☐	☐
ACTION: Flag as estimated all data within the affected ranges if the recovery of the standard is between 50-79%; flag only positive data if the recovery is between 121-150%; reject (red line) all data if the recovery is less than 50%; reject only positive data if the recovery is greater than 150%.			
A.1.9.4 <u>Form III (Initial and Continuing Calibration Blanks)</u>			
A.1.9.4.1 Present and complete?	☒	☐	☐
For both AA and ICP when both are used for same analyte?	☐	☐	☒
Was an initial calibration blank analyzed?	☒	☐	☐
Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	☐	☒	☐
ACTION: If no, prepare Telephone Record Log, contact laboratory and write in the contract-problems/non-compliance section of the Data Assessment Narrative.			

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	YES	NO	N/A
A.1.9.4.2 Circle all calibration blank values on Data Summary Sheet that are above CRDL (or 2 x IDL when IDL > CRDL). Are all calibration blanks (when IDL < CRDL) less than or equal to Contract Required Detection Limits (CRDL)?	☒	—	—
Are all calibration blanks less than two times Instrument Detection Limit (when IDL > CRDL)?	☐	—	☒
ACTION: If no for any of the above, flag as estimated (J) all positive data less than or equal to calibration blank values analyzed between calibration blank with value over CRDL (or 2xIDL) and nearest good calibration blank. Flag five samples on either side of the calibration blank.			
A.1.9.5 <u>FORM III (Preparation Blank) -</u>			
(Note: The preparation blank for mercury is the same as the calibration blank.)			
A.1.9.5.1 Was one prep. blank analyzed for: each 20 samples?	☒	—	—
each batch?	☒	—	—
each matrix type?	☐	—	☒
both AA and ICP when both are used for same analyte?	☐	—	☒
ACTION: If no for any of the above, flag as estimated (J) all associated positive data <10 x IDLs for which prep. blank was not analyzed.			
NOTE: If only one blank was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			
A.1.9.5.2 Is concentration of prep. blank greater than CRDL when IDL is less than or equal to CRDL?	—	☒	—
If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank value?	—	☐	☒

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	YES	NO	N/A
ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value found in the raw data.			
A.1.9.5.3 Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	☐	☐	☒
ACTION: If no, reject (red-line) all positive data that has a concentration less than 10 times the prep. blank value in the raw data.			
A.1.9.5.4 Is concentration of prep. blank below the negative CRDL?	☐	☒	☐
ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.9.6 <u>Form IV (ICP Interference Check Sample)</u>			
1.9.6.1 Present and complete?	☒	☐	☐
(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	☒	☐	☐
ACTION: If no, flag as estimated (J) all samples for which Al, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.6.2 Circle all values on Data Summary Sheet that are more than + 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (+ 20%)?	☒	☐	☐
If no, is concentration of Al, Ca, Fe, or Mg lower than in ICS?	☐	☐	☒
ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			

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YES NO U.S.

A.1.9.7 Form V A (Spiked Sample Recovery - Pre-Digestion/Pre-Distillation)-
(Note: Not required for Ca, Mg, K, and Na (both matrices), Al, and Fe
(soil only.)

A.1.9.7.1 Present and complete for:	each 20 samples?	☒	--	☐
	each matrix type?	☐	--	☒
	each conc. range (i.e. low, med., high)?	☐	--	☒
	For both AA and ICP when both are used for same analyte?	☐	--	☒

ACTION: If no for any of the above, flag as
estimated (J) all positive data less
than four times spiking level for
which spiked sample was not analyzed.

NOTE: If one spiked sample was analyzed for more
than 20 samples, then first 20 samples
analyzed do not have to be flagged as
estimated (J).

A.1.9.7.2 Was field blank used for spiked sample? ☐ ☒ ☐

ACTION: If yes, flag all positive data less than
4 x spike added as estimated (J) for which
field blank was used as spiked sample.

NOTE: Matrix spike analysis should be performed on a
field blank when it is the only aqueous sample in SDG.

A.1.9.7.3 Circle all values on Data Summary Sheet that are outside
control limits (75% to 125%). Are all recoveries
within control limits? ☐ ☒ ☐

If no, is sample concentration greater than or equal
to four times spike concentration? ☐ ☒ ☐

ACTION: If yes, disregard spike recoveries for analytes
whose concentrations are greater than or equal
to four times spike added. If no, circle those
analytes on Form V for which sample concentration
is less than four times the spike concentration.

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	YES	NO	U
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	☒	☐	☐
ACTION: If no, write in the Contract - Problem/Non - Compliance section of "Data Assessment Narrative".			
A.1.9.7.4 Aqueous			
Are any spike recoveries:			
(a) less than 30%?	☒	☐	☐
(b) between 30-74%?	☒	☐	☐
(c) between 126-150%?	☐	☒	☐
(d) greater than 150%?	☐	☒	☐

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

NOTE: If pre-digestion spike result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, disregard spike recovery on Form V. Flag the associated data as estimated(J).

A.1.9.7.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	☐	☒
(b) between 10-74%?	☐	☒
(c) between 126-200%?	☐	☒
(d) greater than 200%?	☐	☒

ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".

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	YES	NO	IL
1.9.8 Form VI (Lab Duplicates)			
1.9.8.1 Present and complete for:			
each 20 samples?	☒	☐	☐
each matrix type?	☐	☐	☒
each concentration range (i.e. low, med., high)?	☐	☐	☒
both AA and ICP when both are used for same analyte?	☐	☐	☒
ACTION: If no for any the above, flag as estimated (J) all data >CRDL* for which duplicate sample was not analyzed.			
Note: 1. If one duplicate sample was analyzed for more than 20 samples, then first 20 samples do not have to be flagged as estimated. 2. If percent solids for soil sample and its duplicate differ by more than 1%, prepare a Form VI for each duplicate pair, report concentrations in Hg/L on wet weight basis and calculate RPD or Difference for each analyte.			
A.1.9.8.2 Was field blank used for duplicate analysis?	☐	☒	☐
ACTION: If yes, flag all data >CRDL* as estimated (J) for which field blank was used as duplicate.			
NOTE: Duplicate analysis should be performed on a field blank when it is the only aqueous sample in SDG.			
A.1.9.8.3 Are all values within control limits (RPD 20% or difference < $\pm$ CRDL)?	☒	☐	☐
If no, are all results outside the control limits flagged with an * on Form I's and VI?	☐	☐	☒
ACTION: If no, write in the Contract - Problems/Non- Compliance section of "Data Assessment Narrative".			
NOTE: 1. RPD is not calculable for an analyte of the sample - duplicate pair when both values are less than IIL.			

* Substitute IIL for CRDL when IIL > CRDL.

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YES NO NA

2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria.

1.9.8.4 Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL? ☒

ACTION: If yes, flag the associated data as estimated (J).

A.1.9.8.5 Aqueous

Circle all values on Data Summary Sheet that are:
RPD > 50%, or
Difference > $\pm$ CRDL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL? ☒

Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL? ☒

ACTION: If yes, flag the associated data as estimated.

A.1.9.8.6 Soil/Sediment

Circle all values on Data Summary Sheet that are:
RPD > 100%, or
Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) :

> 100%? ☐

Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) :

> 2x*CRDL? ☐

* Substitute IDL for CRDL when IDL > CRDL.

** Use absolute values of sample and duplicate to calculate the difference.

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YES NO

ACTION: If yes, flag the associated data as estimated.

A.1.9.9 Field Duplicates

A.1.9.9.1 Were field duplicates analyzed? ☒

ACTION: If yes, prepare a Form VI for each aqueous field duplicate pair. Prepare a Form VI for each soil duplicate pair, if percent solids for sample and its duplicate differ by more than 1%; report concentrations of soils in ug/l on wet weight basis and calculate RPDs or Difference for each analyte.

- NOTE:**
1. Do not calculate RPD when both values are less than IDL.
 2. Flag all associated data only for field duplicate pair.

A.1.9.9.2 Is any value for sample duplicate pair less than *CROL and other value greater than or equal to 10 x *CROL? ☒

ACTION: If yes, flag the associated data as estimated.

A.1.9.9.3 Aqueous

Circle all values on Form VI for field duplicates that are:
RPD > 50%, or
Difference > $\pm$ CROL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CROL? ☒

Is any **difference between sample and duplicate greater than *CROL where sample and/or duplicate is less than 5 times *CROL? ☒

ACTION: If yes, flag the associated data as estimated.

* Substitute IDL for CROL when IDL > CROL.

** Use absolute values of sample and duplicate to calculate the difference.

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YES NO

A.1.9.9.4 Soil/Sediment

Circle all values on Form VI for field duplicates that are:
RPD >100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both
greater than 5 times *CRDL) :

>100%?

 [] ✓

Is any **difference between sample and duplicate
(where sample and/or duplicate is less than 5x *CRDL) :

>2x *CRDL?

 [] ✓

ACTION: If yes, flag the associated data as estimated.

A.1.9.10 Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg and cyanide analyses.)

A.1.9.10.1 Was one LCS prepared and analyzed for:

every 20 water samples?

[]

--

 ✓

every 20 solid samples?

[]

--

 ✓

both AA and ICP when both are used for same analyte?

[]

--

 ✓

ACTION: If no for any of the above, prepare Telephone
Record Log and contact laboratory for submittal
of results of LCS. Flag as estimated (J) all
data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20
samples, then first 20 samples close to LCS
do not have to be flagged as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

**Use absolute values of sample and duplicate to calculate the difference.

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A.1.9.10.2 Aqueous LCS

Circle all LCS values outside control limits
(80 - 120% except aqueous Ag and Sb).

Is any LCS recovery: less than 50%?

YES NO NO

between 50% and 79%?

YES NO YES

between 121% and 150%?

YES NO YES

greater than 150%?

YES NO YES

ACTION: Less than 50%, reject (red-line) all data;
between 50% and 79%, flag all associated data
as estimated (J); between 121% and 150%, flag
all positive (not flagged with a "U") results
as estimated; greater than 150%, reject all
positive results.

A.1.9.10.3 Solid LCS

- NOTE:** 1. If "Found" value of LCS is rejectable due to duplicate
injections or analytical spike recovery criteria,
regardless of LCS recovery, flag the associated data
as estimated (J).
2. If IDL of an analyte is equal to or greater than
true value of LCS, disregard the "Action" below even
though LCS is out of control limits.

Is LCS "Found" value higher than the control
limits on Form VII?

YES NO NO

ACTION: If yes, qualify all associated positive data
as estimated.

Is LCS "Found" value lower than the Control
limits on Form VII?

YES NO NO

ACTION: If yes, qualify all associated data as
estimated.

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YES NO N/A

A.1.9.11 Form IX (ICP Serial Dilution) -

NOTE: Serial dilution analysis is required only for initial concentrations equal to or greater than 10 x IDL.

A.1.9.11.1 Was Serial Dilution analysis performed for:

each 20 samples?

[☒]

--

--

each matrix type?

[☐]

--

☒

each concentration range (i.e. low, med.)?

[☐]

--

☒

ACTION: If no for any of the above, flag all positive data greater than or equal to 10xIDLs as estimated (J) for which Serial Dilution Analysis was not performed, and summarize the deficiency on the DPO report.

A.1.9.11.2 Was field blank(s) used for Serial Dilution Analysis?

--

☒

--

ACTION: If yes, flag all associated data $\geq 10 \times \text{IDL}$ as estimated (J).

NOTE: Serial dilution analysis should be performed on a field blank when it is the only aqueous sample in SDG.

A.1.9.11.3 Are results outside control limit flagged with an "E" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.

[☐]

--

☒

ACTION: If no, write in the contract-problem/non-compliance section of the "Data Assessment Narrative".

A.1.9.11.4 Circle all values on Data Summary Sheet that are outside control limit for initial concentrations equal to or greater than 10 x IDLs only. Are any % difference values:

> 10%?

☒

[☐]

--

$\geq 100\%$

--

☒

--

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Title: Evaluation of Metals Data for the
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YES	NO	N.S.
-----	----	------

ACTION: Flag as estimated (J) all associated equal to or greater than 10xIDLs for which percent difference is greater than 10% but less than 100%. Reject (red-line) all associated sample results equal to or greater than 10xIDLs for which PD is greater than or equal to 100%.

A.1.9.12 Furnace Atomic Absorption (AA) QC Analysis

- A.1.9.12.1 Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed by GFAA?

☒

ACTION: If no, reject the data on Form I's for which duplicate injections were not performed.

- A.1.9.12.2 Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or Coefficient of Variation (CV) for concentration greater than CROL?

☒

Was a dilution analyzed for sample with post digestion spike recovery less than 40%?

☐☒

ACTION: If no for any of the above, flag all the associated data as estimated (J).

- A.1.9.12.3 Is *post digestion spike recovery less than 10% or greater than 150% for any result?

☒

ACTION: If yes, reject (red-line) the affected data if recovery is <10%; reject data not flagged with "U" if spike recovery is >150%.

NOTE: Reject the data only if the affected sample was not subsequently analyzed by Method of Standard Addition.

* Post digestion spike is not required on the pre-digestion spiked sample when predigest spike recovery is within control limits of 75-125% or when SR>4xSA.

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	YES	NO	N/A
A.1.9.13 <u>Form VIII (Method of Standard Addition Results)</u>			
A.1.9.13.1 Present?	☒	☐	☐
If no, is any Form I result coded with "S" or a "+"?	☐	☐	☒
ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.9.13.2 Is coefficient of correlation for MSA less than 0.990 for any sample?	☐	☐	☒
ACTION: If yes, reject (red-line) affected data.			
A.1.9.13.3 Was *MSA required for any sample but not performed?	☐	☒	☐
Is coefficient of correlation for MSA less than 0.995?	☐	☐	☒
Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	☐	☐	☒
ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.9.13.4 Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	☐	☐	☒
ACTION: If no, note exception under contract problem/non-compliance of data assessment narrative, or prepare a separate list.			
A.1.9.14 <u>Dissolved/Total or Inorganic/Total Analytes -</u>			
A.1.9.14.1 Were any analyses performed for dissolved as well as total analytes on the same sample(s).	☐	☒	☐
Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	☐	☒	☐

* MSA is not required on LCS and prep. blank.

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	YES	NO	N/A
NOTE: 1. If yes, prepare a list comparing differences between all dissolved (or inorganic) and total analytes. Compute the differences as a percent of the total analyte only when dissolved concentration is greater than CRDL as well as total concentration.			
2. Apply the following questions only if inorganic (or dissolved) results are (i) above CRDL, and (ii) greater than total constituents.			
3. At least one preparation blank, ICS, and LCS should be analyzed in each analytical run.			
A.1.9.14.2 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%?	—	[]	✓
A.1.9.14.3 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?	—	[]	✓
ACTION: If more than 10%, flag both dissolved (or inorganic) and total values as estimated (J); if more than 50%, reject (red-line) the data for both values.			
A.1.9.15 <u>Form I to IX</u>			
A.1.9.15.1 Are all the Form I through Form IX labeled with:			
Laboratory name?	[✓]	--	—
Case/SAS number?	[✓]	--	—
EPA sample No.?	[✓]	--	—
SDG No.?	[✓]	---	—
Contract No.?	[✓]	—	—
Correct units?	[✓]	--	—
Matrix?	[✓]	--	—
ACTION: If no for any of the above, note under contract problem/non-compliance section of the "Data Assessment Narrative".			

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A.1.9.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:

(NOTE: Check all forms against raw data.)

- | | YES | NO | NA |
|--|-----|-------------------------------------|-------------------------------------|
| (a) all analytes analyzed by ICP? | — | ☒ | — |
| (b) all analytes analyzed by GFAA? | — | ☒ | — |
| (c) all analytes analyzed by AA Flame? | — | ☐ | ☒ |
| (d) Mercury? | — | ☒ | — |
| (e) Cyanide? | — | ☒ | — |

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

A.1.9.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than CRDL, 2 x IDL when IDL > CRDL.

Do concentrations of field blank(s) fall below CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?

☐	—	☒
--------------------------	---	-------------------------------------

If no, was field blank value already rejected due to other QC criteria?

☐	—	☒
--------------------------	---	-------------------------------------

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value.

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Title: Evaluation of Metals Data for the
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YES NO N/A

A.1.9.17 Form X, XI, XII (Verification of Instrumental Parameters)

A.1.9.17.1 Is verification report present for:

Instrument Detection Limits (quarterly)?

[☒] -- --

ICP Interelement Correction Factors (annually)?

[☒] -- --

ICP Linear Ranges (quarterly)?

[☒] -- --

ACTION: If no, contact DPO of the lab.

A.1.9.17.2 Form X (Instrument Detection Limits) - (Note: IDL is not required for Cyanide.)

Are IDLs present for: all the analytes?

[☒] -- --

all the instruments used?

[☒] -- --

For both AA and ICP when both are used for same analyte?

[] -- ☒

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

Is IDL greater than CRDL for any analyte?

-- [☒] --

If yes, is the concentration on Form I of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL?

[] -- ☒

ACTION: If no, flag as estimated all values less than five times IDL of the instrument whose IDL exceeds CRDL.

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YES NO NA

A.1.9.17.3 Form XI (Linear Ranges)

Was any sample result higher than high linear range
of ICP.

— [✓] —

Was any sample result higher than the highest
calibration standard for non-ICP parameters?

— [✓] —

If yes for any of the above, was the
sample diluted to obtain the result on Form I?

[] — ✓

ACTION: If no, flag the result reported on Form I
as estimated(J).

A.1.9.18 Percent Solids of Sediments

Is soil content in sediment(s) less than 50%?

— [] ✓

ACTION: If yes, qualify as estimated all data
not previously rejected or flagged due
to other QC criteria.

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

Lab Name: CEIMICContract: 9000731TILLET (D)Lab Code: CEIMICCase No.: 9000770 SAS No.: _____SDG No.: VIHA IMatrix (soil/water): WATERLevel (low/med): LOW% Solids for Sample: 0.0% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): _____

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		153.0	B	159.0	B	3.8		
Antimony		52.0	V	52.0	V			
Arsenic		3.0	V	4.4	B	200.0		
Barium		43.0	B	40.0	B	7.2		
Beryllium		4.0	B	4.0	B			
Cadmium		4.0	B	3.0	B	28.6		
Calcium		54800.0		48600.0		12.0		
Chromium		8.0	B	7.0	B	13.3		
Cobalt		18.0	V	18.0	V			
Copper		48.0		32.0		48.0		
Iron		953.0		2660.0		94.3		
Lead		1.5	B	8.5		940.0		
Magnesium		38300.0		34500.0		10.4		
Manganese		1260.0		1100.0		13.6		
Mercury		0.2	V	0.2	V			
Nickel		33.0	B	15.0	B	75.0		
Potassium		760.0	B	1190.0	B	44.1		
Selenium		10.0	V	10.0	V			
Silver		7.0	V	7.0	V			
Sodium		192000.0		167000.0		12.7		
Thallium		3.0	V	3.0	V			
Vanadium		25.0	B	50.0		66.7		
Zinc		162.0		124.0		26.6		
Cyanide		5.0	V	5.0	V			

FORM VI - IN

7/88

TUT 002 2048

STANDARD OPERATING PROCEDURE

MERCURY HOLDING TIMES EXCEEDED

SAMPLE	LAB I.D.	DATE SAMPLE COLLECTED	DATE SAMPLE ANALYZED	# DAYS EXCEEDED
VIHA I	770-14	9-27-90	11-5-90	11
LaPlace	770-07	10-2-90	10-31-90	1
Eglin I	770-06	10-2-90	10-31-90	1
Tillet	770-08	10-2-90	10-31-90	1
Tillet D	770-08	10-2-90	10-31-90	1
Dimitri	770-01	10-1-90	10-31-90	2
Bryan	770-09	10-1-90	10-31-90	2
Matthias	770-03	10-1-90	10-31-90	2
Ramsey	770-04	10-1-90	10-31-90	2

TUT 002 2049

Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.1: Data Assessment – Contract
Compliance (Total Review – Inorganics)

Date: Feb. 1990
Number: HW-2
Revision: 10

Case #	<u>900770</u>	Site	<u>Tutu Well Site</u>	Matrix:	Soil	<u> </u>
SDG#	<u>VIHA I</u>	Lab	<u>Ceimic</u>		Water	<u>X</u>
Contractor	<u>Geraghty & Miller</u>	Reviewer	<u>Donna Lesch</u>		Other	<u> </u>

A.2.1 The case description and exceptions, if any, are noted below with reason(s) for rejection or qualification as estimated values(s) J.

This data package includes the analysis of the samples for SDG VIHA I. These
samples originated from St. Thomas on the 27th of September and the 1, 2, and 3
of October 1990.

Samples VIHA I, LaPlace, Eglin I, Tillet, Tillet(D), Dimitri, Bryan, Matthias, and
Ramsey were analyzed beyond the holding time for Mercury. All non-detects
(values less than the Instrument Detection Limit) are rejected and a red line is
drawn through the data. The Mercury concentration value for LaPlace, the only
positive hit, is qualified with a "J".

The metal logbook indicates that samples Dimitri and Tillet were
preserved at a pH of 5. Samples correctly preserved for metals and Mercury analyses
should have a pH of 2 or less. All data for these two samples are qualified with
"J" (except Mercury and Cyanide). The Mercury values in the affected samples
remain qualified with "R".

TUT 002 2050

Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.1: Data Assessment - Contract
Compliance (Total Review - Inorganics)

Date: Feb. 1990
Number: HW-2
Revision: 10

A.2.1 (continuation)

The calibration correlation coefficient is less than 0.995 for the atomic absorption analysis of Arsenic (0.99219). The affected samples are Bryan, Dimitri, Matthais, and Ramsey. The Arsenic concentration values for these samples are qualified with "J".

The correlation coefficient is less than 0.995 for the atomic absorption analysis of Thallium (0.98954). The affected samples are Matthias, Ramsey, LaPlace, Tillet, Tillet(D), and H2O blk Tutu. The Thallium concentration values for these samples are qualified with "UJ".

The Selenium analysis run on 10/29/90 at 16:48 contained 11 samples between the ICV and the CCV. The allowable number is 10 samples. The eleventh sample is not included in SDG VIHA I therefore no qualifiers are necessary.

The CRDL standards are out of control limits (80-120% Recovery) for several metals and in several analyses. The CRI run on 10/17/90 has the following deficiencies:

<u>Metals</u>	<u>%R</u>
Cadmium	150
Copper	136
Nickel	121
Zinc	128

Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.1: Data Assessment - Contract
Compliance (Total Review - Inorganics)

Date: Feb. 1990
Number: HW-2
Revision: 10

A.2.1 (continuation)

The CRA run on 10/31/90 has a 45% recovery for Mercury. The samples Bryan, Dimitri, Matthias, Ramsey, Eglin I, LaPlace, Tillet, Tillet(D), H20 blk Tutu, and Hartman I are associated with the above deficiencies.

Positive hits for the listed metals are qualified "J" in the affected samples.

The mercury concentration values are qualified "R" for all affected samples because the recovery is below 50%.

The CRI run on 11/01 has the following deficiencies:

<u>Metal</u>	<u>%R</u>
Antimony	71.7
Cadmium	130.0
Silver	140.0

The CRA run on 11/05 has a 50% recovery for Mercury. VIHA I is the only sample associated with the above deficiencies. The positive hits for the listed metals are qualified "J". The Mercury value has previously been qualified "R".

The CRA run on 10/20 has a 133% recovery for Selenium. Samples Bryan, Dimitri, DimitriD, DimitriS, Matthias, and Ramsey are associated with this CRA analysis. The positive hits for Selenium are qualified with "J" for the samples.

Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.1: Data Assessment – Contract
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Date: Feb. 1990
Number: HW-2
Revision: 10

A.2.1 (continuation)

The CRA run on 10/25 has a 125% recovery for Thallium. The samples Matthias, Ramsey, Eglin I, LaPlace, Tillet, Tillet(D), and the H2O blk Tutu are associated with this deficiency. There are no positive hits, therefore no qualifiers are necessary. However, Thallium has previously been qualified "UJ" for these samples.

The Iron concentration value in the field duplicate has a RPD that is greater than 50% where sample and duplicate are both greater than 5 times the CRDL. As a result, Iron values are qualified as estimated ("J") in all samples. The Lead concentration values are less than 5 times the CRDL in both the sample and duplicate and the difference is greater than the CRDL, therefore all Lead values are qualified as estimated ("J") in all samples.

Sample Dimitri was used for the matrix spike analysis. Selenium (36%) and Thallium (25%) have % recoveries out of QC limits (75–125%). All Selenium results are qualified "UJ" for non-detects and "J" for positive hits. All Thallium results are qualified "R", which supercedes previous qualifiers.

In the ICP Serial Dilution, the initial concentration of Vanadium is greater than 10 times the IDL and the % difference is out of QC units. As a result, all Vanadium concentration values are qualified with "J".

Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.1: Data Assessment - Contract
Compliance (Total Review - Inorganics)

Date: Feb. 1990
Number: HW-2
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A.2.2 Contract Problems/Non Compliance

The holding time for Mercury analysis was exceeded for nine samples.

Samples Dimitri and Tillet were not correctly preserved.

The correlation coefficients were out of QC limits for Arsenic and Thallium
analyses.

The Selenium analysis had eleven samples between the ICV and CCV, one sample
over the QC limit.

MMB Reviewer: _____
Signature

Date: _____

Contractor Reviewer: Donna M. Lesch
Signature

Date: 01/07/91

Verified by: (see next page for verification signature) Date: _____

STANDARD OPERATING PROCEDURE

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Title: Evaluation of Metals Data for the
Contract Laboratory Program
Appendix A.2: Data Assessment Narrative

Date: Feb. 1991
Number: HW-2
Revision: 10

A.2.2 Contract-Problems/Non-Compliance

MMB Reviewer: _____

Signature

Date: _____

Contractor Reviewer: _____

Signature

Date: 01/07/91

Verified by: _____

Date: 1/14/91

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-01	770-02	770-03	770-04	770-05 10/01	770-06
Volatile Organic Compounds (VOCs)	Bryan	Dimitri	Matthias	Ramsey	Trip Blank	Eglin I
Chloromethane	2 U	2 UJ	2 UJ	4 UJ	2 UJ	R
Bromomethane	2 U	2 UJ	2 UJ	4 UJ	2 UJ	R
Vinyl Chloride	2 U	2 UJ	2 UJ	4 UJ	2 UJ	R
Chloroethane	2 U	2 UJ	2 UJ	4 UJ	2 UJ	R
Methylene Chloride	2 UJ	2 UJ	9 UJ	17 UJ	13 J	R
Acetone	R	R	R	R	6 J	R
Carbon Disulfide	1 UJ	1 UJ	1 UJ	2 UJ	1 UJ	R
1,1-Dichloroethene	1 UJ	1 UJ	1 UJ	2 UJ	1 UJ	R
1,1-Dichloroethane	1 U	1 UJ	1 U	2 UJ	1 UJ	R
1,2-Dichloroethene (total)	1 U	1 UJ	22	2 UJ	1 UJ	68 J
Chloroform	1 U	1 UJ	1 UJ	2 UJ	1 UJ	R
1,2-Dichloroethane	1 UJ	1 UJ	1 UJ	2 UJ	1 UJ	R
2-Butanone	R	R	R	R	R	R
1,1,1-Trichloroethane	1 U	1 UJ	1 UJ	2 UJ	1 UJ	R
Carbon Tetrachloride	1 U	1 UJ	1 U	2 UJ	1 UJ	R
Vinyl Acetate	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	R
Bromodichloromethane	1 U	1 UJ	1 U	2 UJ	1 UJ	R
1,2-Dichloropropane	1 U	1 UJ	1 U	2 UJ	1 UJ	R
cis-1,3-Dichloropropene	1 U	1 UJ	1 UJ	2 UJ	1 UJ	R
Trichloroethene	1 U	1 UJ	11	2 UJ	1 UJ	10 J
Dibromochloromethane	1 U	1 UJ	1 U	2 UJ	1 UJ	R
1,1,2-Trichloroethane	1 U	1 UJ	1 U	2 UJ	1 UJ	R
Benzene	1 U	1 UJ	1 U	2 UJ	1 UJ	R
trans-1,3-Dichloropropene	1 U	R	1 UJ	2 UJ	R	R
Bromoform	1 U	1 UJ	1 U	2 UJ	1 UJ	R
4-Methyl-2-Pentanone	2 UJ	2 UJ	2 UJ	4 UJ	2 UJ	R
2-Hexanone	R	R	R	R	R	R
Tetrachloroethene	1 UJ	1 UJ	120 J	3 J	1 UJ	32 J
1,1,2,2-Tetrachloroethane	1 UJ	1 UJ	1 UJ	2 UJ	1 UJ	R
Toluene	1 U	1 UJ	1 U	2 UJ	1 UJ	R
Chlorobenzene	1 U	1 UJ	1 U	2 UJ	1 UJ	R
Ethylbenzene	1 U	1 UJ	1 U	2 UJ	1 UJ	R
Styrene	1 U	1 UJ	1 UJ	2 UJ	1 UJ	R
Total Xylenes	1 U	1 UJ	1 UJ	2 UJ	1 UJ	R
Tentatively Identified VOCs						
Ethane, 1,1,2-Trichloro-1,2,2 trifluoro						
Unknown			16 JN	2 JN	1 JN	3 JN
Propane, 2-Methoxy-2-methyl						6 JN
C5H12 isomer						
Aliphatic hydrocarbon						
C3-Benzene isomer						
C6H12 isomer						
C9H12 isomer						

All concentrations are reported in micrograms per liter (ug/L).

Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

TUT 002 2056

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-07	770-08	770-09	770-10	770-11	770-12
				H2O	10/02	Gassett
Volatile Organic Compounds (VOCs)	LaPlace	Tillet	Tillet-D (Replicate)	Blank Tutu	Trip Blank	(Hartman I)
Chloromethane	R	R	R	2 UJ	2 UJ	2 UJ
Bromomethane	R	R	R	2 UJ	2 UJ	2 UJ
Vinyl Chloride	R	17 J	12 J	2 UJ	2 UJ	2 UJ
Chloroethane	R	R	R	2 UJ	2 UJ	2 UJ
Methylene Chloride	R	R	R	2 UJ	14 J	1 UJ
Acetone	R	R	R	R	7 J	R
Carbon Disulfide	R	R	R	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene	R	R	R	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane	R	R	R	1 UJ	1 UJ	1 U
1,2-Dichloroethene (total)	140 J	280 J	270 J	1 UJ	1 UJ	1 U
Chloroform	R	R	R	1 UJ	1 UJ	1 U
1,2-Dichloroethane	R	R	R	1 UJ	1 UJ	1 UJ
2-Butanone	R	R	R	R	R	R
1,1,1-Trichloroethane	R	R	R	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	R	R	R	1 UJ	1 UJ	1 U
Vinyl Acetate	R	R	R	2 UJ	2 UJ	2 UJ
Bromodichloromethane	R	R	R	1 UJ	1 UJ	1 U
1,2-Dichloropropane	R	R	R	1 UJ	1 UJ	1 U
cis-1,3-Dichloropropene	R	R	R	1 UJ	1 UJ	1 U
Trichloroethene	24 J	56 J	47 J	1 UJ	1 UJ	1 U
Dibromochloromethane	R	R	R	1 UJ	1 UJ	1 U
1,1,2-Trichloroethane	R	R	R	1 UJ	1 UJ	1 UJ
Benzene	R	32 J	26 J	1 UJ	1 UJ	1 U
trans-1,3-Dichloropropene	R	R	R	R	R	1 UJ
Bromoform	R	R	R	1 UJ	1 UJ	1 UJ
4-Methyl-2-Pentanone	R	R	R	2 UJ	2 UJ	1 UJ
2-Hexanone	R	R	R	R	R	R
Tetrachloroethene	98 J	120 J	98 J	1 UJ	1 UJ	1 UJ
1,1,2,2-Tetrachloroethane	R	R	R	1 UJ	1 UJ	1 UJ
Toluene	R	R	R	1 UJ	1 UJ	1 U
Chlorobenzene	R	R	R	1 UJ	1 UJ	1 U
Ethylbenzene	R	R	R	1 UJ	1 UJ	1 U
Styrene	R	R	R	1 UJ	1 UJ	1 UJ
Total Xylenes	R	R	R	1 UJ	1 UJ	1 UJ
Tentatively Identified VOCs						
Ethane, 1,1,2-Trichloro-1,2,2-trifluoro					3 JN	
Unknown		21 JN	39 JN			2 JN
Propane, 2-Methoxy-2-methyl	130 JN	240 JN	270 JN			
C5H12 isomer		121 JN	230 JN			
Aliphatic hydrocarbon		6 JN				
C3-Benzene isomer		6 JN				
C6H12 isomer		35 JN				
C9H12 isomer		6 JN				

concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

TUT 002 2057

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-13 10/03	770-14 VIHA I	770-15 9/27
Volatile Organic Compounds (VOCs)	Trip Blank	VIHA I	Trip Blank
Chloromethane	2 UJ	2 UJ	2 UJ
Bromomethane	2 UJ	2 UJ	2 UJ
Vinyl Chloride	2 UJ	2 UJ	2 UJ
Chloroethane	2 UJ	2 UJ	2 UJ
Methylene Chloride	1 UJ	2 UJ	16 J
Acetone	R	R	R
Carbon Disulfide	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane	1 UJ	1 UJ	1 U
1,2-Dichloroethene (total)	1 UJ	6 J	1 U
Chloroform	1 UJ	1 UJ	1 U
1,2-Dichloroethane	1 UJ	1 UJ	1 UJ
2-Butanone	R	R	R
1,1,1-Trichloroethane	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	1 UJ	1 UJ	1 U
Vinyl Acetate	2 UJ	2 UJ	2 UJ
Bromodichloromethane	1 UJ	1 UJ	1 U
1,2-Dichloropropane	1 UJ	1 UJ	1 U
cis-1,3-Dichloropropene	1 UJ	1 UJ	1 U
Trichloroethene	1 UJ	1 UJ	1 U
Dibromochloromethane	1 UJ	1 UJ	1 U
1,1,2-Trichloroethane	1 UJ	1 UJ	1 UJ
Benzene	1 UJ	1 UJ	1 U
trans-1,3-Dichloropropene	1 UJ	1 UJ	1 UJ
Bromoform	1 UJ	1 UJ	1 UJ
4-Methyl-2-Pentanone	2 UJ	2 UJ	2 UJ
2-Hexanone	R	R	R
Tetrachloroethene	1 UJ	5 J	1 UJ
1,1,2,2-Tetrachloroethane	1 UJ	1 UJ	1 UJ
Toluene	1 UJ	1 UJ	1 U
Chlorobenzene	1 UJ	1 UJ	1 U
Ethylbenzene	1 UJ	1 UJ	1 U
Styrene	1 UJ	1 UJ	1 UJ
Total Xylenes	1 UJ	1 UJ	1 UJ

Tentatively Identified VOCs

Ethane, 1,1,2-Trichloro-1,2,2-trifluoro

Unknown

Propane, 2-Methoxy-2-methyl 1.5 JN

C5H12 isomer

Aliphatic hydrocarbon

C3-Benzene isomer

C6H12 isomer

C9H12 isomer

All concentrations are reported in micrograms per liter (ug/L).

Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

TLT 002 2058

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-01	770-02	770-03	770-04	770-06	770-07
Semivolatile Organic Compounds (SVOCs)	Bryan	Dimitri	Matthias	Ramsey	Eglin I	LaPlace
Phenol	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
1-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	50 U	50 U	50 U	50 U	50 U	50 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
1,2,3-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

N - Compound is a tentatively identified compound.

TUT 002 2059

GERAGHTY & MILLER, INC.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-01	770-02	770-03	770-04	770-06	770-07
Semivolatile Organic compounds (SVOCs)	Bryan	Dimitri	Matthias	Ramsey	Eglin I	LaPlace
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U	10 U
<u>Tentatively Identified SVOCs</u>						
Unknown			4 JN		12 JN	42 JN
Benzene, pentachlorofluoro-						

concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

N - Compound is a tentatively identified compound.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-08	770-09	770-10	770-12	770-14
Semivolatile Organic	Tillet *	Tillet-D	H2O Blank	Gassett	VIHA I
Compounds (SVOCs)		(Replicate)		(Hartman I)	
Phenol	R	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	R	R	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	R	R	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	R	R	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	R	R	10 U	10 U	10 U
2,4-Dimethylphenol	R	R	10 U	10 U	10 U
Benzoic Acid	R	R	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	R	R	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	R	R	10 U	10 U	10 U
1-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 UJ	10 UJ	10 U	10 U	10 U
2,4,6-Trichlorophenol	R	R	10 U	10 U	10 U
2,4,5-Trichlorophenol	R	R	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	R	R	50 U	50 U	50 U
4-Nitrophenol	R	R	50 U	50 U	50 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U
4,6-Dinitro-2-Methylphenol	R	R	50 U	50 U	50 U
N-Nitrosodiphenylamine	R	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	R	10 U	10 U	10 U	10 U

* The first extraction results.

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-08	770-09	770-10	770-12	770-14
Semivolatile Organic apounds (SVOCs)	Tillet	Tillet-D (Replicate)	H2O Blank	Gassett (Hartman I)	VIHA I
Hexachlorobenzene	R	10 U	10 U	10 U	10 U
Pentachlorophenol	R	R	50 U	50 U	50 U
Phenanthrene	R	10 U	10 U	10 U	10 U
Anthracene	R	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	R	10 U	10 U	10 U	10 U
Fluoranthene	R	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U
3,3-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)Phthalate	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U
<u>Tentatively Identified SVOCs</u>					
Unknown		82 JN			
zene, pentachlorofluoro-		4 JN			

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Compound is not detected.

R - Value is rejected.

N - Compound is a tentatively identified compound.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-01	770-02	770-03	770-04	770-06	70-07
Pesticide/PCBs	Bryan	Dimitri	Matthias	Ramsey	Eglin I	LaPlace
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-08	770-09	770-10	770-12	770-14
Pesticides/PCBs	Tillet	TilletD	H2O Blk	HartmanI	VIHA I
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

All concentrations are reported in micrograms per liter (ug/L).

U - Compound is not detected.

TUT 002 2064

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-01	770-02	770-03	770-04	770-06	770-07
Inorganics Analysis	Bryan	Dimitri	Matthias	Ramsey	Eglin I	LaPlace
Aluminum	149 B	163 BJ	227	187 B	149 B	146 B
Antimony	52 U	52 UJ	52 U	52 U	52 U	57 B
Arsenic	3 UJ	3 UJ	3 UJ	3 UJ	3 U	3 U
Barium	3 U	3 UJ	6 B	3 U	3 U	3 U
Beryllium	3 B	4 BJ	3 B	3 B	4 B	4 B
Cadmium	4 BJ	3 BJ	3 U	3 BJ	3 U	4 BJ
Calcium	54300	37500 J	36300	43100	35300	41000
Chromium	7 B	4 BJ	5 B	11	12	8 B
Cobalt	18 U	18 UJ	18 U	18 U	18 U	18 U
Copper	17 BJ	17 BJ	18 BJ	15 BJ	14 BJ	49 J
Iron	63 BJ	115 J	20 UJ	20 BJ	20 UJ	55 BJ
Lead	4.6J	2.6BJ	1.8BJ	2.6BJ	2 BJ	2.3BJ
Magnesium	49100	27800 J	34900	34400	28700	32600
Manganese	2 B	7 BJ	2 U	2 U	56	2 B
Mercury	R	R	R	R	R	R
Nickel	11 U	14 BJ	20 BJ	21 BJ	26 BJ	18 BJ
Potassium	1000 B	2000 BJ	1410 B	1140 B	920 B	1140 B
Selenium	2 UJ	10 UJ	2 UJ	10 UJ	10 UJ	10 UJ
Silver	7 U	7 UJ	7 U	7 U	7 U	7 U
Sodium	83000	328000 J	379000	209000	190000	250000
Thallium	R	R	R	R	R	R
Vanadium	37 B	92 J	21 B	43 B	34 B	39 B
Zinc	30	4 UJ	4 BJ	7 BJ	13 BJ	13 BJ
Cyanide	5 U	5 UJ	5 U	5 U	5 U	5 U

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Analyte is not detected.

R - Value is rejected.

B - Value is between instrument detection limit and contact required detection limit.

Table 1. Tutu Residential Wells Sampling Results, September 1990, Sample Delivery Group 900770

Sample Identification:	770-08	770-09	770-10	770-12	770-14
Inorganic Analysis	Tillet	Tillet-D (Replicate)	H2O Blank Tutu	Gassett (Hartman I)	VIHA I
Aluminum	153 BJ	159 B	85 B	526	154 B
Antimony	52 UJ	52 U	52 U	52 U	54 BJ
Arsenic	3 UJ	4.4B	3 U	3 U	3 U
Barium	43 BJ	40 B	3 U	7 B	5 B
Beryllium	4 BJ	4 B	4 B	4 B	3 B
Cadmium	4 BJ	3 BJ	3 U	3 U	4 BJ
Calcium	54800 J	48600	74 U	31200	49400
Chromium	8 BJ	7 B	5 B	4 B	10
Cobalt	18 UJ	18 U	18 U	18 U	18 U
Copper	48 J	32 J	12 BJ	10 BJ	10 B
Iron	953 J	2660 J	27 BJ	418 J	29 BJ
Lead	1.5BJ	8.5J	1 UJ	1.4BJ	9 J
Magnesium	38300 J	34500	95 U	26300	33900
Manganese	1260 J	1100	2 U	853	2 U
Mercury	R	R	R	R	R
Nickel	33 BJ	15 BJ	11 UJ	11 U	15 B
Potassium	760 BJ	1190 B	300 B	880 B	2000 B
Selenium	10 UJ	10 UJ	2 UJ	10 UJ	1.4BJ
Silver	7 UJ	7 U	7 U	7 B	16 J
Sodium	192000 J	169000	158 B	236000	252000
Thallium	R	R	R	R	R
Vanadium	25 BJ	50 J	10 BJ	26 BJ	67 J
Zinc	162 J	124 J	4 - UJ	5 BJ	16 B
Cyanide	5 UJ	5 U	5 U	5 U	9.7B

All concentrations are reported in micrograms per liter (ug/L).

J - Value is estimated.

U - Analyte is not detected.

R - Value is rejected.

B - Value is between instrument detection limit and contract required detection limit.

TUT 002 2066