N00216.AR.000426
NAS CORPUS CHRISTI
5090.3a

GROUNDWATER BACKGROUND REPORT UPDATE NAS CORPUS CHRISTI TX

7/1/2005

TETRA TECH

TETRA TECH NUS, INC.
2901 Wilcrest Drive, Suite 405 • Houston, TX 77042-6012
Tel 832.251.5160 • Fax 832.251.5190 • www.tetratech.com

July 12, 2005

Project Number 7301

Commander, Southern Division
NAVFAC EFD SOUTH
ATTN: Helen Smartt Lockard, EIT
2155 Eagle Drive
North Charleston, SC 29406

Reference: **CLEAN Contract No. N62467-94-D-0888**
Contract Task Order No. 0340

Subject: **Groundwater Background Report Update**
Naval Air Station Corpus Christi

Dear Ms. Lockard:

Tetra Tech NUS, Inc. (TtNUS) is pleased to submit the two copies plus two CD's of the Groundwater Background Report Update for the referenced CTO. TtNUS conducted an investigation to develop a site background value for arsenic in groundwater at Naval Air Station (NAS) Corpus Christi. Groundwater samples were collected from existing on-site background wells and analyzed for arsenic. The analytical results were statistically evaluated and an Upper Tolerance Limit (UTL) calculated per U.S. Environmental Protection Agency (USEPA) guidance documents.

The calculated background UTL for arsenic in groundwater is 28.4 micrograms per liter (ug/L).

If you have any questions or require clarification, please contact the undersigned at (832) 251-6019.

Sincerely,

Diane R. Lindsay, P.E.
Task Order Manager

DRL:llg

Enclosure

c: Mr. M. Hilger, NAS Corpus Christi (2 copies plus 1 CD)
Mr. K. Davis, TCEQ (2 copies plus 1 CD)
Mr. B. Sturdivant, EPA (1 copy plus 1 CD)
Ms. D. Humbert (1 copy plus 1 CD)
Administrative Record (1 copy)
File 7301 (6.1)

3294sr

Groundwater Background Report Update

Naval Air Station Corpus Christi
Corpus Christi, Texas

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0340

July 2005

Rev. 1
07/12/05

GROUNDWATER BACKGROUND REPORT UPDATE

NAVAL AIR STATION CORPUS CHRISTI
CORPUS CHRISTI, TEXAS

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220-2745

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0340

JULY 2005

PREPARED UNDER THE SUPERVISION OF:

Diane R. Lindsay

DIANE R. LINDSAY, P.E.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
HOUSTON, TEXAS

APPROVED FOR SUBMITTAL BY:

Debra M. Humbert

DEBRA M. HUMBERT
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

3294sr

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

CLEAN	Comprehensive Long-term Environmental Action Navy
CTO	Contract Task Order
MCL	Maximum Contaminant Level
ml/min	milliliters per minute
NAS	Naval Air Station
NTU	nephelometeric turbidity unit
PID	photoionization detector
RCRA	Resource Conservation Recovery Act
TtNUS	Tetra Tech NUS, Inc.
ug/l	microgram per liter
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit

EXECUTIVE SUMMARY

This Groundwater Background Report Update presents the results of the background groundwater study conducted by Tetra Tech NUS, Inc. (TtNUS) at Naval Air Station (NAS) Corpus Christi in January 2005. The study described in this report establishes the background concentration for arsenic in unimpacted groundwater during the study period of this report.

The calculated arsenic background groundwater concentration is expressed as an upper tolerance limit (UTL) using methodology presented in U.S. Environmental Protection Agency (USEPA) guidance documents. The UTL value produced from this study will be compared to groundwater sample results to determine whether arsenic concentrations in groundwater exceed the established background UTL.

The calculated background UTL for arsenic in groundwater is 28.4 micrograms per liter (ug/L).

1.0 INTRODUCTION

This Groundwater Background Report Update presents the results of the background groundwater study conducted at Naval Air Station (NAS) Corpus Christi in January 2005. The study described in this report establishes the background concentration for arsenic in unimpacted groundwater during the study period of this report.

The calculated arsenic background groundwater concentration is expressed as an upper tolerance limit (UTL). The UTL value produced from this study will be compared to groundwater sample values to determine whether arsenic concentrations in groundwater exceed the established background UTL.

Tetra Tech NUS Inc. (TtNUS) completed the work tasks outlined herein under Contract Task Order (CTO) No. 0340, Comprehensive Long-term Environmental Action Navy (CLEAN) Contract No. N62467 94-D-0888.

The remainder of this report is organized in the following sections:

Section 2 presents a summary of the purpose of the investigation.

Section 3 presents a description of the field and laboratory activities.

Section 4 summarizes the findings background evaluation.

Section 5 lists references for this report.

Appendix A presents the field sample logs.

Appendix B presents the laboratory data package.

Appendix C presents a summary of the arsenic UTL calculations.

2.0 BACKGROUND

The objective of the background study was to develop a site background value for arsenic in groundwater. The current arsenic background concentration for NAS Corpus Christi in groundwater is 50 micrograms per liter (ug/L). This background value was set based upon existing technology and laboratory analytical methods, as determined by Halff & Associates in the Resource Conservation and Recovery Act (RCRA) Background Investigation Report for NAS Corpus Christi, dated November 1996. Since issuance of that report the Maximum Contaminant Level (MCL) for arsenic was lowered to 10 ug/L. The Safe Drinking Water Act required the U.S. Environmental Protection Agency (USEPA) to revise the existing 50 ug/L MCL standard for arsenic. Therefore, the previous background level is no longer valid and a new arsenic background value was developed. A site background study was required to determine if the site background concentration for arsenic is greater than the new MCL of 10 ug/L.

3.0 SAMPLING AND ANALYSES

3.1 GROUNDWATER SAMPLING

Groundwater samples were collected from eight existing background wells at NAS Corpus Christi. Figure 3-1 depicts the locations of the background monitoring wells. Two other background wells (BG-2 and BG-3) could not be located during the sampling event. Monitoring well BG-3 appears to have been located (through historical maps) in a housing area currently under construction at the time of the sampling event. Groundwater samples collected as part of this background study were submitted to a fixed-based laboratory for analysis of arsenic only.

3.2 MONITORING WELL RE-DEVELOPMENT

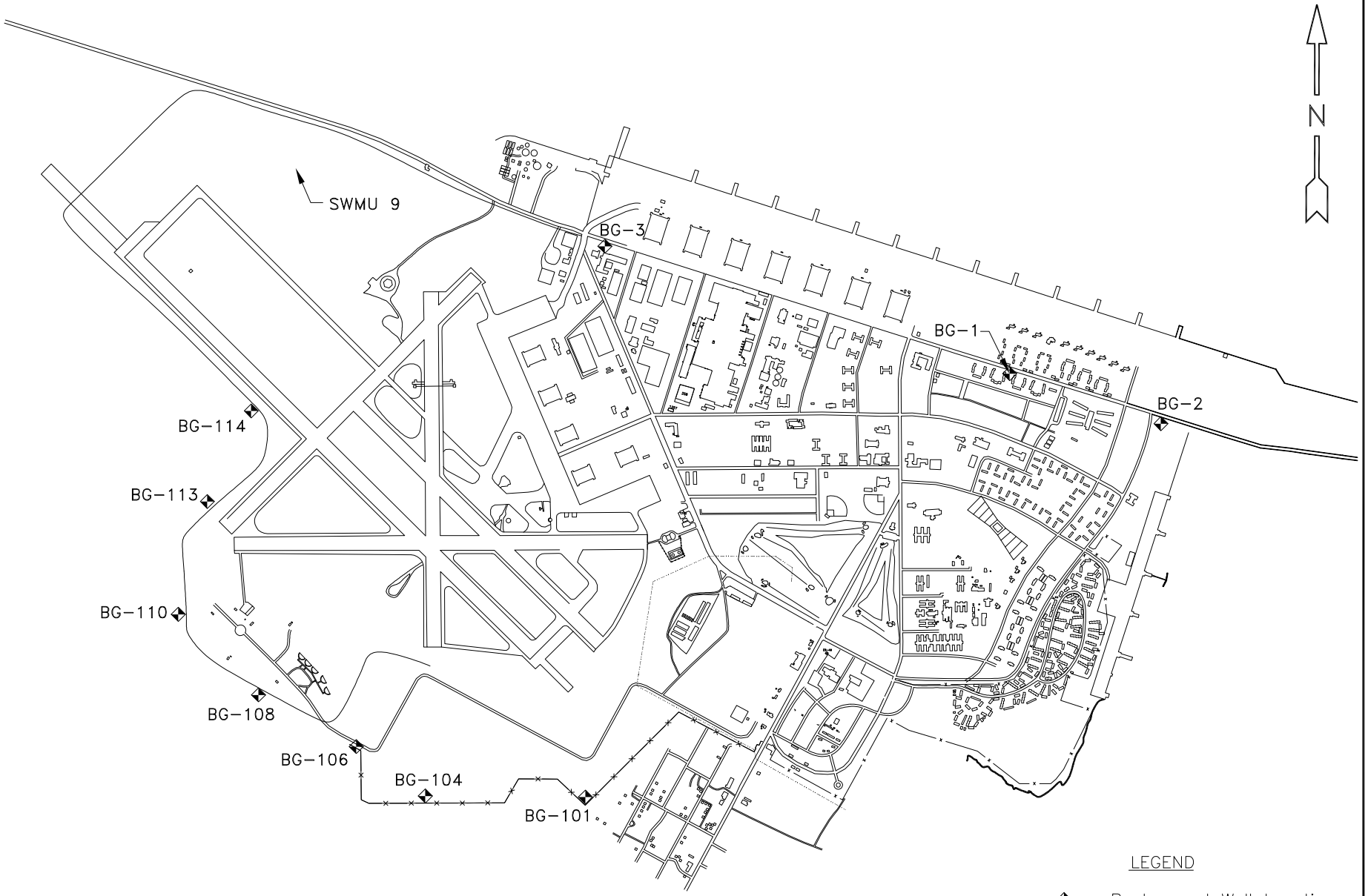
The water level and total depth of each background monitoring well was measured. In each monitoring well, with the exception of one well, the total depth of the wells corresponded to the well logs. A "hard" bottom was felt in these wells indicating that there was no accumulation of sediment. In monitoring well BG-104 a soft bottom was observed. Monitoring well BG-104 was, therefore, re-developed using a submersible pump. Measurements of pH, temperature, turbidity and specific conductance were collected after each well casing volume was removed and recorded in the field logs. Well development proceeded until the water was clear to the eye. A copy of the Monitoring Well Development Record for monitoring well BG-104 is included as Appendix A.

3.3 MONITORING WELL SAMPLING

Groundwater samples were collected from the background monitoring wells using the low-flow purge sampling method. The goal of the procedure was to obtain a turbidity level of less than 10 nephelometric turbidity units (NTU) and to achieve a water level drawdown of less than 0.3 feet during purging and sampling. In all wells the NTU value at the time of sampling was less than 10 NTUs. However, in some wells the drawdown was greater than 0.3 feet. A peristaltic pump with 1/4-inch Teflon® tubing was used for well purging and groundwater sample collection. Copies of the Low-Flow Purge Data Sheet and Groundwater Sample Log Sheet are included as Appendix A.

The following steps were used during groundwater sampling.

1. A photoionization detector (PID) was used to measure headspace gases while opening the monitoring well. There were no PID readings above the instrument detection level. The water level and total depth of the well was measured and recorded.



0 2000
Scale in Feet

SITE MANAGER: D. LINDSAY	
CHECKED BY: L. BASILIO	
DRAWN BY: J. FLESCH	
DATE: 03-17-04	SCALE: 1"=2000'
DWG. NO.: 7301SM	PROJ. NO.: N7301

TETRA TECH NUS, INC.
Houston, Texas

FIGURE 3-1

BACKGROUND MONITORING WELL LOCATION MAP

NAS CORPUS CHRISTI, TEXAS

2. The sample tubing was slowly lowered into the well so that the pump intake was within the saturated screen length of the well and at least two feet above the bottom of the well.

3. The initial pump rate was set at approximately 100 milliliters per minute (ml/min). The flow rate was maintained at 100 ml/L or less in all wells during purging and sampling protocols. The groundwater level drawdown did exceed 0.3 feet in some of the wells.

4. Water level and water quality parameters (pH, specific conductance, temperature, turbidity, oxidation-reduction potential and dissolved oxygen) were measured and recorded every five to 10 minutes during purging activities. The data was recorded on the Low-Flow Purge Data Sheet which is presented in Appendix A.

5. After stabilization was achieved, sampling began when a minimum of two saturated screen volumes had been removed and three consecutive readings, taken at 5 to 10 minute intervals, were within the following limits:
    - pH ±0.2 standard units
    - Specific conductance ±10%
    - Temperature ±10%
    - Turbidity less than 10 NTUs
    - Dissolved oxygen ±10%

6. Final well stabilization parameters were recorded on the Groundwater Sample Log Sheet presented in Appendix A.

Groundwater samples were collected into pre-preserved sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. The groundwater samples to be submitted for laboratory analyses were immediately labeled and placed on ice in an insulated cooler awaiting packing and shipment.

3.4 ANALYTICAL PROCEDURES AND DATA VALIDATION

Groundwater samples collected were analyzed for arsenic only by USEPA Method 6010.

Analytical data obtained as part of this investigation were subjected to data validation. The environmental samples collected were analyzed by E-Lab of Tennessee, and in accordance with state and federal guidance documents that establish definitive analytical/technical elements, i.e., USEPA SW-846 Methods.

Overall, the data meets the general requirements of the project objectives and data should be considered valid and acceptable.

4.0 BACKGROUND CONCENTRATION EVALUATION

Background metals concentrations were calculated using methodology presented in USEPA guidance documents. The guidance pertaining to the statistical analysis was obtained from the following documents:

1. Interim Final Guidance - Guidance Document on the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, USEPA 530/SW-B9-026, 1989.

2. Addendum to Interim Final Guidance - Guidance Document on the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, July 1992.

3. Texas Natural Resource Conservation Commission, Chapter 350 – Risk Reduction Program Rule, Section 350.79, Comparison of Chemical of Concern Concentration to Protective Concentration Levels.

4. Gilbert, R. O., Statistical Methods for Environmental Pollution Monitoring, Van Norstrand Reinhold, New York, New York, 1987.

The analytical results of the groundwater samples collected from the background monitoring wells ranged from non-detect to 39 ug/L. A summary of the analytical results are presented in Table 4-1. A copy of the laboratory data package (Form 1A) is presented in Appendix B.

One value (39 ug/L) was removed from the dataset as it is believed that the value is not indicative of background conditions. The concentration of 39 ug/L was recorded in the groundwater sample from monitoring well BG-104. This monitoring well was the only one which required re-development. The construction of the monitoring well is questionable as it is located in a low swampy area in which the water level is above the top of the PVC casing within the flush mounted well vault.

A total of eight results were used to calculate the background value. The duplicate value from BG-114 was used in place of the rejected value from BG-104. The use of the duplicate result from BG-114 was discussed and approved of by the TCEQ. The method of statistical analysis was defined after reviewing the number of nondetect values in the data set. There were two nondetect values. The percentage of nondetect values (data with “U” or “UJ” qualifiers) was calculated to determine the statistical method to be employed to determine the UTL. After replacing each nondetect by half its reported detection limit, the distribution type of the data was analyzed to determine whether the data were drawn from an underlying normal, log-normal

or undetermined distribution. The Shapiro-Wilk test was used to determine the normality of the data set. The data set exhibited a lognormal distribution.

TABLE 4-1

SUMMARY OF ARSENIC BACKGROUND GROUNDWATER ANALYTICAL RESULTS

NAS CORPUS CHRISTI, TEXAS

Location	Result (ug/L)	Qualifier
BG-3	3	U
BG-101	3.1	
BG-104	39 (1)	
BG-106	4.4	
BG-108	3	U
BG-110	4	
BG-112	3.7	
BG-114	8.2	
BG-114 (Duplicate)	8	

Note: (1) Value is considered anomalistic due to condition of the monitor well and therefore was not used in calculating background value.

Once the normality of the data was determined, the UTL was calculated. The UTLs present one-sided UTLs with ninety-five percent (95%) coverage and 95% confidence. This allows the user to assume with 95% certainty that a given UTL value is higher than 95% of the possible sample values from the same population.

The calculated background UTL for arsenic in groundwater as determined using the above methods is 28.4 ug/L. Detailed UTL calculations are provided in Appendix C.

5.0 REFERENCES

Halff Associates, Inc., 1996. RCRA Background Investigation for Naval Air Station Corpus Christi, Texas. November 1996.

TtNUS (Tetra Tech NUS) 2004. "Work Plan for the Site Investigation at North Gate Disposal Area – SWMU 9, Naval Air Station Corpus Christi, Corpus Christi, Texas". Tetra Tech NUS, Pittsburgh, Pennsylvania. September 2004.

APPENDIX A

FIELD LOGS

MONITORING WELL DEVELOPMENT RECORD

Tetra Tech NUS, Inc.
Houston, Texas

MONITORING WELL DEVELOPMENT RECORD

Well: BG-104
Site: Background
Date Installed: 4/2/96
Date Developed: 1/12/05
Dev. Method: Pump
Pump Type: Whale

Depth to Bottom (ft.): 16.64 (TOC)
Static Water Level Before (ft.): 0.0 (TOC)
Static Water Level After (ft.): 2.02 (TOC)
Screen Length (ft.): 15
Specific Capacity: NA
Casing ID (in.): 2

Responsible Personnel: LB/JR
Drilling Co.: Lewis Environmental
Project Name: NAS Corpus Christi
Project Number: N7301

Time	Cumulative Water Volume (gallon)	Water Level Readings (Ft. BGS)	Temperature (Degrees C)	pH	Specific Conductance (S/cm)	Turbidity (NTU)	Remarks
1036		0.00					Begin pumping
1039	4	1.50	26.38	8.40	2.05	330	dirty, silty, dark gray
1042	8	1.92	22.98	8.10	0.900	69	slightly silty
1044	12	2.01	22.59	7.53	0.995	44	cloudy
1047	16	2.02	22.34	7.05	0.887	37	clear, yellow tint
1049	18	2.02	22.41	7.01	0.881	34	clear, yellow tint
							Well was redeveloped because it had a soft bottom. The well is located in a low wet area. The water level in the well was above the top of the PVC pipe. Water appeared to have flowed out of the well and into the well vault.

LOW FLOW PURGE DATA SHEET

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-3
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1240	7.75									
1250	7.96	100	6.42	1.00	0	6.37	25.84	-1	0.0	
1300	7.97	100	6.53	1.05	0	4.10	25.01	-2	0.0	
1310	7.99	100	6.58	1.04	0	4.29	25.41	0	0.0	
1320	8.02	100	6.62	1.02	0	4.48	25.82	2	0.0	
1330	8.02	100	6.61	1.01	0	2.36	25.57	6	0.0	
1340	8.02	100	6.60	1.04	0	2.35	24.40	8	0.0	
1350	8.01	100	6.60	1.04	0	2.16	24.42	12	0.0	
1400	8.02	100	6.55	1.05	0	2.09	24.40	15	0.0	
1410	8.02	100	6.52	1.05	0	2.04	24.38	18	0.0	

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-101
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1130	1.96									
1140	1.98	100	5.6	10.70	53	1.01	20.7	-24		clear, slightly turbid
1200	1.98	100	5.59	10.50	58.5	0.82	21.6	-30		clear, slightly turbid
1215	1.98	100	5.63	10.20	20.2	0.74	21.1	-30		clear, slightly turbid
1230	1.99	100	5.66	9.79	62.2	0.64	21.2	-27		clear
1245	1.99	100	5.68	9.44	62.7	0.64	21.2	-27		clear
1300	1.99	100	5.68	9.25	7.7	0.67	21.2	-20		clear
1315	1.99	100	5.68	9.19	5.9	0.60	21.4	-18		clear
1330	1.99	100	5.69	9.16	4.1	0.57	21.4	-18		clear
1335	1.99	100	5.69	9.15	4.5	0.57	21.4	-19		clear
1340	1.99	100	5.69	9.14	4.1	0.56	21.5	-17		clear

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-104
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1000	+0.22									water level is above
1010	+0.22	100	5.93	0.719	130	3.78	21.03	-15	0.0	the top of the PVC casing
1020	+0.22	100	5.91	0.702	120	3.57	20.87	-14	0.0	inside of the below ground
1030	+0.22	100	5.96	0.706	66.7	4.67	21.68	-25	0.0	well vault
1040	+0.22	100	5.95	0.703	31.5	4.58	22.09	-28	0.0	
1050	+0.22	100	5.98	0.732	19.8	2.97	20.79	-30	0.0	
1100	+0.22	100	5.99	0.705	9.7	2.69	20.48	-34	0.0	
1110	+0.22	100	5.99	0.728	5.2	2.52	20.35	-30	0.0	
1120	+0.22	100	5.98	0.710	0	2.44	20.29	-33	0.0	
1130	+0.22	100	5.99	0.721	0	2.48	20.26	-31	0.0	
1140	+0.22	100	5.99	0.702	0	2.39	20.20	-36	0.0	
1150	+0.22	100	5.98	0.703	0	2.32	20.20	-34	0.0	
1200	+0.22	100	5.98	0.701	0	2.28	20.21	-35	0.0	
1210	+0.22	100	5.98	0.703	0	2.21	20.21	-33	0.0	

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-106
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
758	0.50									
810	0.75	100	6.55	0.595	33.6	1.45	19.5	87		slight tan, slightly turbid
830	0.85	100	6.55	0.596	38.3	1.09	19.5	79		tan, slightly turbid
845	0.90	100	6.66	0.598	32.3	1.00	19.4	64		clear
900	0.92	100	6.54	0.598	27.8	0.92	19.7	53		clear
915	0.93	100	6.54	0.598	58.9	0.84	19.8	46		clear
930	0.94	100	6.53	0.595	17.9	0.77	20.0	42		clear
945	0.94	100	6.53	0.593	12.1	0.74	20.2	42		clear
1000	0.94	100	6.53	0.590	7.1	0.67	20.7	42		clear
1015	0.94	100	6.52	0.590	5.6	0.58	20.7	43		clear
1030	0.94	100	6.52	0.590	6.0	0.57	20.9	43		clear
1045	0.95	100	6.52	0.589	3.9	0.60	21.4	49		clear
1100	0.95	100	6.51	0.592	3.1	0.54	21.2	46		clear
1110	0.95	100	6.51	0.592	4.1	0.54	21.3	45		clear

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-108
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
745	3.14									
755	3.25	100	6.45	0.900	151.0	8.61	21.38	100	0.1	
805	3.26	100	6.41	0.900	128.0	4.19	20.59	94	0.0	
815	3.26	100	6.45	0.900	89.0	7.49	20.69	96	0.1	recalibrate Horiba due
825	3.24	100	5.80	0.771	67.0	5.57	18.08	142	0.0	to erratic readings
835	3.24	100	6.35	0.718	43.9	3.93	19.08	108	0.0	
845	3.27	100	6.47	0.698	32.9	3.36	21.14	88	0.0	
855	3.27	100	6.48	0.700	16.8	3.33	21.17	87	0.0	
905	3.25	100	6.53	0.691	19.2	3.36	20.72	78	0.0	
915	3.25	100	6.56	0.677	10.6	3.55	21.06	75	0.0	
925	3.24	100	6.57	0.672	8.2	4.50	21.84	78	0.0	
935	3.23	100	6.59	0.683	8.9	3.31	21.12	65	0.0	
945	3.23	100	6.58	0.690	9.2	3.30	21.08	61	0.0	

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-110
DATE: 1/15/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1325	9.91									
1335	10.22	100	7.01	1.72	51.8	4.27	26.37	-94	0.1	
1345	10.48	100	6.87	1.53	40.6	3.37	25.82	-106	0.1	
1355	10.61	100	6.42	1.34	38.1	2.17	24.92	-111	0.1	
1405	10.91	100	6.28	1.36	21.4	1.79	24.75	-114	0.1	
1415	10.94	100	6.23	1.39	16.6	1.59	24.83	-116	0.1	
1425	11.25	100	6.14	1.44	12.2	1.42	24.69	-120	0.1	
1435	11.48	100	6.07	1.51	9.8	1.29	24.61	-123	0.1	
1445	11.61	100	6.06	1.54	12.6	1.26	24.95	-122	0.1	
1455	11.69	100	6.06	1.58	15.4	1.23	25.01	-127	0.1	
1505	12.14	100	6.01	1.60	8.2	2.27	26.03	-99	0.1	
1515	12.27	100	6.03	1.61	9.7	2.32	25.26	-101	0.1	
1525	12.41	100	6.05	1.63	9.2	2.29	24.88	-104	0.1	
1535	12.68	100	6.03	1.63	9.8	2.31	24.44	-105	0.1	

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-112
DATE: 1/14/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
815	3.27									
825	3.65	100	7.03	1.12	2.0	2.16	20.1	105	0.1	
835	3.80	100	7.10	1.17	2.7	2.06	20.0	103	0.1	
845	4.15	100	7.04	1.02	0.6	2.39	19.9	118	0.0	
855	4.45	100	7.09	0.960	0.7	2.24	20.1	119	0.0	
905	4.80	100	7.05	0.842	1.7	2.20	20.1	111	0.0	
915	4.98	100	7.03	0.803	0.1	2.17	19.9	105	0.0	
925	5.15	100	7.02	0.804	0.0	2.10	20.1	99	0.0	
935	5.35	100	7.03	0.814	0.7	2.04	20.2	95	0.0	
945	5.52	100	7.02	0.809	0.0	1.98	20.4	92	0.0	
955	5.63	100	7.03	0.812	0.0	1.94	20.5	93	0.0	
1005	5.68	100	7.03	0.820	0.0	1.90	20.7	93	0.0	
1015	5.71	100	7.03	0.821	0.0	1.88	20.8	93	0.0	

Tetra Tech NUS, Inc
Houston, Texas

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Corpus Christi, Background Wells
PROJECT NUMBER: N7301
WELL ID.: BG-114
DATE: 1/14/2005

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
805	3.28									
830	4.40	130	6.15	26.20	28.5	1.99	21.31	-75		clear, yellow tint
840	4.45	100	6.17	26.40	31.5	1.96	20.75	-77		clear
850	4.60	110	6.18	26.70	27.9	1.72	19.87	-76		clear
900	4.69	90	6.19	26.50	32.0	1.63	19.82	-77		clear
915	4.80	100	6.21	26.20	31.3	1.60	20.42	-76		clear
930	4.95	90	6.25	26.30	34.6	1.56	20.57	-76		clear
945	5.05	90	6.29	25.70	37.4	1.41	21.75	-80		clear
1000	5.14	90	6.31	25.50	38.9	1.37	27.79	-85		clear
1005	5.15	70	6.32	25.20	22.1	1.31	22.23	-85		clear
1010	5.19	70	6.23	25.00	20.4	1.31	22.62	-91		clear
1015	5.22	70	6.24	22.50	12.3	1.31	22.90	-94		clear
1020	5.27	70	6.24	21.00	10.0	1.37	22.62	-95		clear
1025	5.30	70	6.25	20.80	10.0	1.41	22.52	-98		clear

GROUNDWATER SAMPLE LOG SHEET

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG3
Sample Location: BG-3
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1410	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	6.52	1.05	24.38	0	2.04	18	

PURGE DATA:

Date: 1/15/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 15.60								
Static Water Level (WL): 7.75								
One Casing Volume(gal): 1.6								
Start (hrs): 1240								
End (hrs): 1410								
Total Time (min): 90								
Total Vol. (gal): 3.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 12 feet bgs.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG101
Sample Location: BG-101
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1340	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	5.69	9.14	21.5	4.1	0.56	-17	

PURGE DATA:

Date: 1/15/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 14.25								
Static Water Level (WL): 1.96								
One Casing Volume(gal): 1.6								
Start (hrs): 1130								
End (hrs): 1340								
Total Time (min): 130								
Total Vol. (gal): 3.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 12 feet bgs.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG104
Sample Location: BG-104
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1210	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	5.98	0.703	20.21	0	2.21	-33	

PURGE DATA:

Date: 1/15/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.65								
Static Water Level (WL): +0.22								
One Casing Volume(gal): 2.4								
Start (hrs): 1000								
End (hrs): 1210								
Total Time (min): 130								
Total Vol. (gal): 5.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 12 feet bgs.

Water level is above the top of the PVC casing inside the below ground well vault.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG106
Sample Location: BG-106
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1110	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	6.51	0.592	21.3	4.1	0.54	45	

PURGE DATA:

Date: 1/15/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 17.50								
Static Water Level (WL): 0.50								
One Casing Volume(gal): 2.4								
Start (hrs): 0758								
End (hrs): 1110								
Total Time (min): 192								
Total Vol. (gal): 5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 12 feet bgs.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG108
Sample Location: BG-108
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 0945	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	6.58	0.69	21.08	9.2	3.3	61	

PURGE DATA:

Date: 1/15/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 11.96								
Static Water Level (WL): 3.14								
One Casing Volume(gal): 1.6								
Start (hrs): 0745								
End (hrs): 0945								
Total Time (min): 120								
Total Vol. (gal): 3.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 8 feet bgs.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG110
Sample Location: BG-110
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/15/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1535	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	6.03	1.63	24.44	9.8	2.31	-105	

PURGE DATA:

Date: 1/14/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 15.65								
Static Water Level (WL): 9.91								
One Casing Volume(gal): 1.6								
Start (hrs): 1325								
End (hrs): 1535								
Total Time (min): 130								
Total Vol. (gal): 4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 12 feet bgs.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG112
Sample Location: BG-112
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/14/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1015	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	7.03	0.821	20.8	0	1.88	93	

PURGE DATA:

Date: 1/14/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 12.80								
Static Water Level (WL): 3.27								
One Casing Volume(gal): 1.6								
Start (hrs): 0815								
End (hrs): 1015								
Total Time (min): 120								
Total Vol. (gal): 3.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 10 feet bgs.

Collect MS/MSD Samples BGW-GW-BG112 MSD
BGW-GW-BG112 MSD

Circle if Applicable:		Signature(s):
MS/MSD X	Duplicate ID No.:	

TBD: To Be Determined

Tetra Tech NUS, Inc.
Houston, Texas

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Corpus Christi, Background
Project No.: N7301

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BGW-GW-BG114
Sample Location: BG-114
Sampled By: LB/JR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/14/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1025	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Peristaltic Pump	clear	6.25	20.8	22.52	10	1.41	-98	

PURGE DATA:

Date: 1/14/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Peristaltic Pump	SEE LOW FLOW PURGE DATA SHEET FOR DETAILS							
Monitor Reading (ppm):0								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 13.96								
Static Water Level (WL): 3.28								
One Casing Volume(gal): 1.6								
Start (hrs): 0805								
End (hrs): 1025								
Total Time (min): 130								
Total Vol. (gal): 3.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Arsenic 6010			X

OBSERVATIONS / NOTES:

Inlet tubing set at 8 feet bgs.

Collect duplicate sample.

Circle if Applicable:

MS/MSD	Duplicate ID No.: BGW-QC-BG114

Signature(s):

TBD: To Be Determined

APPENDIX B

LABORATORY DATA PACKAGE

Appendix A Laboratory Data Package Cover Page

This data package consists of:

- ☑ This signature page, the laboratory review checklist, and the following reportable data:
- ☑ R1 Field chain-of-custody documentation;
- ☑ R2 Sample identification cross-reference;
- ☑ R3 Test reports (analytical data sheets) for each environmental sample that includes:
  - a) Items consistent with NELAC 5.13 or ISO/IEC 17025 Section 5.10
  - b) dilution factors,
  - c) preparation methods,
  - d) cleanup methods, and
  - e) if required for the project, tentatively identified compounds (TICs).
- ☐ R4 Surrogate recovery data including:
  - a) Calculated recovery (%R), and
  - b) The laboratory's surrogate QC limits.
- ☑ R5 Test reports/summary forms for blank samples;
- ☑ R6 Test reports/summary forms for laboratory control samples (LCSs) including:
  - a) LCS spiking amounts,
  - b) Calculated %R for each analyte, and
  - c) The laboratory's LCS QC limits.
- ☑ R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  - a) Samples associated with the MS/MSD clearly identified,
  - b) MS/MSD spiking amounts,
  - c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  - d) Calculated %Rs and relative percent differences (RPDs), and
  - e) The laboratory's MS/MSD QC limits
- ☑ R8 Laboratory analytical duplicate (if applicable) recovery and precision:
  - a) the amount of analyte measured in the duplicate,
  - b) the calculated RPD, and
  - c) the laboratory's QC limits for analytical duplicates.
- ☑ R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;
- ☑ R10 Other problems or anomalies.
- ☑ The Exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release Statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By me signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: [ ] This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Betty DeVille	Betty DeVille	Inorganic Manager	2-15-05
Name (Printed)	Signature	Official Title (printed)	Date

Tetra Tech NUS, Inc.

Parameters Requested

Lab Sample ID	Field ID	Matrix	Date Time Sampled	Parameters requested
0501089-01	SO9-GW-TT01	Water	1/13/05 10:40:00 AM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc
0501089-02	SO9-QC-TT01	Water	1/13/05 10:40:00 AM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc
0501089-03	SO9-GW REI23	Water	1/13/05 11:35:00 AM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel

Lab Sample ID	Field ID	Matrix	Date Time Sampled	Parameters requested
0501089-03	SO9-GW-REI23	Water	1/13/05 11:35:00 AM	Selenium
				Silver
				Zinc
0501089-04	SO9-GW-TT02	Water	1/13/05 1:30:00 PM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc
0501089-05	SO9-GW-TT03	Water	1/13/05 2:25:00 PM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc
0501089-06	SO9-FB001	Water	1/13/05 9:30:00 AM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc

Lab Sample ID	Field ID	Matrix	Date Time Sampled	Parameters requested
0501089-07	SO9-RB001	Water	1/13/05 3:40:00 PM	Arsenic
				Barium
				Cadmium
				Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc

Tetra Tech NUS, Inc.

Parameters Requested

Lab Sample ID	Field ID	Matrix	Date Time Sampled	Parameters requested
0501100-01	BGW-GW-BG112	Water	1/14/05 10:15:00 AM	Arsenic
0501100-02	BGW-GW-BG114	Water	1/14/05 10:24:00 AM	Arsenic
0501100-03	BGW-QC-BG114	Water	1/14/05 10:24:00 AM	Arsenic
0501100-04	SO9-GW-GM22	Water	1/14/05 12:10:00 PM	Arsenic Barium Cadmium Chromium Chromium, Hexavalent Copper Lead Mercury Nickel Selenium Silver Zinc
0501100-05	SO9-GW-REI31	Water	1/14/05 3:20:00 PM	Arsenic Barium Cadmium Chromium Chromium, Hexavalent Copper Lead Mercury Nickel Selenium Silver Zinc
0501100-06	BGW-GW-BG110	Water	1/14/05 3:35:00 PM	Arsenic
0501100-07	BGW-FB001	Water	1/14/05 2:30:00 PM	Arsenic
0501100-08	SO9-RB002	Water	1/14/05 3:45:00 PM	Arsenic Barium Cadmium

Lab Sample ID	Field ID	Matrix	Date Time Sampled	Parameters requested
0501100-08	SO9-RB002	Water	1/14/05 3:45:00 PM	Chromium
				Chromium, Hexavalent
				Copper
				Lead
				Mercury
				Nickel
				Selenium
				Silver
				Zinc

Tetra Tech NUS, Inc.

Parameters Requested

Lab Sample ID	Field ID	Matrix	Date_Time Sampled	Parameters requested
0501107-01	BGW-GW-BG108	Water	1/15/05 9:45:00 AM	Arsenic
0501107-02	BGW-GW-BG106	Water	1/15/05 11:10:00 AM	Arsenic
0501107-03	BGW-GW-BG104	Water	1/15/05 12:10:00 PM	Arsenic
0501107-04	BGW-RB001	Water	1/15/05 12:35:00 PM	Arsenic
0501107-05	BGW-GW-BG101	Water	1/15/05 1:40:00 PM	Arsenic
0501107-06	BGW-GW-BG3	Water	1/15/05 2:10:00 PM	Arsenic

ELAB OF TENNESSEE CHAIN OF CUSTODY RECORD

Nº 32668

Ship to:
ELAB of Tennessee
227 French Landing Drive
Suite 550
Nashville, TN 37228
Attn: Analytical Laboratory
(615) 345-1115 (phone)
(615) 846-5426 (fax)

Send Results to:
Name Diane Lindsay
Company Tetra Tech NUS
Address 2901 Wilcrest Dr
City,State,Zip Houston TX 77042
Phone 832 251 5160
Fax 832 251-5190
E-mail

Send Invoice To:
Name SAME
Company
Address
City,State,Zip
Phone
Purchase Order
E-mail

Details:
Page 1 of 2
Cooler No. ____ of ____
Date Shipped 1/13/05
Shipped By LB / JR

Turnaround
(Std. Turn unless noted otherwise / There may be a surcharge for RUSH-contact lab)

Project No./Name CTO 340 MW1/14/05

Samplers (Signature)*

Lab Use Only Lab #	Date Sampled	Time	Comp./ Grab	Sample Location/Description	Sample Matrix	Field pH/Temp	Field Cond.	ANALYSIS REQUIRED	No. of Bottles	Lab Use Only Containers/Pres.
108901	1/13/05	1040	G	SO9-GW-TT01	W	7.02/23	84	VOC, METALS, Hexavalent Cr	5	3.5 TB amber 1BHNO3
02		1040	G	SO9-QC-TT01	W	"	"		5	
03		1135	G	SO9-GW-REI23	W	7.18/19.3	414.9		5	
		1135	G	SO9-GW-REI23 MS	W				5	
		1135	G	SO9-GW-REI23 MSD	W				5	
04		1330	G	SO9-GW-TT02	W	6.86/23	84		5	
05		1425	G	SO9-GW-TT03	W	7.01/22.7	80.7		5	
06		0930	G	SO9-FB001	W	—	—		5	
07		1540	G	SO9-RB001	W	—	—		5	
08				TRIP BLANK 3038						

Sample Kit Prep'd by: (Signature)	Date 1-5-05	Received By: (Signature)
Relinquished by: (Signature)	Date/Time 1/13/05 1700	Received By: (Signature) FEDEX
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature)	Date/Time 1-14-05 900	*Temperature* 2.6

REMARKS
*Signature required to ensure validity

Lab Use Only

VOA Headspace	Y	(N)	NA
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill # AB XXX Hand Delivered
CAR #

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers

SEVERN TRENT **STL**

No. 021772

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION	PROJECT INFORMATION
COMPANY: Tetra Tech NUS	PROJECT NAME/NUMBER: N7301
SEND REPORT TO: Blaine Lindsay	**BILLING INFORMATION**
ADDRESS: 2901 Wilcrest 405	BILL TO: SAME
Houston TX 77042	ADDRESS:
PHONE: 832 - 251 - 5160	PHONE:
FAX: 832 251 5190	FAX: PO NO:

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	Arsenic 1B-HNO3 PHLS	TAL Metals	Hexavalent Chromium 1B-NAOH	VOCs 3 3B HCl PHLS					REMARKS/PRECAUTIONS
1100-01	BGW-GW-BG112	1/14/05	1015	W	1B	HNO3	1	X								
	BGW-GW-BG112 MS						1	X								MS
	BGW-GW-BG112 MSD						1	X								MSD
02	BGW-GW-BG114		1027				1	X								
03	DGW-GW-BG114						1	X								
04	SOG-GW-GM22		1210		3S 1B 1B	HCl HNO3 Unpres	5		X	X	X					
05	SOG-GW-NEF31		1320				5		X	X	X					
06	BGW-GW-BG110		1535		1B	HNO3	1	X								
07	BGW-FB001		1430				1	X								
08	SOG-RB002		1545		3S 1B 1B	HCl HNO3 Unpres	5		X	X	X					

SAMPLER: C Basilio / S Nobenhour

SHIPMENT METHOD: FED EX

AIRBILL NO.: 841511316309

REQUIRED TURNAROUND* ☐ SAME DAY ☐ 24 HOURS ☐ 48 HOURS ☐ 72 HOURS ☐ 5 DAYS ☐ 10 DAYS ☒ ROUTINE ☐ OTHER

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: C Basilio	1/14/05	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: C BASILIO / TETRA TECH	TIME 1700	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME
1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: Andy Boston	1-15-05	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: Andy B. - STL ELAB	TIME 900	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

*RUSH TURNAROUND MAY REQUIRE SURCHARGE

1100-09 TRIP BLANK 3038 2S/HCl

STL8222H-600 (0803)

STL Houston
6310 Rothway Drive
Houston, TX 77040

ELAB OF TENNESSEE CHAIN OF CUSTODY RECORD

Nº 32603

Ship to:
ELAB of Tennessee
227 French Landing Drive
Suite 550
Nashville, TN 37228
Attn: Analytical Laboratory
(615) 345-1115 (phone)
(615) 846-5426 (fax)

Send Results to:
Name Diane Lindsay
Company Tetra Tech NUS
Address 2901 Wilcrest Dr
City,State,Zip Houston TX 77042
Phone 832-251-6019
Fax 832-251-5190
E-mail

Send Invoice To:
Name Same
Company
Address
City,State,Zip
Phone
Purchase Order
E-mail

Details:
Page 1 of 1
Cooler No. 1 of 1
Date Shipped 1/17/05
Shipped By
Turnaround
(Std. Turn unless noted otherwise / There may be a surcharge for RUSH-contact lab)

Project No./Name
Samplers (Signature)*

Lab Use Only Lab #	Date Sampled	Time	Comp./ Grab	Sample Location/Description	Sample Matrix	Field pH/Temp	Field Cond.	ANALYSIS REQUIRED	No. of Bottles	Lab Use Only Containers/Pres.
01107-01	1/15/05	945	G	BGW-GW-BG108	W			Arsenic	1	1B HNO_3
02		1110	G	BGW-GW-BG10C	W	6.51/21.3	0.792		1	
03		1210	G	BGW-GW-BG104	W				1	
04		1235	G	BGW-RB001	W	—	—		1	
05		1340	G	BGW-GW-BG101	W	6.69/21.5	9.14		1	
06		1410	G	BGW-GW-BG3	W				1	

Sample Kit Prep'd by: (Signature)	Date	Received By: (Signature)
Relinquished by: (Signature)	Date/Time 1/17/05 1700	Received By: (Signature) FLD EXP
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature) Andy Barton	Date/Time 1-18-05 900	*Temperature* 2.8

REMARKS
*Signature required to ensure validity

Lab Use Only

VOA Headspace	Y	N	(NA)
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill # FX
CAR #

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers

ELAB OF TN COOLER RECEIPT FORM

LIMS Number 0501089 COC ID(s): 32668

Client Tetra Tech NUS Project CTO 340

Sample Custodian Andy Barton Today's Date 1-14-05

Date/Time Samples Received 1-14 900
Airbill Number Hand Delivered
Cooler Opened: Date 1-14

Chain of custody seal intact?	(Yes)	No
Chain of custody provided?	(Yes)	No
Sample labels present?	(Yes)	No
Bottle labels correspond w/COC	(Yes)	No

Number of Custody Seals on Cooler(s): 2 Seal Date(s): 1-13

Type of coolant used ICE

Coolant condition : Melted _____ Partially melted/frozen ✓
Frozen _____

# of Coolers 1 Temp. of Coolers 2.6

Condition of Bottles in Shipment: Broken Leaking (Intact) Missing

If broken or leaking list sample ID#s and bottle types affected:

_____

_____

_____

Comments:

_____

_____

_____

_____

ELAB OF TN COOLER RECEIPT FORM

LIMS Number 0501100 COC ID(s): _____

Client Tetra Tech NUS Project N7301

Sample Custodian Andy Barton Today's Date 1-15-05

Date/Time Samples Received 1-15 900
Airbill Number FX
Cooler Opened: Date 1-15

Chain of custody seal intact?	(Yes)	No
Chain of custody provided?	(Yes)	No
Sample labels present?	(Yes)	No
Bottle labels correspond w/COC	(Yes)	No

Number of Custody Seals on Cooler(s): 1 Seal Date(s): 1-14-05

Type of coolant used ICE

Coolant condition : Melted _____ Partially melted/frozen /
Frozen _____

# of Coolers 1 Temp. of Coolers 3.1

Condition of Bottles in Shipment: Broken Leaking (Intact) Missing

If broken or leaking list sample ID#s and bottle types affected:

_____

_____

_____

Comments:

_____

_____

_____

_____

ELAB OF TN COOLER RECEIPT FORM

LIMS Number 0501107 COC ID(s): 32603

Client Tetra Tech NUS Project NAS Corpus Christi CTO340

Sample Custodian Andy Barton Today's Date 1-18-05

Date/Time Samples Received 1-18 900
Airbill Number FX
Cooler Opened: Date 1-18

Chain of custody seal intact?	(Yes)	No
Chain of custody provided?	(Yes)	No
Sample labels present?	(Yes)	No
Bottle labels correspond w/COC	(Yes)	No

Number of Custody Seals on Cooler(s): 2 Seal Date(s): 1-17

Type of coolant used ICE

Coolant condition : Melted _____ Partially melted/frozen /
Frozen _____

# of Coolers 1 Temp. of Coolers 2.8

Condition of Bottles in Shipment: Broken Leaking (Intact) Missing

If broken or leaking list sample ID#s and bottle types affected:

N/A

Comments:

Sample Delivery Group Assignment Form

CLIENT: Tetra Tech NUS
PROJECT NAME: NAS Corpus Christi, TX CTO340
SDG #: NASCC001
MATRIX: Water

QC LEVEL: EDD/IV
CLOSED: 01/19/05
Report Due: 02/16/05

Sample Type/count	Date Sampled	Date Rec'd	Lab ID	Client ID	VOA 8260	Metals 6010	Cr+6 7196A	Arsenic 6010
1	1/13/05	1/14/05	0501089-01	SO9-GW-TT01	X	X	X	
2	1/13/05	1/14/05	0501089-02	SO9-QC-TT01	X	X	X	
3	1/13/05	1/14/05	0501089-03	SO9-GW-REI23	MS/MSD	MS/MSD	MS/MSD	
4	1/13/05	1/14/05	0501089-04	SO9-GW-TT02	X	X	X	
5	1/13/05	1/14/05	0501089-05	SO9-GW-TT03	X	X	X	
FB	1/13/05	1/14/05	0501089-06	SO9-FB001	X	X	X	
RB	1/13/05	1/14/05	0501089-07	SO9-RB001	X	X	X	
TB	1/13/04	1/14/05	0501089-08	Trip Blank #3038	X			
6	1/14/05	1/15/05	0501100-01	BGW-GW-BG112				MS/MSD
7	1/14/05	1/15/05	0501100-02	BGW-GW-BG114				X
8	1/14/05	1/15/05	0501100-03	BGW-QC-BG114				X
9	1/14/05	1/15/05	0501100-04	SO9-GW-GM22	X	X	X	
10	1/14/05	1/15/05	0501100-05	SO9-GW-REI31	X	X	X	
11	1/14/05	1/15/05	0501100-06	BGW-GW-BG110				X
FB	1/14/05	1/15/05	0501100-07	BGW-FB001				X
RB	1/14/05	1/15/05	0501100-08	SO9-RB002	X	X	X	
TB	1/14/05	1/15/05	0501100-09	Trip Blank #3038	X			
12	1/15/05	1/18/05	0501107-01	BGW-GW-BG108				X
13	1/15/05	1/18/05	0501107-02	BGW-GW-BG106				X
14	1/15/05	1/18/05	0501107-03	BGW-GW-BG104				X
RB	1/15/05	1/18/05	0501107-04	BGW-RB001				X
15	1/15/05	1/18/05	0501107-05	BGW-GW-BG101				X
16	1/15/05	1/18/05	0501107-06	BGW-GW-BG3				X

Appendix A (cont'd): Laboratory Review Checklist: Reportable Data

Laboratory Name: Elab of Tennessee LLC	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name: Betty DeVille	Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	✓				
		Were percent RSDs or correlation coefficient criteria met?	✓*				
		Was the number of standards recommended in the method used for all analytes?	✓				
		Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
		Are ICAL data available for all instruments used?	✓				
		Has the initial calibration curve been verified using an appropriate second source standard?	✓				
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration**					
		Was the CCV analyzed at the method-required frequency?	✓				
		Were percent differences for each analyte within the method-required QC limits?	✓				
		Was the ICAL curve verified for each analyte?	✓				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	✓				
S3	O	**Mass spectral tuning:**					
		Was the appropriate compound for the method used for tuning?			✓		
		Were ion abundance data within the method-required QC limits?			✓		
S4	O	**Internal standards (IS):**					
		Were IS area counts and retention times within the method-required QC limits?			✓		
S5	OI	**Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
		Were data associated with manual integrations flagged on the raw data?	✓				
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			✓		
S7	O	**Tentatively identified compounds (TICs):**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
S8	I	**Interference Check Sample (ICS) results:**					
		Were percent recoveries within method QC limits?	✓				
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	✓				
		Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
S11	OI	**Proficiency test reports:**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	✓				
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
		Is documentation of the analyst's competency up-to-date and on file?	✓				
S15	OI	**Verification/validation documentation for methods** (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
S16	OI	**Laboratory standard operating procedures (SOPs):**					
		Are laboratory SOPs current and on file for each method performed?	✓				

1 Items identified by the letter "R" should be included in the laboratory data package submitted to the TCEQ in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2 O = organic analyses; I = inorganic analyses (and general chemistry, when applicable).
3 NA = Not applicable.
4 NR = Not Reviewed.
5 ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

* This is not applicable to ICAP data.

Appendix A (cont'd): Laboratory Review Checklist: Reportable Data

Laboratory Name: Elab of Tennessee LLC	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name: Betty DeVille	Prep Batch Number(s):

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
		Chain-of-custody (C-O-C)					
R1	OI	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?		✓			
		Were all departures from standard conditions described in an exception report?	✓				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?		✓			1
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	✓				
		Were calculations checked by a peer or supervisor?	✓				
		Were all analyte identifications checked by a peer or supervisor?	✓				
		Were sample quantitation limits reported for all analytes not detected?	✓				
		Were all results for soil and sediment samples reported on a dry weight basis?			✓		
		Were % moisture (or solids) reported for all soil and sediment samples?			✓		
		If required for the project, TICs reported?			✓		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			✓		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	✓				
		Were blanks analyzed at the appropriate frequency?	✓				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
		Were blank concentrations < MQL?	✓				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	✓				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
		Were LCSs analyzed at the required frequency?	✓				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
		Was the LCSD RPD within QC limits?			✓		
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	✓				
		Were MS/MSD analyzed at the appropriate frequency?	✓				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Were MS/MSD RPDs within laboratory QC limits?	✓				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?	✓				
		Were analytical duplicates analyzed at the appropriate frequency?	✓				
		Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	✓				
		Do the MQLs correspond to the concentration of the lowest non zero calibration standard?	✓*				
		Are unadjusted MQLs included in the laboratory data package?	✓				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
		Were all necessary corrective actions performed for the reported data?	✓				
		Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

* Does not apply to ICAP.

Appendix A (cont'd): Laboratory Review Checklist: Exception Reports	
Laboratory Name: ELAB of Tennessee, LLC	LRC Date: 02/15/05
Project Name: Tetra Tech NUS, Inc.	Laboratory Job Number: 0501089-01 through 07, 0501100-04 through 05, 08
Reviewer Name: Betty DeVille	Prep Batch Number(s): ICP012105A, ICP012105B, HG012005B, HCr011405, HCr011505

ER #[1]	DESCRIPTION
1	Sample description S09-FB001, ELAB ID # 0501089-06 was received in the laboratory out of the US EPA Holding time for hexavalent chromium. The sample was analyzed one hour out of the holding time period of 24 hours.

1 ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked on the LRC)

Batching Information

SDG No.: NASCC001
Contract: Tetra Tech NUS, Inc.

Batch Number: ICP012105A – ICP Metals

PBW012105A	PBW012105A	MB	WATER
LCSW012105A	LCSW012105A	LCS	WATER
0501089-01	SO9-GW-TT01	SAM	WATER
0501089-02	SO9-QC-TT01	SAM	WATER
0501089-03	SO9-GW-REI23	SAM	WATER
0501089-03S	SO9-GW-REI23S	MS	WATER
0501089-03SD	SO9-GW-REI23SD	MSD	WATER
0501089-04	SO9-GW-TT02	SAM	WATER
0501089-05	SO9-GW-TT03	SAM	WATER
0501089-06	SO9-FB001	SAM	WATER
0501089-07	SO9-RB001	SAM	WATER
0501100-01	BGW-GW-BG112	SAM	WATER
0501100-01S	BGW-GW-BG112S	MS	WATER
0501100-01SD	BGW-GW-BG112SD	MSD	WATER
0501100-02	BGW-GW-BG114	SAM	WATER
0501100-03	BGW-QC-BG114	SAM	WATER
0501100-04	SO9-GW-GM22	SAM	WATER
0501100-05	SO9-GW-REI31	SAM	WATER
0501100-06	BGW-GW-BG110	SAM	WATER
0501100-07	BGW-FB001	SAM	WATER
0501100-08	SO9-RB002	SAM	WATER
0501107-01	BGW-GW-BG108	SAM	WATER
0501107-02	BGW-GW-BG106	SAM	WATER
0501107-03	BGW-GW-BG104	SAM	WATER
0501107-04	BGW-RB001	SAM	WATER
0501107-05	BGW-GW-BG101	SAM	WATER

Batch Number: ICP012105B – ICP Metals

PBW012105B	PBW012105B	MB	WATER
LCSW012105B	LCSW012105B	LCS	WATER
0501107-06	BGW-GW-BG3	SAM	WATER

Batch Number: HG012005B – Mercury

PBW0122005B	PBW0122005B	MB	WATER
LCSW012005B	LCSW012005B	LCS	WATER
0501089-01	SO9-GW-TT01	SAM	WATER
0501089-02	SO9-QC-TT01	SAM	WATER
0501089-03	SO9-GW-REI23	SAM	WATER
0501089-03S	SO9-GW-REI23S	MS	WATER
0501089-03SD	SO9-GW-REI23SD	MSD	WATER
0501089-03D	SO9-GW-REI23D	DUP	WATER
0501089-04	SO9-GW-TT02	SAM	WATER
0501089-05	SO9-GW-TT03	SAM	WATER

Batching Information

SDG No.: NASCC001
Contract: Tetra Tech NUS, Inc.

Batch Number: HG012005B – Mercury

0501089-06	SO9-FB001	SAM	WATER
0501089-07	SO9-RB001	SAM	WATER
0501100-04	SO9-GW-GM22	SAM	WATER
0501100-05	SO9-GW-REI31	SAM	WATER
0501100-08	SO9-RB002	SAM	WATER

Batch Number: HCr011405 – Hexavalent Chromium

PBW011405	PBW011405	MB	WATER
LCSW011405	LCSW011405	LCS	WATER
0501089-01	SO9-GW-TT01	SAM	WATER
0501089-01S	SO9-GW-TT01S	MS	WATER
0501089-02	SO9-QC-TT01	SAM	WATER
0501089-02D	SO9-QC-TT01D	DUP	WATER
0501089-02S	SO9-QC-TT01S	MS	WATER
0501089-03	SO9-GW-REI23	SAM	WATER
0501089-03S	SO9-GW-REI23S	MS	WATER
0501089-03SD	SO9-GW-REI23SD	MSD	WATER
0501089-04	SO9-GW-TT02	SAM	WATER
0501089-04S	SO9-GW-TT02S	MS	WATER
0501089-05	SO9-GW-TT03	SAM	WATER
0501089-05S	SO9-GW-TT03S	MS	WATER
0501089-06	SO9-FB001	SAM	WATER
0501089-06S	SO9-FB001S	MS	WATER
0501089-07	SO9-RB001	SAM	WATER
0501089-07S	SO9-RB001S	MS	WATER

Batch Number: HCr011505 – Hexavalent Chromium

PBW011505	PBW011505	MB	WATER
LCSW011505	LCSW011505	LCS	WATER
0501100-04	SO9-GW-GM22	SAM	WATER
0501100-04S	SO9-GW-GM22S	MS	WATER
0501100-05	SO9-GW-REI31	SAM	WATER
0501100-05S	SO9-GW-REI31S	MS	WATER
0501100-08	SO9-RB002	SAM	WATER
0501100-08S	SO9-RB002S	MS	WATER
0501100-08SD	SO9-RB002SD	MSD	WATER

USEPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: NASCC001

SOW No.: ILM04.2

EPA Sample No.	Lab Sample ID.
SO9-GW-TT01	0501089-01
SO9-QC-TT01	0501089-02
SO9-GW-REI23	0501089-03
SO9-GW-REI23D	0501089-03D
SO9-GW-REI23S	0501089-03S
SO9-GW-REI23SD	0501089-03SD
SO9-GW-TT02	0501089-04
SO9-GW-TT03	0501089-05
SO9-FB001	0501089-06
SO9-RB001	0501089-07
BGW-GW-BG112	0501100-01
BGW-GW-BG112S	0501100-01S
BGW-GW-BG112SD	0501100-01SD
BGW-GW-BG114	0501100-02
BGW-QC-BG114	0501100-03
SO9-GW-GM22	0501100-04
SO9-GW-REI31	0501100-05
BGW-GW-BG110	0501100-06
BGW-FB001	0501100-07
SO9-RB002	0501100-08

Were ICP interelement corrections applied? Yes/No YES

Were ICP background corrections applied? Yes/No YES

If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

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

Signature: _____ Name: D. Rick Davis

Date: _____ Title: Vice-President

USEPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: NASCC001

SOW No.: ILM04.2

EPA Sample No.	Lab Sample ID.
BGW-GW-BG108	0501107-01
BGW-GW-BG106	0501107-02
BGW-GW-BG104	0501107-03
BGW-RB001	0501107-04
BGW-GW-BG101	0501107-05
BGW-GW-BG3	0501107-06

Were ICP interelement corrections applied? Yes/No YES

Were ICP background corrections applied? Yes/No YES

If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

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

Signature: _____ Name: D. Rick Davis

Date: _____ Title: Vice-President

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG3

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-06

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG101

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-05

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.1	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG104

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-03

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	39.0			P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG106

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-02

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	4.4	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG108

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-01

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG110

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501100-06

Level (low/med): LOW Date Received: 1/15/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	4.0	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG112

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501100-01

Level (low/med): LOW Date Received: 1/15/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.7	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-GW-BG114

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501100-02

Level (low/med): LOW Date Received: 1/15/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	8.2	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-QC-BG114

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501100-03

Level (low/med): LOW Date Received: 1/15/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	8.0	B		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-FB001

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501100-07

Level (low/med): LOW Date Received: 1/15/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGW-RB001

Lab Name: ELAB of Tennessee, LLC Contract: Tetra Tech NUS

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: NASCC001

Matrix (soil/water) WATER Lab Sample ID: 0501107-04

Level (low/med): LOW Date Received: 1/18/2005

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

APPENDIX C

UPPER TOLERANCE LEVEL CALCULATIONS

Appendix C **95%UTL of Arsenic in Background Groundwater Samples**

NAS Corpus Christi

(a) Shapiro-Wilk Test of Normality

Sample No.	(1) Ordered Conc. x(i)	Reverse Ordered x(n-i+1)	Difference x(n-i+1)-x(i)	Coefficient for W Test a(n-i+1)	Vector b(i)		ln of Ordered Conc. x(i)	ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	Coefficient for W Test a(n-i+1)	Vector b(i)
1	1.5	8.1	6.6	0.6052	3.99432		0.41	2.09	-1.69	0.6052	-1.021
2	1.5	8.0	6.5	0.3164	2.0566		0.41	2.08	-1.67	0.3164	-0.530
3	3.1	4.4	1.3	0.1743	0.22659		1.13	1.48	-0.35	0.1743	-0.061
4	3.7	4.0	0.3	0.0561	0.01683		1.31	1.39	-0.08	0.0561	-0.004
5	4.0	3.7	-0.3		0		1.39	1.31	0.08		0
6	4.4	3.1	-1.3		0		1.48	1.13	0.35		0
7	8.0	1.5	-6.5		0		2.08	0.41	1.67		0
8	8.2	1.5	-6.7		0		2.10	0.41	1.70		0

sum=	34.4000		b=sum of (bi)=	6.29	
Mean (Xi) =	4.3000				
n=	8				
Std. Dev.=	2.5768				
W cal.=[b/Std.Deviation*(sqrt(n-1)]^2					
W cal.=	0.8524				
W table (0.05,8)=	0.8180				
W cal>W table		Normality=	**Normal**		

sum of ln (Xi)=	10.30		b=sum of (bi)=	-1.616	
Mean Xy=	1.29				
n=	8				
Std. Dev. (of ln)=	0.6461				
W cal.=[b/Std.Deviation*(sqrt(n-1)]^2					
W cal.=	0.893				
W table (0.05,8)=	0.8180				
W cal>W table		Normality=	**Lognormal**		

Normal UTL		n=8
95% UTL =	mean+k*SD	k=3.188
95% UTL =	**12.51**	ug/L

It is lognormal distribution.

Lognormal UTL		**n=8**
95% UTL =	**e^(Xy+KSy)**	**k=3.188**
95% UTL =	**28.43**	**ug/L**
95% UTL =	**0.028**	**mg/L**

(1) analytical results in ug/L.