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Monitoring Event No. 4
3rd Quarter 1999
September 6 - 15, 1999
Ammunition Burning Grounds

Naval Surface Warfare Center
Crane Division
Crane, Indiana

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0038

July 2001

010019/P

MONITORING EVENT NO. 4
3rd QUARTER 1999
September 6 - 15, 1999
AMMUNTION BURNING GROUNDS

NAVAL SURFACE WARFARE CENTER, CRANE DIVISION
CRANE, INDIANA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
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

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0038

JULY 2001

PREPARED UNDER THE SUPERVISION OF:

Ralph Basinski Date 7/10/01
RALPH BASINSKI
TASK ORDER MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMITTAL BY:

D M Wroblewski Date 7/10/01
DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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MONITORING EVENT NO. 4
(September 6-15, 1999)

Naval Surface Warfare Center (NSWC)
Crane Division
Crane, Indiana

VOLUME I OF II

(Volume II of II is included in only the record copy of this report, which is maintained in the NSWC Crane Ground Water Monitoring Information Repository.)

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PITT 01-0-119

January 25, 2000

Project Number 7651

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
Attn: E.P. Johns (Code 1829)
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order 0038

Subject: Report for Ground Water Monitoring Event Number 4
for Naval Surface Warfare Center Crane, Indiana

Dear Mr. Johns:

Monitoring Event No. 4 has been completed. During this monitoring event samples from ground water, surface waters, and springs were collected at the Ammunition Burning Grounds (ABG) from September 6 through September 15, 1999 and analyzed. Absence of water flow at the Creek A location prevented collection of surface water from this location during Monitoring Event No. 4.

Enclosed is the Report for Monitoring Event No. 4. All field sampling was conducted in accordance with the May 1999 Field Sampling Plan (FSP). Table 1 summarizes the ground water monitoring wells, surface waters, and springs sampled at the ABG. Water level measurement data was used to prepare flow contours for the Beech Creek Aquifer. Figure 1 shows the ground water flow contours obtained using only wells located at the Point of Compliance or within the Point of Compliance. Figure 2 shows the ground water flow contours obtained when wells located beyond the Point of Compliance are included.

Table 2 highlights the positive detections. Figures 3 and 4 are tag maps depicting, for the ABG proper and ABG surrounding areas, respectively, the locations and concentrations of positively detected organic parameters and total metals. These figures also highlight parameters detected at concentrations exceeding risk-based target levels.

Piper diagrams (Figures 5 and 6, respectively) were constructed for the Beech Creek and Beaver Bend Aquifers. These Piper diagrams were used to determine if changes in the behavior of the aquifers have occurred that could result in the need to modify the existing ground water monitoring program. Comparisons of Figures 5 and 6 were made to the Piper Diagrams in the Section 7.5 of the approved Ground Water Monitoring Plan (GWMP).

The Piper diagram for the Beech Creek Aquifer (Figure 5) shows a calcium+magnesium-bicarbonate chemistry. This chemistry is consistent with the chemistry shown on the Piper diagram for the Beech Creek Aquifer found in the Section 7.5 of the GWMP, thus confirming that the behavior of the Beech Creek Aquifer has not changed.

The Piper diagram for the Beaver Bend Aquifer shows a sodium+potassium-bicarbonate chemistry. Comparison with the Piper diagram for the Beaver Bend Aquifer found in Section 7.5 of the GWMP

indicates that a similar chemistry exists, thus confirming that the behavior of the Beaver Bend Aquifer has not changed.

Following is a listing of the documentation provided in this report.

ABG FIELD SAMPLING ACTIVITIES

Samples were collected from 18 monitoring wells, 1 surface water location, and 2 springs at the ABG. Field chemical analysis for natural attenuation parameters was performed for the third time.

Attachment 1 contains a summary of the field activities.

Attachment 2 contains the Monitoring Well Inspection Forms.

Attachment 3 contains the Water Level Measurement Forms.

Attachment 4 contains the Low Flow Purge Data Form and the Ground Water Sample Log Form for each monitoring well that was sampled.

Attachment 5 contains the Surface Water Sample Log Form for each surface water and spring location that was sampled.

Attachment 6 contains the Field Chemical Analysis Log Form for each monitoring point at which field chemical analysis was conducted.

Attachment 7 contains a copy of the Chain of Custody (COC) records as completed by the TtNUS field staff. Because their size (8"x14") does not allow for them to be included in a binder, the original COC records are provided separately for inclusion in the Crane Ground Water Monitoring Information Repository.

Attachment 8 contains the Equipment Calibration Logs.

Attachment 9 contains a copy of the Field Notebook pages.

LABORATORY ANALYSIS

Eighteen ground water, one surface water, and two spring water samples were analyzed for the parameters indicated in Table 4-2 of the Field Sampling Plan for RCRA Ground Water Monitoring at the Ammunition Burning Grounds, Old Rifle Range, and Demolition Range. All analyses were conducted in accordance with the procedures described in the May 1999 Quality Assurance Project Plan (QAPP).

Attachment 10 contains a tabular summary of the results for all parameters that were analyzed.

Attachment 11 contains a tabular summary of positive detections, as printed from the TtNUS database, for all parameters that were positively detected in one or more samples.

Attachment 12 contains a tabular summary of trip blank results.

Attachment 13 contains the data packages and electronic deliverable received from Laucks Testing Laboratories, Inc. Also included for the NSWC information repository in Attachment 13 is one copy of the TtNUS electronic database file after data validation was completed. Please note that this attachment is voluminous and is provided separately for inclusion in the Crane Ground Water Monitoring Information Repository. This attachment is not included in all copies of this report.

Attachment 14 contains the data validation letters for the Laucks Testing Laboratories, Inc., data. TtNUS conducted the data validation. This attachment is also included separately for inclusion in the Crane Ground Water Monitoring Information Repository. This attachment is not included in all copies of this report.

Attachment 15 contains the Microseeps, Inc., data packages, electronic deliverable, and data validation letters. TtNUS conducted the data validation. This attachment is also included separately for inclusion in the Crane Ground Water Monitoring Information Repository. This attachment is not included in all copies of this report.

Attachments 13, 14, and 15, as well as the original COC forms previously mentioned, constitute Volume II of this report. One copy each of these attachments is provided separately (to Tom Brent's attention) in two banker's boxes for inclusion in the NSWC Crane Ground Water Information Repository.

Please contact Ralph Basinski at 412/921-8308 (e-mail basinskir@ttnus.com) or Daneen Resnick at 412/921-8714 (e-mail resnickd@ttnus.com) regarding questions and or comments.

Sincerely,

Ralph R. Basinski

Ralph R. Basinski
Task Order Manager

RRB/vvp

Enclosures

c: Mr. Tom Brent, NSWC Crane, (w/enclosures - 3 copies of Volume 1, 1 copy of Volume 2)
Ms. D. Wroblewski, (w/o enclosures)
Mr. M. Perry, Project File CTO 0038 (unbound - w/enclosures - 1 copy of Volume 1) (Volume 2 maintained at TtNUS Warehouse)

TABLE 1

AMMUNITION BURNING GROUNDS
GROUND WATER/SURFACE WATER/SPRING WATER MONITORING POINTS
MONITORING EVENT NO. 4
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

Monitoring Points	Screened Formation
03B02	Al
03B04	Al
03C02P2	BC
03C03	BB
03C04	BC
03C07	BC
03C08P2	BC
03C09P2	BC
03C10	BC
03C11	BC
03C12	BC
03C15	BC
03C17	BC
03C20	BC
03C25	BC
03C26	BC
03C27	BC
03C30	BC
Little Sulphur Creek Below Spring A	Not sampled due to lack of water
Little Sulphur Creek at Boundary	NA
Spring A	NA
Spring C	NA

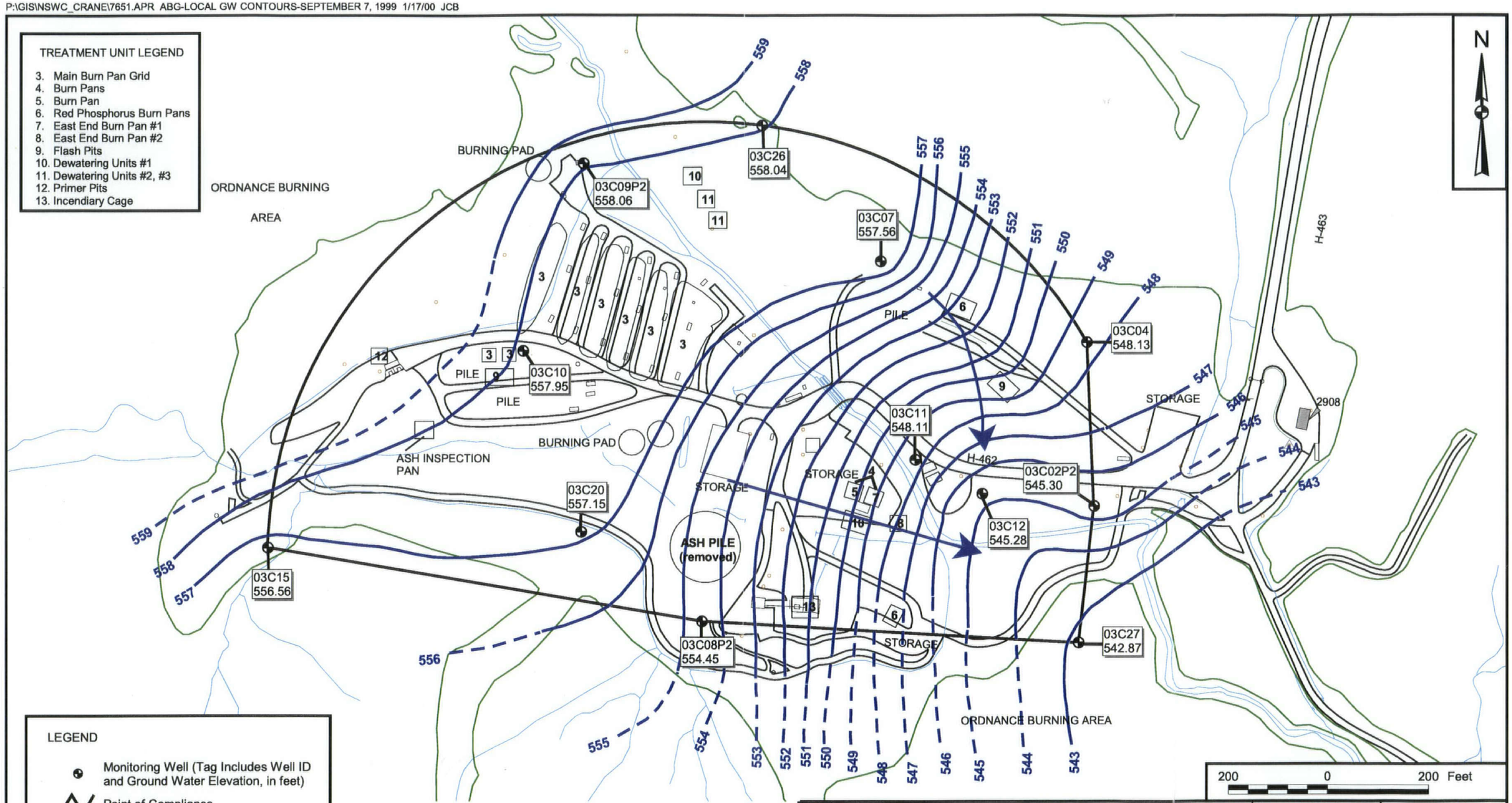
Legend:

Al - Alluvium
BB - Beaver Bend
BC - Beech Creek
NA – Not applicable

TABLE 2
SUMMARY OF PARAMETERS DETECTED AT LEAST ONCE
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03B02	03B04	03C02P2	03C02P2	03C03	03C03	03C04	03C07	03C08P2	03C09P2	03C10	03C11	03C12	03C15	03C17	03C20	03C25	03C26	03C27	03C30	CRB	SPRING A	SPRING C	SPRING C
Aquifer	ALLUVIUM	ALLUVIUM	BEECH CREEK	BEECH CREEK	BEAVER BEND	BEAVER BEND	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK				
Matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	SW	SW	SW	SW
Nsample	AB023A99	AB043A99	AC02P23A99	AC02P23A99-D	AC033A99	AC033A99-D	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	ASPC3A99-D
Sample	AB023A99	AB043A99	AC02P23A99	FD09079901	AC033A99	FD09119901	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	FD09139901
SA Code	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP
Sample Date	9/9/99	9/9/99	9/7/99	9/7/99	9/11/99	9/11/99	9/11/99	9/11/99	9/12/99	9/11/99	9/8/99	9/10/99	9/8/99	9/8/99	9/9/99	9/14/99	9/10/99	9/12/99	9/8/99	9/10/99	9/13/99	9/13/99	9/13/99	9/13/99
Duplicate				AC02P23A99		AC033A99																		ASPC3A99
Volatile Organics (ug/L)																								
1,2-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				25	0.5 U	0.5 U				0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.4	0.3 U	0.3 U				0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CHLOROFORM	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.9	2.1	0.3 U				0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	14	0.5 U	0.5 U	8.9	0.5 U	0.5 U	0.5 U	77	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.5 U	0.5 U	10	10	0.5 U	0.5 U	0.5 U	4.3	63	170	61	2300	21	0.5 U	0.5 U	3400	0.5 U	8.9	4.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dissolved Gases (ug/L)																								
ETHANE	0.091	0.048			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U				0.044				0.006	0.005 U	0.005 U	0.005 U
ETHENE	0.028	0.005 U			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U				0.005 U				0.005 U	0.005 U	0.005 U	0.005 U
METHANE	7.4	7.2			0.37	0.31	1.8				0.095	0.051	0.08				43.8				9	0.048	0.059	0.07
Energetics (ug/L)																								
1,3,5-TRINITROBENZENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	6.7 J	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2,4,6-TRINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	1.8	0.31 U	0.4 U
2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.94	0.58 J	0.51 U	0.75 U	1.4 U	1.4 U	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2-AMINO-4,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	2.1 J	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	12	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	2.1	0.31 U	0.4 U
3,5-DINITROANILINE	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U				0.79 U				0.52 U	0.94	0.31 U	0.4 U
4-AMINO-2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.4 J	3.9 J	0.31 U	1.3 J	0.56 J	0.75 U	1.4 U	1.4 U	19	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	4.9	0.31 U	0.4 U
HMX	0.3 U	0.64 U	29	27	0.70 U	0.48 U	1.5 U	5.3 J	31	2.9	6.8	5.4	38	1.4 U	1.4 U	26	0.79 U	0.61 U	0.86 U	0.25 U	3.4	31	0.51	0.54
MNX	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				3	0.51 U	0.75 U				0.79 U				0.52 U	2.4 J	0.31 U	0.4 U
RDX	0.3 U	0.64 U	17	16	0.70 U	0.48 U	1.5 U	21	86	130	100	25	28	1.4 U	1.4 U	170	0.79 U	0.8	0.86 U	0.25 U	3.8	120	0.72	0.77
Total Metals (ug/L)																								
ARSENIC	10.3	6.3	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1	2.2	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM	88.0	95.0	105	105	42.3	43.7	30.6	31.9	81.8	15.2	45.6	23.1	96.9	25.1	13.2	30.4	16.8	41.6	33.0	17.2	158	142	70.2	68.9
COPPER	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.9	2.2 U	30.1	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
IRON	12100	6790			111 U	111 U	190				111 U	111 U	111 U				201				517	111 U	118	111 U
LEAD	1.1 UJ	1.1 UJ	4.0 J	1.1 UJ	1.1 U	1.1 U	1.1 U	8.3	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 UJ	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
MANGANESE	1210	1760	16.7 U	16.7 U	16.7 U	16.7 U	908	16.7 U	16.7 U	30.9	16.7 U	16.7 U	16.7 U	36.2	140	16.7 U	29.7	20.1	16.7 U	26.7	362	16.7 U	16.7 U	16.7 U
SELENIUM	1.1 U	1.1 U	3.1	2.0	1.1 U	1.1 U	2.3	1.8	2.6	2	3.0	4.4	1.2	2.0	1.3	1.3	1.1 U	1.3	1.1 U	1.1 U	1.1 U	1.6	1.1 U	1.2
ZINC	11.1 UJ	13.4 J	193 J	11.1 UJ	11.1 U	11.1 U	11.1 U	33.9	11.1 U	11.1 U	11.1 UJ	11.1 U	11.1 UJ	11.1 UJ	11.1 U	11.1 U	11.1 U	11.1 U	20.6 J	11.1 U	11.9	11.1 U	11.1 U	11.1 U
Dissolved Metals (ug/L)																								
ARSENIC, FILTERED	10.9	6.4	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2	2	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM, FILTERED	91.3	107	105	105	49.7	45	31.7	32.9	89.6	15.3	44.0	27	99.6	24.9	13.8	34.4	18.1	47.3	33.2	73	158	154	71.8	72.2
CALCIUM, FILTERED	47300	29500	119000	122000	1430	1470	147000	97100	119000	76800	93300	237000	106000	105000	204000	92200	104000	106000	57100	52800	48100	71800	58800	57700
CHROMIUM, FILTERED	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	7.6	5.6 U	5.6 U	5.6 U	7.3	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
COPPER, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.2 J	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
MAGNESIUM, FILTERED	5920	4150	17600	17700	1110 U	1110 U	193000	46000	41300	14900	12300	121000	7510	43800	196000	31100	59600	55700	3030	33300	9090	15800	12200	12100
MANGANESE, FILTERED	1250	1730	16.7 U	16.7 U	16.7 U	16.7 U	102	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	35.7	130	16.7 U	23.8	20.7	16.7 U	16.7 U	356	16.7 U	16.7 U	16.7 U
NICKEL, FILTERED	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	24	13.1	15.6	11.1 U	11.1 U	33.4	11.1 U	11.1 U	30.7	11.1	15.7	12.9	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
POTASSIUM, FILTERED	1350	1110 U	2930	2950	1190	1300	3220	3500	26800	1450	1130	4770	2160	2110	3300	2130	2640	3110	1400	3630	2320	2780	1240	1180
SELENIUM, FILTERED	1.1 U	1.1 U	3.3	2.8	1.1 U	1.1 U	2.6	2	1.8	1.6	4.2	3.4	1.3	2.2	1.3	1.1 U	1.1 U	1.2	1.2	1.1 U	1.1 U	1.1	1.1 U	1.1 U
SODIUM, FILTERED	9560	5790	33800	32800	221000	235000	51100	22400	19000	4810	7960	88400	12900	25400	119000	12700	66100	68500	5720	80700	6370	11400	6710	6590
ZINC, FILTERED	11.1 U	11.1 U	32.2	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	81 J	11.1 U	11.1 U	11.1 U	14 J	14.6 J	11.1 U	11.1 U	11.1 U	11.1 U	32.8 J	11.1 U	11.1 U
Miscellaneous																								
ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353	198	328	301	116.4	229	167	158	165	136
BICARBONATE ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353	198	328	301	116.4	229	167	158	165	136
CARBON DIOXIDE (MG/L)	120	60	113.8		33.0	34.1	106				101	131	63.6				93				38.3	37.9	39.8	40.7
CHLORIDE (MG/L)	4	1	77	73	1	1	6	8	13	5	8	46	34	4	3	5	2	3	3	2	6	11	4	4
CYANIDE (MG/L)	0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
DISSOLVED OXYGEN-HACH (MG/L)	0.2	1.5	9.0		0.15	0.15	2				2.5	5	8				0.28				6	12	11	11
DISSOLVED OXYGEN-METER (MG/L)	1.10	3.11	9.4		3.15	3.15	6.57	3.82	7.01	8.04	3.71	8.45	7.48	3.3	2.14	4.66	1.4	5.50	10.46	3.04	6.34	11.12	11.06	11.06
FERROUS IRON (MG/L)	3.3 >	3.3 >			0	0	0.03				0.02	0.04	0				0.15				0.01	0.01	0.01	0
NITRATE (MG/L)	0	0			0.05	0.05	0.02				2.43 >	2.43 >	2.43				0.03				1.70	2.43	1.82	1.71
NITRITE (MG/L)	0	0			0	0.005	0				0	0.006	0.001				0.002				0.001	0.001	0.001	0.001
OXIDATION REDUCTION POTENTIAL (MV)	-141.5	-98	146		2		-3	107.5	93	96	182.9	-5.8	167	-50	-71.0	125.0	-70.3	125.9	210.5	-61	19	132.6	147	
PH ()	7.26	6.88	6.73		9.21		7.18	7.24	7.22	6.77	6.57	7.19	7.11	7.02	7.02	7.25	7.16	7.22	7.62	9.44	7.41	7.60	7.55	
SPECIFIC CONDUCTIVITY (MS/CM)	0.373	0.215	0.843		0.903		1.884	0.87	0.829	0.488	0.561	1.92	0.782	0.856	2.26	0.577	1.09	0.744	0.314	0.675	0.307	0.434	0.620	
SULFATE (MG/L)	28	17	62	60	83	86	810	92	130	51	58	820	61	160	1000	99	270	94	12	120	31	59	49	48
SULFIDE (MG/L)	1 UJ	1 UJ			1 UJ	1 UJ	1 UJ				1 J	1 UJ	2 J				1 UJ				1 UJ	1 UJ	1 UJ	1 UJ
SULFIDE (MG/L)	0.04	0.01			0.01	0	0				0.03	0.03	0.01				0.13				0.01	0	0.02	0.01
TEMPERATURE (C)	16.5	16.05	15.8		15.5		18.9	23.33	21.5	17.1	18.33	19.41	17.37	14.99	17.21	16.16	13.6	17.08	14.7	16.0	19.3	11.74	11.9	
TOTAL ORGANIC CARBON (MG/L)	5.1 J	7.3 J	10 J	9.9	7.7 J	8.9 J	7.8 J	8 J	7.4 J	11 J	7 J	7.2 J	8.6 J	7.4 J	8.8 J	11 J	8.6 J	6.7 J	7	7.8 J	7 J	7.5 J	8 J	5 J
TOTAL ORGANIC HALOGENS (MG/L)	0.02 U	0.02 U	0.02 U	0.02 U	0.04	0.02 U	0.02 U	0.02	0.05	0.13	0.06	1.4	0.04	0.02 U	0.02 U	2.3	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
TURBIDITY (NTU)	3.3	1	2		1		2	0	2	6	1.8	3.8	0	0	0	0	1.5	0	1.4	0	5	4.2	1	
WATER LEVEL (FT)	6.51	8.03	37.6		88.0		76.13	78.76	74.7	45.32	49.97	44.15	41.85	64.54	138.07	89.4	46.76	62.58	60.88	223.39				

P:\GIS\NSWC_CRANE\7651.APR ABG-LOCAL GW CONTOURS-SEPTEMBER 7, 1999 1/17/00 JCB



NOTES:
1. Water level measurements taken on September 7, 1999.
2. Figure does not include upgradient well 03C17 or compliance wells 03C25 and 03C30.
3. Contour interval is one (1) foot.

DRAWN BY J. LAMEY	DATE 10/7/99	Tetra Tech NUS, Inc.	CONTRACT NUMBER N7651 / OWNER NUMBER CTO 0038
CHECKED BY S. NEIL	DATE 10/15/99	AMMUNITION BURNING GROUNDS LOCAL GROUNDWATER CONTOUR MAP BEECH CREEK AQUIFER NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	APPROVED BY K. HENN / DATE 1/18/00
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV 0

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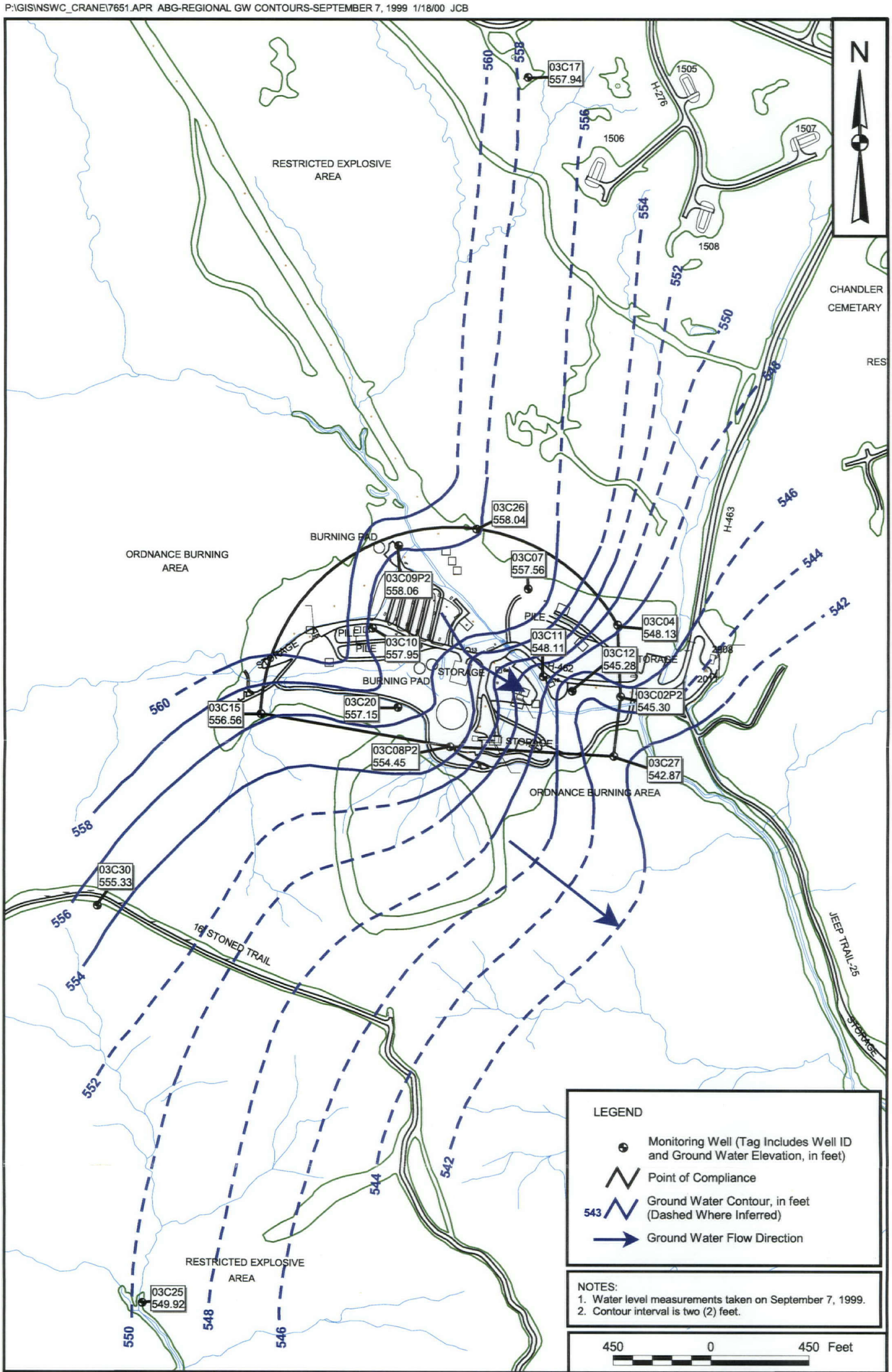
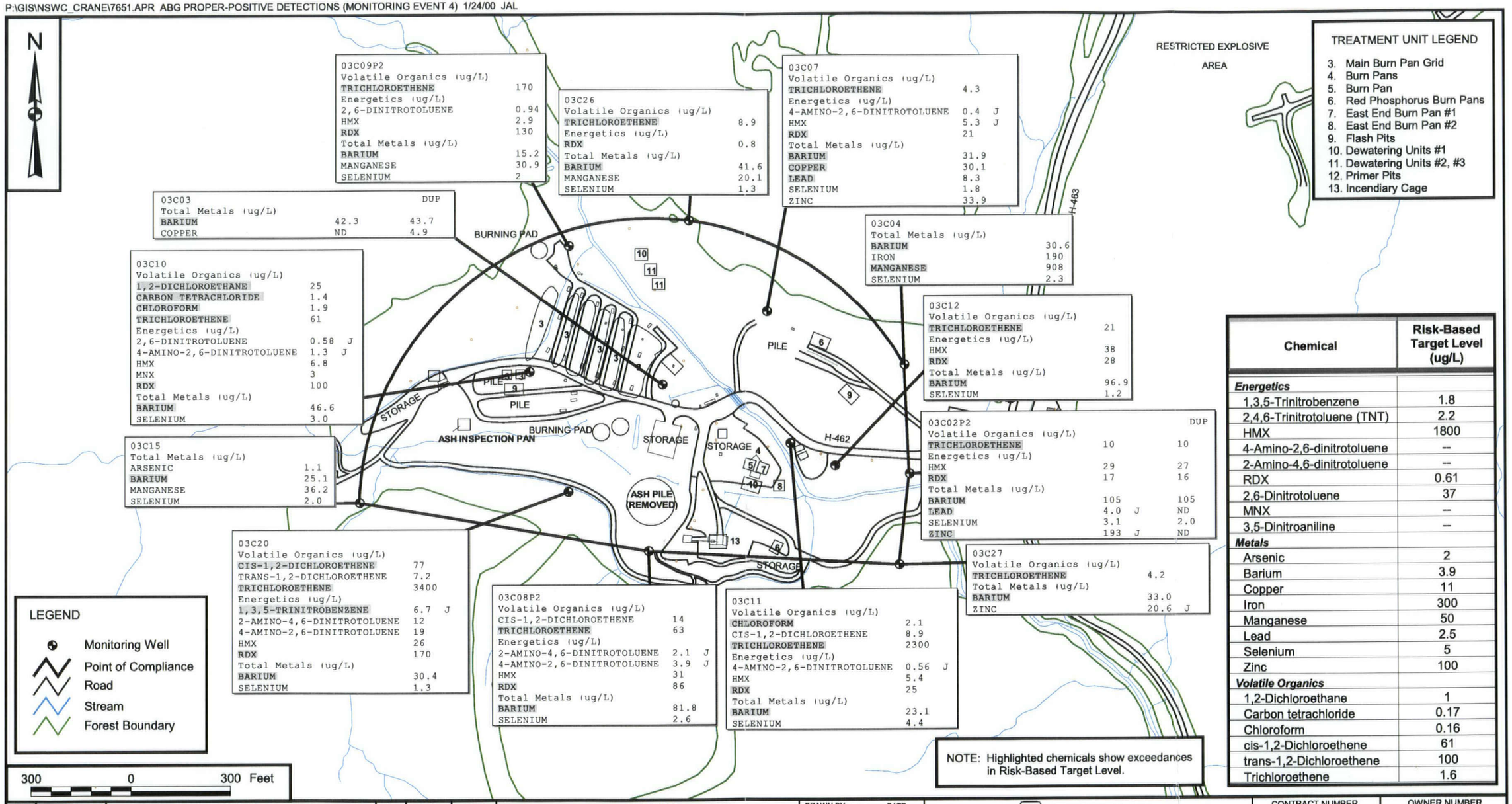


DRAWN BY J. LAMEY — DATE 10/8/99	Tetra Tech NUS, Inc.	CONTRACT NUMBER N7651	OWNER NUMBER CTO 0038
CHECKED BY S. NEIL — DATE 10/15/99	AMMUNITION BURNING GROUNDS REGIONAL GROUND WATER CONTOUR MAP BEECH CREEK AQUIFER NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	APPROVED BY K. HENN	DATE 1/18/00
COST/SCHEDULE-AREA		APPROVED BY —	DATE —
SCALE AS NOTED		DRAWING NO. FIGURE 2	REV 0

P:\GIS\NSWC_CRANE\7651.APR ABG PROPER-POSITIVE DETECTIONS (MONITORING EVENT 4) 1/24/00 JAL



03C09P2
Volatile Organics (ug/L)
TRICHLOROETHENE 170
Energetics (ug/L)
2,6-DINITROTOLUENE 0.94
HMX 2.9
RDX 130
Total Metals (ug/L)
BARIUM 15.2
MANGANESE 30.9
SELENIUM 2

03C26
Volatile Organics (ug/L)
TRICHLOROETHENE 8.9
Energetics (ug/L)
RDX 0.8
Total Metals (ug/L)
BARIUM 41.6
MANGANESE 20.1
SELENIUM 1.3

03C07
Volatile Organics (ug/L)
TRICHLOROETHENE 4.3
Energetics (ug/L)
4-AMINO-2,6-DINITROTOLUENE 0.4 J
HMX 5.3 J
RDX 21
Total Metals (ug/L)
BARIUM 31.9
COPPER 30.1
LEAD 8.3
SELENIUM 1.8
ZINC 33.9

03C03 DUP
Total Metals (ug/L)
BARIUM 42.3 43.7
COPPER ND 4.9

03C04
Total Metals (ug/L)
BARIUM 30.6
IRON 190
MANGANESE 908
SELENIUM 2.3

03C10
Volatile Organics (ug/L)
1,2-DICHLOROETHANE 25
CARBON TETRACHLORIDE 1.4
CHLOROFORM 1.9
TRICHLOROETHENE 61
Energetics (ug/L)
2,6-DINITROTOLUENE 0.58 J
4-AMINO-2,6-DINITROTOLUENE 1.3 J
HMX 6.8
MNX 3
RDX 100
Total Metals (ug/L)
BARIUM 46.6
SELENIUM 3.0

03C12
Volatile Organics (ug/L)
TRICHLOROETHENE 21
Energetics (ug/L)
HMX 38
RDX 28
Total Metals (ug/L)
BARIUM 96.9
SELENIUM 1.2

03C15
Total Metals (ug/L)
ARSENIC 1.1
BARIUM 25.1
MANGANESE 36.2
SELENIUM 2.0

03C02P2 DUP
Volatile Organics (ug/L)
TRICHLOROETHENE 10 10
Energetics (ug/L)
HMX 29 27
RDX 17 16
Total Metals (ug/L)
BARIUM 105 105
LEAD 4.0 J ND
SELENIUM 3.1 2.0
ZINC 193 J ND

03C20
Volatile Organics (ug/L)
CIS-1,2-DICHLOROETHENE 77
TRANS-1,2-DICHLOROETHENE 7.2
TRICHLOROETHENE 3400
Energetics (ug/L)
1,3,5-TRINITROBENZENE 6.7 J
2-AMINO-4,6-DINITROTOLUENE 12
4-AMINO-2,6-DINITROTOLUENE 19
HMX 26
RDX 170
Total Metals (ug/L)
BARIUM 30.4
SELENIUM 1.3

03C08P2
Volatile Organics (ug/L)
CIS-1,2-DICHLOROETHENE 14
TRICHLOROETHENE 63
Energetics (ug/L)
2-AMINO-4,6-DINITROTOLUENE 2.1 J
4-AMINO-2,6-DINITROTOLUENE 3.9 J
HMX 31
RDX 86
Total Metals (ug/L)
BARIUM 81.8
SELENIUM 2.6

03C11
Volatile Organics (ug/L)
CHLOROFORM 2.1
CIS-1,2-DICHLOROETHENE 8.9
TRICHLOROETHENE 2300
Energetics (ug/L)
4-AMINO-2,6-DINITROTOLUENE 0.56 J
HMX 5.4
RDX 25
Total Metals (ug/L)
BARIUM 23.1
SELENIUM 4.4

03C27
Volatile Organics (ug/L)
TRICHLOROETHENE 4.2
Total Metals (ug/L)
BARIUM 33.0
ZINC 20.6 J

NOTE: Highlighted chemicals show exceedances in Risk-Based Target Level.

TREATMENT UNIT LEGEND

3. Main Burn Pan Grid
4. Burn Pans
5. Burn Pan
6. Red Phosphorus Burn Pans
7. East End Burn Pan #1
8. East End Burn Pan #2
9. Flash Pits
10. Dewatering Units #1
11. Dewatering Units #2, #3
12. Primer Pits
13. Incendiary Cage

Chemical	Risk-Based Target Level (ug/L)
Energetics	
1,3,5-Trinitrobenzene	1.8
2,4,6-Trinitrotoluene (TNT)	2.2
HMX	1800
4-Amino-2,6-dinitrotoluene	--
2-Amino-4,6-dinitrotoluene	--
RDX	0.61
2,6-Dinitrotoluene	37
MNX	--
3,5-Dinitroaniline	--
Metals	
Arsenic	2
Barium	3.9
Copper	11
Iron	300
Manganese	50
Lead	2.5
Selenium	5
Zinc	100
Volatile Organics	
1,2-Dichloroethane	1
Carbon tetrachloride	0.17
Chloroform	0.16
cis-1,2-Dichloroethene	61
trans-1,2-Dichloroethene	100
Trichloroethene	1.6

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY J. LAMEY DATE 1/20/00
CHECKED BY D. RESNICK DATE 1/21/00
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

AMMUNITION BURNING GROUND PROPER
POSITIVE DETECTIONS - ORGANIC PARAMETERS AND TOTAL METALS
MONITORING EVENT 4
NSWC CRANE, INDIANA

CONTRACT NUMBER N7640
OWNER NUMBER —
APPROVED BY — DATE —
APPROVED BY — DATE —
DRAWING NO. FIGURE 3
REV 0

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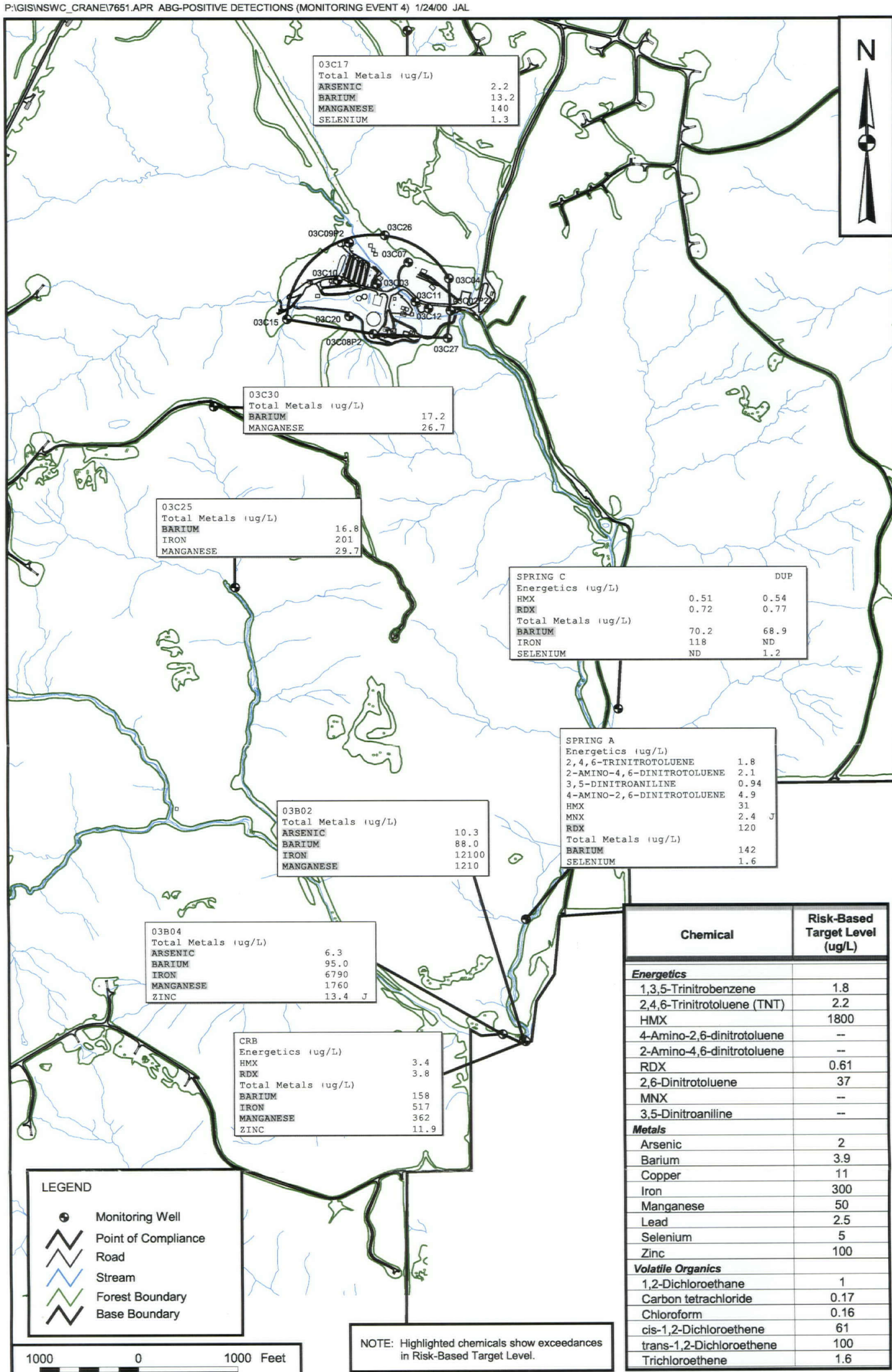
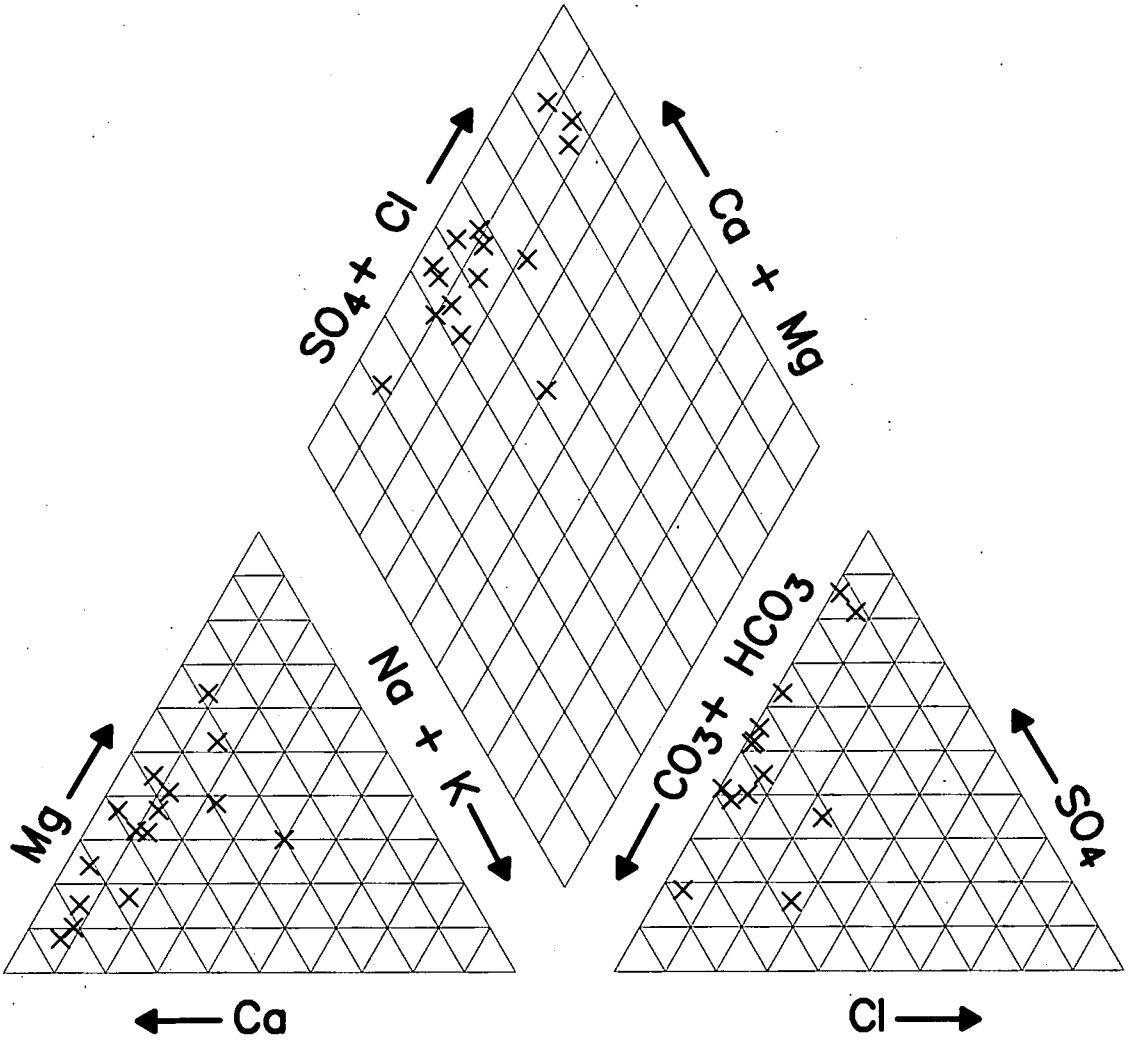


Chemical	Risk-Based Target Level (ug/L)
Energetics	
1,3,5-Trinitrobenzene	1.8
2,4,6-Trinitrotoluene (TNT)	2.2
HMX	1800
4-Amino-2,6-dinitrotoluene	--
2-Amino-4,6-dinitrotoluene	--
RDX	0.61
2,6-Dinitrotoluene	37
MNX	--
3,5-Dinitroaniline	--
Metals	
Arsenic	2
Barium	3.9
Copper	11
Iron	300
Manganese	50
Lead	2.5
Selenium	5
Zinc	100
Volatile Organics	
1,2-Dichloroethane	1
Carbon tetrachloride	0.17
Chloroform	0.16
cis-1,2-Dichloroethene	61
trans-1,2-Dichloroethene	100
Trichloroethene	1.6

NOTE: Highlighted chemicals show exceedances in Risk-Based Target Level.

DRAWN BY J. LAMEY	DATE 1/20/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER N7640	OWNER NUMBER —
CHECKED BY D. RESNICK	DATE 1/21/00	AMMUNITION BURNING GROUND SURROUNDING AREAS POSITIVE DETECTIONS - ORGANIC PARAMETERS AND TOTAL METALS MONITORING EVENT 4 NSWC CRANE, INDIANA	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4	REV 0

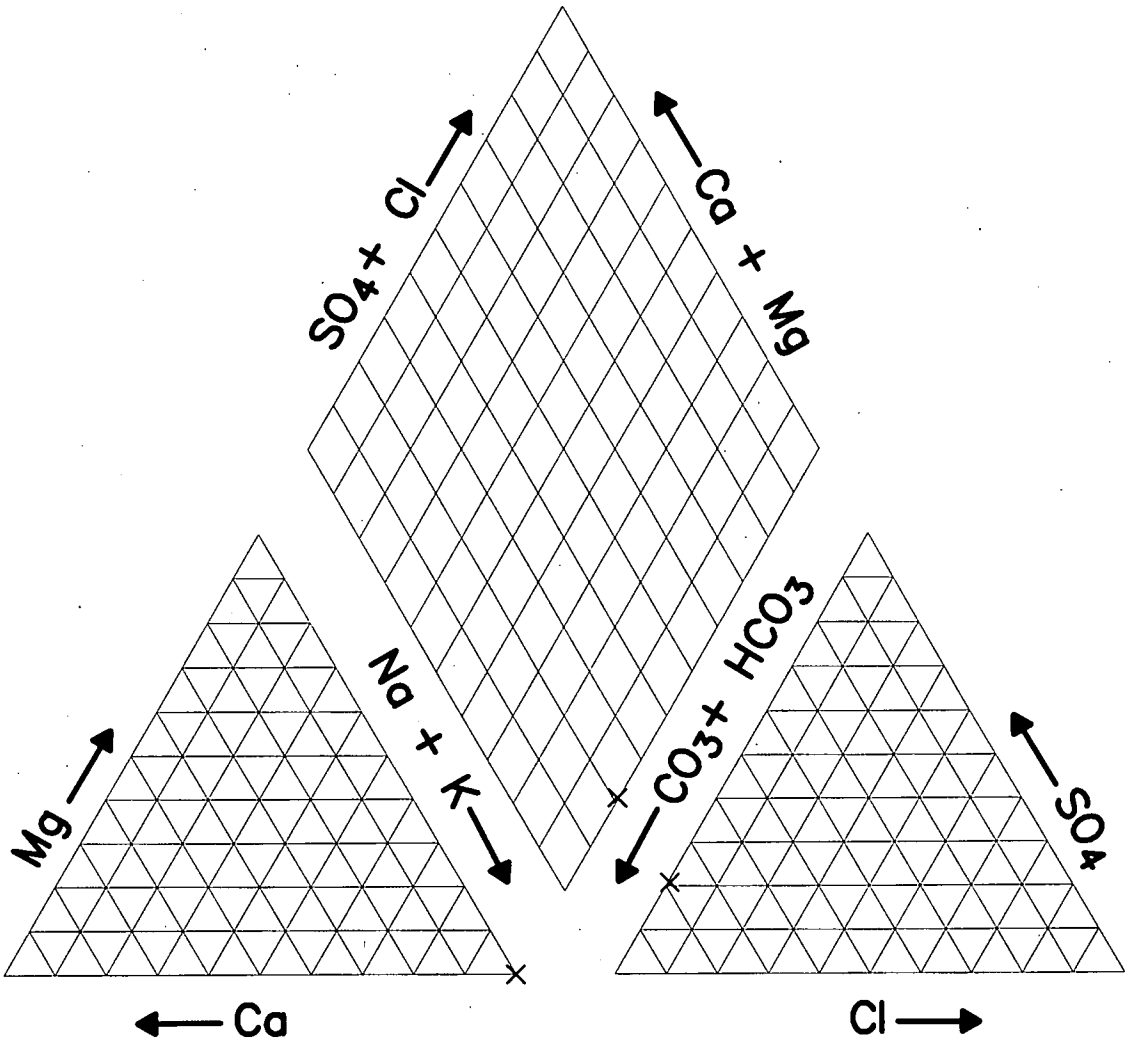
ACAD: 7651KD07.dwg 01/24/00 HJP



DRAWN BY MF DATE 1/21/00		PIPER DIAGRAM OF WATER CHEMISTRY ANALYSIS BEECH CREEK AQUIFER WELLS AMMUNITION BURNING GROUNDS SEPTEMBER 7–14, 1999 NSWC CRANE, INDIANA	CONTRACT NO. 7651
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 5 / REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

ACAD: 7651KD08.dwg 01/24/00 HJP



DRAWN BY HJP DATE 10/7/99		PIPER DIAGRAM OF WATER CHEMISTRY ANALYSIS BEAVER BEND AQUIFER WELLS AMMUNITION BURNING GROUNDS SEPTEMBER 11, 1999 NSWC CRANE, INDIANA	CONTRACT NO. 7651
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 6 / REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

ATTACHMENT 1

SUMMARY OF FIELD ACTIVITIES
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC CRANE, IN
CTO 38
SUMMARY OF FIELD ACTIVITIES
SEPTEMBER 6, 1999 THROUGH SEPTEMBER 15, 1999

The following is a summary of field activities conducted for RCRA Monitoring Event #4 from September 6, 1999 through September 15, 1999, during one 10-day work shift, at the NSWC Crane facility, Crane, Indiana. RCRA Monitoring Event #4 sampling was completed for all monitoring points at the Ammunition Burning Grounds (ABG). Creek A surface water location (ACRA3A99) was not sampled; due to the ongoing drought, there was no flow at this location. Field chemical analysis was also completed, on-site, for all monitoring points. Monitoring Event #4 sampling was conducted following the May 1999 Field Sampling Plan (FSP).

Monitoring Point Sampling:
Monitoring Event #4 sampling was completed for all monitoring wells and three of the four surface water points (19 wells, 1 surface water, and 2 spring waters) at the ABG. As previously noted, absence of water flow at the Creek A location prevented collection of surface water from this location during this sampling event. All samples to be analyzed at a fixed base laboratory were shipped, via over-night courier, to Laucks Testing Laboratory, Inc., Triangle Laboratory, Inc., and Microseeps, Inc. Field chemical analysis for various parameters (see FSP Table 4-2 and FSP Appendix D for parameter list) was conducted on site for all monitoring points sampled. A HACH brand portable Colorimeter, and/or Digital Titrator and CHEMetrics' ampoules were used for the field chemical analysis of all samples. Purge water generated during the sampling effort was transported (via 8 gal. containers) and discharged into NSWC-permitted sanitary sewer system on site via manhole #327. See the table below for a list of monitoring points and dates sampled.

- **TtNUS personnel on site:**
  Keith Simpson, Scott Neil, and Seth Pelepko

For more details on any of the above activities, see the following: log books, sample log forms, and COCs.
Log book numbers: 2426, 1309, 2456, and 2397

The following table lists monitoring point sample dates and quality control (QC) samples taken.

SITE	MONITORING POINT	SAMPLE DATE	QC SAMPLES
ABG	3B02	9/9/99	
ABG	3B04	9/9/99	
ABG	3C02P2	9/7/99	DUP & MS/MSD
ABG	3C03	9/11/99	DUPLICATE
ABG	3C04	9/10-12/99	
ABG	3C07	9/11/99	
ABG	3C08P2	9/12/99	
ABG	3C09P2	9/11/99	
ABG	3C10	9/8/99	
ABG	3C11	9/10/99	
ABG	3C12	9/8/99	
ABG	3C15	9/8/99	
ABG	3C17	9/9/99	
ABG	3C20	9/14/99	
ABG	3C25	9/10/99	
ABG	3C26	9/12/99	
ABG	3C27	9/8/99	
ABG	3C30	9/10/99	
ABG	CRA	NA	DRY
ABG	CRB	9/13/99	
ABG	SPA	9/13/99	
ABG	SPC	9/13/99	DUP & MS/MSD

ATTACHMENT 2

MONITORING WELL INSPECTION FORMS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03B02

Time: 1540 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible		✓	NO TAG, LID IS STAMPED
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03B4

Time: 1544 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. S. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C02P2

Time: 1341 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments: I U TRANSDUCER

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C3

Time: 1402 **Date:** 9-7-99 **Inspector's Name:** R. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) R. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C04

Time: 1445 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. S. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C07

Time: 1449 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C8P2

Time: 1435 **Date:** 9-7-99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C9P2

Time: 1410 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. S. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C10

Time: 1413 **Date:** 9.7.99 **Inspector's Name:** R. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		BENT RISER (HAS BEEN BENT)

Comments:

Signature(s) R. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C11

Time: 1356 **Date:** 9.7.99 **Inspector's Name:** R. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C12

Time: 1352 **Date:** 9.7.99 **Inspector's Name:** R. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		WES EXPOSED STICK-UP
Well seal	Condition of...	✓		IT WAS 1/2 BELOW GRADE
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) R. S. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C15

Time: 1420 **Date:** 9-7-99 **Inspector's Name:** R. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) R. E. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C17

Time: 1314

Date: ~~1314~~ KS 9-7-99

Inspector's Name: K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C20

Time: 1426 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 63 C25

Time: 1555 **Date:** 9-7-99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C26

Time: 1455 **Date:** 9-7-99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. S. Simpson

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C27

Time: 1345 **Date:** 9.7.99 **Inspector's Name:** R SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) [illegible]

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

NSWC Crane
Field Form
Revision: 0
January 1999

MONITORING WELL INSPECTION FORM

Well ID: 03C30

Time: 1256 **Date:** 9.7.99 **Inspector's Name:** K. SIMPSON

Inspection Item	Types of Problems	Status		Observation
		S	U	
Well Tag	Is it in-place, legible	✓		
Well security	Condition protective case, cap, lock	✓		
Well pad	Concrete or gravel & condition	✓		
Well seal	Condition of...	✓		
Area Immediately around well pad	Record any evidence of/or standing water in area of well	✓		
Dedicated sampling equipment	Condition of...	✓		
PVC Riser	Condition of riser & survey reference point	✓		

Comments:

Signature(s) K. S.

Note: S= Satisfactory, U= Unsatisfactory
Check one, if unsatisfactory explain

ATTACHMENT 3

WATER LEVEL MEASUREMENT FORMS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC Crane
Field Form
Revision: 0
January 1999

WATER LEVEL MEASUREMENT FORM

Project Name: NSWC Crane
Location: Crane, IN
Weather Conditions: SUNNY 80°F

Project No.: CTO 38 7651
Personnel: R. SIMPSON
Measuring Device: DIPPER T - HERRON BRAND
Remarks:

Well ID	Date	Time	Water Level *	Thickness of Free Product *	PID Reading ppm RP	PID Reading ppm BZ	Comments
03B02	9.7.99	1540	6.51	0	0	0	
03B04		1544	8.03		0	0	
03C02P2		1341	37.60		0	0	
03C03		1402	88.00		0	0	
03C04		1445	76.13		0	0	
03C07		1449	78.76		0	0	
03C08P2		1435	~~74.63~~ 1KS	74.70	0	0	74.70'
03C09P2		1410	45.32		0	0	
03C10		1413	49.97		0	0	
03C11		1356	44.15		0	0	
03C12		1352	41.85		0	0	
03C15		1420	64.54		0	0	

* All measurements to the nearest 0.01 foot

Signature(s): R. S. Simpson

NSWC Crane
Field Form
Revision: 0
January 1999

WATER LEVEL MEASUREMENT FORM

Project Name: NSWC Crane
Location: Crane, IN
Weather Conditions: SUNNY 80 °F

Project No.: CTO 387651
Personnel: K. SIMPSON
Measuring Device: DIPPER T - HERRON BRAND
Remarks:

Well ID	Date	Time	Water Level *	Thickness of Free Product *	PID Reading ppm RP	PID Reading ppm BZ	Comments
03C17	9.7.99	1314	138.07	0	0	0	(138.07')
03C20		1426	89.40		0	0	
03C25		1555	KS ~~35~~ 46.76		0	0	(46.76')
03C26		1455	82.58		0	0	
03C27		1345	60.88		0	0	
03C30		1256	223.39		0	0	USED 300' M-SCOPE

* All measurements to the nearest 0.01 foot

Signature(s): K. S. Simpson

ATTACHMENT 4

LOW FLOW PURGE DATA FORMS/GROUND WATER SAMPLE LOG FORMS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AB023A99
Sample Location: 03B02
Sampled By: S. Petrko
C.O.C. No.: 67, 68, 69, 70

SAMPLING DATA:

Date: 09-09-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 0914 End: 1125	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	Clear	7.26	0.373	16.50	3.3	1.10	-141.5	-n.a.-

PURGE DATA:

Date: 09-09-99	Total Well Depth (TD): 18.60 FT	End Purge (hrs): 0914
Method: Dedicated Bladder Pump	Static Water Level (WL): 5.48 FT	Total Purge Time (min): 72
Well Casing: 2" PVC	Start Purge (hrs): 0902	Total Vol. Purged (gal): 2.43
One Casing Volume(gal): 1.99		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	0914
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	0925
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	0930
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	0934
Explosives (Subsets A)	4°C/Dark (3)	(~~2~~) 1000 mL Amber Glass	0939, 0948, 0955
Explosives (Subsets B) (Picric Acid)	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1007, 1015
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1024
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1031
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1040
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1041
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1049
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1059
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1106
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1116

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative: Cyanide has light blue-green tint. white precipitate in sulfide.

Sulfide at wellhead = 0.04 mg/L
DO = 0.20 mg/L at wellhead.

QA Samples Collected:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651
WELL ID.: ABG-03B02
DATE: 09-09-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0809	6.60	145	7.21	0.734	203.7	1.54	16.06	-117.1	
0814	6.63	145	7.28	0.419	408.3	2.17	16.19	-135.0	
0819	6.63	145	7.27	0.396	135.3	0.98	16.22	-136.0	
0824	6.64	120	7.27	0.384	170.0	1.23	16.28	-133.6	Decrease pumping rate
0829	6.64	120	7.28	0.381	25.2	1.19	16.27	-133.0	Clean turbidity probe, calibrate vessel
0839	6.65	120	7.26	0.383	7.5	1.05	16.30	-139.5	Clean turbidity probe
0849	6.63	120	7.29	0.377	8.4	1.11	16.39	-143.2	Clean turbidity probe
0859	6.65	120	7.28	0.377	4.2	1.10	16.43	-145.5	Clean turbidity probe
0909	6.67	120	7.26	0.373	3.3	1.10	16.50	-141.5	

SIGNATURE(S): [signature]

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651/CC038

Sample ID No.: AB043A99
Sample Location: AB6-03B04
Sampled By: S. NEIL
C.O.C. No.: 67, 69, 70

SAMPLING DATA:

Date: 9/9/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 0945 End: 1104	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	6.88	0.215	16.05	1	3.11	-98	NONE

PURGE DATA:

Date: 9/9/99	Total Well Depth (TD): 16.80 FT.	End Purge (hrs): 0940
Method: Dedicated Bladder Pump	Static Water Level (WL): 8.31 FT.	Total Purge Time (min): 60
Well Casing: 2" PVC	Start Purge (hrs): 0840	Total Vol. Purged (gal): 2.4
One Casing Volume(gal): 1.4		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	0945
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	0948
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	0950
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	0953
Explosives (Subsets A) + NITROCELLULOSE	4°C/Dark	3 (2) 1000 mL Amber Glass	0957, 1007
Explosives (Subsets B) PICRIC ACID	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1012
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1022
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1028
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1033
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1035
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1042
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1048
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1058
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1104

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 1.7 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Chemets Check:
Alkalinity = 83 mg/L @ 1118
Carbon Dioxide = 12 mg/L @ 1125

Reaction of sample to preservative: NONE

Sulfide at wellhead = 0.01 mg/L @ 1109.
DO = 1.5 mg/L @ 1110

QA Samples Collected:

MS/MSD	Duplicate ID No.:
✓	—

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: D3B04
DATE: 9/9/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments	
0840	8.31	—						→	Start purge.	
0845	8.30	120	6.64	0.341	188	7.56	16.71	-72	Increase flow.	600
0850	8.30	144	6.71	0.210	106	3.87	16.55	-85		720
0900	8.30	144	6.78	0.223	6	3.30	16.63	-90		1440
0910	8.30	144	6.82	0.207	3	3.12	16.68	-93		1440
0920	8.30	144	6.86	0.211	1	2.94	16.43	-98	Increase flow.	1440
0930	8.31	180	6.86	0.212	2	3.15	16.03	-95		1800
0940	8.31	180	6.88	0.215	1	3.11	16.05	-98		

SIGNATURE(S): Scott W. Reid

PAGE 1 **OF** ___

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651 / CTO 38

Sample ID No.: AC02P23A99
Sample Location: 03C02P2 (ASG)
Sampled By: S. NEIL
C.O.C. No.: 62, 63, 65, 66, 70

SAMPLING DATA:

Date: 9/7/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1540 End: 1855	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	Clear	6.73	0.843	15.8	2	9.40	146	NONE

PURGE DATA:

Date: 9/7/99	Total Well Depth (TD): 50.90 FT.	End Purge (hrs): 1535
Method: Dedicated Bladder Pump	Static Water Level (WL): 37.60 FT.	Total Purge Time (min): 95 min
Well Casing: 2" PVC	Start Purge (hrs): 1400	Total Vol. Purged (gal):
One Casing Volume(gal): 2.2 gal.		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1540
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1550
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1600, 1640
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1655
Cyanide	NaOH/4°C	(1) ~~500~~ mL Polyethylene 1000 mL	1715
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1735
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1740
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1755
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1815
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1835
Field test	Alkalinity, see SOP 7		1855

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Reaction of sample to preservative:

IU transducer in well.

Chemets DO = 9.0 mg/L

QA Samples Collected:

MS/MSD	Duplicate ID No.:
YES	FD09079901

Signature(s): [illegible]

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER:
WELL ID.: 03C02P2
DATE: 9/7/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments	
1400	37.63							→	Begin purge.	
1405	37.63	125	6.54	0.991	18	8.90	17.68	201	Increase flow rate.	625
1415	37.62	150	6.65	0.851	31	9.53	16.39	184	Increase flow rate.	1050
1425	37.62	187.5	6.67	0.850	14	10.18	15.68	165		1875
1435	37.61	187.5	6.69	0.849	0	9.09	15.96	185		1875
1445	37.61	187.5	6.71	0.846	1	10.52	15.80	156		1875
1455	37.61	187.5	6.70	0.850	0	9.42	15.85	175		1875
1505	37.61	187.5	6.71	0.847	2	9.30	15.86	176		1875
1515	37.61	187.5	6.71	0.845	0	9.44	15.78	163		1875
1525	37.61	187.5	6.72	0.845	1	9.35	15.77	157		1875
1535	37.61	187.5	6.73	0.843	2	9.40	15.82	146		
Begin sampling @ 1540 - sample ID A02P23A99.										

SIGNATURE(S): Scott L. Shed

PAGE 1 **OF** 2

NSWC Crane
Field Form
Revision: 0
January 1999

GROUND WATER SAMPLE LOG FORM

Page 1 of 1

Project Site Name: NSWC CRANE, IN
Project No.: 7051 / CTO 38

Sample ID No.: AC033A99
Sample Location: 03C03-ABSA
Sampled By: S. NEIL
C.O.C. No.: 74, 77, 81

SAMPLING DATA:

Date: 9/11/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1040 End: 1212	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	9.21	0.403	15.5	1	3.15	2	NONE

PURGE DATA:

Date: 9/11/99	Total Well Depth (TD): 152.70 FT.	End Purge (hrs): 1036
Method: Dedicated Bladder Pump	Static Water Level (WL): 88.15 FT.	Total Purge Time (min): 150
Well Casing: 2" PVC	Start Purge (hrs): 0806	Total Vol. Purged (gal): 10.6
One Casing Volume(gal): 10.5		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1040
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1044
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1046
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500mL	1052
Explosives (Subsets A) + NITROCELLULOSE	4°C/Dark	3 (2) 1000 mL Amber Glass	1056, 1108
Explosives (Subsets B) + PICRIC ACID	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000mL	1116
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1130
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1136
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1142
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1144
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1149
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000mL	1157
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1205
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1212

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Reaction of sample to preservative: NONE

CHEMETS CHECK

TROUBLE RUNNING CO_2 ? # KES

~~Alkalinity~~: ~~>1000ppm~~ KS @ 1100
Carbon Dioxide <10 PPM

T. ALKALINITY: 190 PPM @ 1105
DISSOLVED OXYGEN: 0.15 PPM @ 1112
DO DUP: 0.15 PPM @ 1116

SULFIDE: 0.01 mg/L @ 1135
S - DUP = 0 mg/L @ 1140

QA Samples Collected:

MS/MSD	Duplicate ID No.:
✓	FD0911 9901

Signature(s): [signature]

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: 03C03 - ABG
DATE: 9/11/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0806	88.15							>	START PURGING.
0816	88.15	225	9.23	0.941	29	3.28	14.9	85	Increase flow.
0826	88.16	270	9.21	0.906	16	2.03	14.8	67	
0836	88.16	270	9.21	0.898	4	2.88	14.9	62	
0846	88.15	270	9.21	0.901	8	3.32	15.1	63	
0856	88.15	270	9.23	0.899	4	4.33	15.1	47	
0906	88.15	270	9.21	0.900	0	3.75	15.2	39	
0916	88.15	270	9.20	0.902	5	2.85	15.2	34	
0926	88.15	270	9.22	0.898	3	3.22	15.2	23	
0936	88.14	270	9.23	0.904	0	3.30	15.5	16	
0946	88.15	270	9.23	0.899	1	3.80	15.5	23	
0956	88.15	270	9.20	0.903	0	1.83	15.4	20	
1006	88.15	270	9.22	0.904	0	2.25	15.6	13	
1016	88.15	270	9.21	0.899	0	3.29	15.7	7	
1026	88.16	270	9.21	0.901	2	3.46	15.6	1	
1036	88.16	270	9.21	0.903	1	3.15	15.5	2	END PURGE
1040	BEGIN SAMPLING - SAMPLE # AC033A95.								

SIGNATURE(S): Scott Red

PAGE 1 **OF** 1

NSWC Crane
Field Form
Revision: 0
January 1999

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 1651/CT038

Sample ID No.: AC043A99
Sample Location: 03C04 - ABG
Sampled By: S. NEIL
C.O.C. No.: 77, 79, 80, 81

SAMPLING DATA:

Date: 9/10-11-12-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1824 End: 1628	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.18	1.884	18.9	2	6.57	-3	NONE

PURGE DATA:

Date: 9/10/99	Total Well Depth (TD): 86.60 FT	End Purge (hrs): 1732
Method: Dedicated Bladder Pump	Static Water Level (WL): 76.25 FT.	Total Purge Time (min): 52
Well Casing: 2" PVC	Start Purge (hrs): 1640	Total Vol. Purged (gal): 0.8 well purged
One Casing Volume(gal): 1.7		"dry" (to pump intake).

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected	
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	9.11.99 @ 1550	14 days
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	9.11.99 @ 1555	14 days
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	9.11.99 @ 1606	7 days
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500mL	9/10/99 @ [illegible]	28 days
Explosives (Subsets A)	4°C/Dark	(2) 1000 mL Amber Glass	9.11.99 1632	7 days
Explosives (Subsets B)	4°C/Dark 1000	(2) ~~500~~ mL Amber Glass 125	9.11.99 @ 1800 / 9.12.99 @ 1530	7 days
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	9/10/99 @ 1829	28 days
Cyanide	NaOH/4°C	(1) 500 mL Polyethylene	9.11.99 @ 1600	14 days
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	9/10/99 @ 1824	28 days
Chloride & Sulfate	4°C	(1) 500 mL Polyethylene	9/12/99 @ 1502	28 days
Total Phosphorus	H_2SO_4/4°C	(1) 500 mL Polyethylene	9/12/99 @ 1530	28 days
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) 500 mL Polyethylene	9.12.99 @ 1553	
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	9.12.99 @ 1614	
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7			

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

SULFIDE @ WELL @ 1625 = 0 MG/L
DO @ WELL @ 1645 = 2 PPM (CHEMETS)

Reaction of sample to preservative:

Well is a historically poor producer and is no exception for this round. Purged dry (to the pump intake) and will sample in the following days until bottles are filled - will sample bottles with the longest hold times first.

WL 9.11.99 @ 1545 = 77.34'

WL ON 9/12/99 @ 1520 = 77.81'

QA Samples Collected:

MS/MSD: ✓ Duplicate ID No.: —

Signature(s): [signature]

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: 03C04 - ABG
DATE: 9/10/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1640	76.25	—	—	—	—	—	—	→	Begin purge.
1645	76.70	60	7.16	2.514	0	7.10	21.9	-75	water level is dropping as
1655	77.27	60	7.16	1.943	3	6.05	19.3	-67	expected from this well-
1705	77.72	60	7.16	1.893	1	6.51	18.9	-46	will purge "dry" and
1715	78.24	60	7.15	1.930	0	6.82	18.4	-24	sample during the next
1725	78.64	60	7.19	1.919	2	7.14	18.7	-8	days.
1732	78.91	—	7.18	1.884	2	6.57	18.9	-3	Bladder yield = 17mL,
									∴ water level is at
									pump intake and
									well has been purged
									"dry". End purging.
1802	Let well recharge for 30 minutes → water level = 78.69 ft; negligable recovery.								

SIGNATURE(S): Scott W. Neil

PAGE 1 **OF** 1

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC073A99
Sample Location: ABG-03C07
Sampled By: S. Polcaro
C.O.C. No.: 78, 81

SAMPLING DATA:

Date: 09-11-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1214 End: 1520	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	clear	7.24	0.87	23.33	0.0	3.52	107.5	-n.a.-

PURGE DATA:

Date: 09-11-99	Total Well Depth (TD): 102.1 FT	End Purge (hrs): 1214
Method: Dedicated Bladder Pump	Static Water Level (WL): 78.99 FT	Total Purge Time (min): 240 *
Well Casing: 2" PVC	Start Purge (hrs): ~~1002~~ SP 09-11-99 0814	Total Vol. Purged (gal): 3.57 **
One Casing Volume(gal): 3.78		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1214
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1221
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1230
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1330
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1345
TOC	H_2SO_4/4°C SP 09-11-99	(1) 125 mL Amber Glass	1400
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1403
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1423
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1441
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1501
Field test	Alkalinity, see SOP 7		

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

T. ALKALINITY: 360 PPM @ 1230

Reaction of sample to preservative: NONE

* Purged well for 4 hours. ** Total volume purged is less than one casing volume. FSP states that sampling should begin after 4 hours even if ~~[illegible]~~ SP 09-11-99 parameter stability / volume requirements have not been satisfied.

note: S.C. probe only stabilizing to nearest 100th's place

QA Samples Collected:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651
WELL ID.: ABC-03C07
DATE: 09-11-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0930	~~79.94~~ 79.19	67.5	7.30	1.24	1.3	5.75	16.57	169.0	
0940	79.22	55	7.29	0.95	1.6	5.13	17.30	157.0	lower pumping rate
0950	79.26	55	7.29	0.94	0.6	3.26	17.44	143.3	clean turbidity probe
0900	79.23	55	7.29	0.94	0.3	3.48	17.84	128.0	
0910	79.20	55	7.28	0.91	1.0	4.39	17.70	132.7	
0920	79.26	55	7.27	0.90	0.2	4.53	18.40	124.4	clean turbidity probe
0930	79.26	55	7.25	0.89	0.9	4.41	18.86	119.0	
0940	79.26	55	7.25	0.90	0.4	3.74	19.41	112.6	clean turbidity probe
0950	79.24	55	7.26	0.90	0.4	2.91	19.66	53.1	clean turbidity probe
1000	79.26	55	7.25	0.89	0.4	3.95	19.39	82.3	
1010	79.23	55	7.25	0.89	0.4	3.77	19.20	97.3	
1020	79.25	55	7.26	0.88	0.0	3.70	19.82	102.1	clean turbidity probe
1030	79.26	55	7.25	0.88	0.0	3.58	20.79	92.9	
1040	79.27	55	7.24	0.88	0.2	3.29	20.48	94.9	
1050	79.26	55	7.25	0.87	0.0	3.68	21.29	104.3	clean turbidity probe
1100	79.29	55	7.25	0.88	0.0	3.70	21.07	107.0	
1110	79.24	55	7.25	0.88	0.0	3.45	21.17	107.9	
1120	79.22	55	7.26	0.87	1.5	3.79	22.05	106.6	
1130	79.24	55	7.24	0.88	0.0	3.34	21.44	108.1	clean turbidity probe
1140	79.22	55	7.24	0.88	0.0	3.77	21.73	106.6	
1150	79.22	55	7.23	0.88	0.0	3.42	22.82	106.5	
1200	79.23	55	7.24	0.88	0.0	~~3.50~~ 3.04	22.83	104.3	
1210	79.24	55	7.24	0.87	0.0	3.52	23.33	107.5	

SIGNATURE(S): Scott Polyak

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651/CT038

Sample ID No.: AC08P23A99
Sample Location: 03C08P2 - ABG
Sampled By: S. NEIL
C.O.C. No.: 75,81

SAMPLING DATA:

Date: 9/12/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1205 End: 1505	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.22	0.829	21.5	2	7.01	93	NONE

PURGE DATA:

Date: 9/12/99	Total Well Depth (TD): 103.50 FT.	End Purge (hrs): 1202
Method: Dedicated Bladder Pump	Static Water Level (WL): 74.96 FT.	Total Purge Time (min): 240
Well Casing: 2" PVC	Start Purge (hrs): 0802	Total Vol. Purged (gal): 3.8 - Purged for 4 hours before sampling (per FSP).
One Casing Volume(gal): 4.7		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1205
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500mL	1207
Explosives (Subset A) + NITROCELLULOSE	4°C/Dark	(3) 1000 mL Amber Glass	1215, 1258
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1318
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1340
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1402
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1407
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1422
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000mL	1440
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1456
Field test	Alkalinity, see SOP 7		

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

CHEMets Alkalinity @ well head = 250ppm @ 1225

Reaction of sample to preservative:

+ Low flow rate prevented purging of one casing volume before 4 hour maximum purge time.

QA Samples Collected:

MS/MSD
Duplicate ID No.:

Signature(s): Scott W. Neil

NSWC Crane
Field Form
Revision: 0
January 1999

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38

WELL ID.: 03C08P2 - ARG
DATE: 9/12/99

	Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
	0802	74.96								BEGIN PURGING
780	0812	75.23	78	6.99	0.997	41	6.51	16.22	170	Decrease flow. Bubbles in
	0822	75.36	58	7.22	0.972	30	5.83	16.4	155	flow thru
1160	0832	75.47	58	7.27	0.898	57	7.25	16.5	146	Decrease flow. cell.
	0842	75.52	55	7.28	0.885	14	7.77	17.2	152	
	0852	75.52	55	7.28	0.886	10	6.09	17.7	154	
	0902	75.53	55	7.29	0.887	7	6.57	18.1	138	
	0912	75.53	55	7.30	0.883	2	6.28	18.3	33	
2750	0922	75.52	55	7.30	0.883	5	6.13	18.5	83	Increase flow.
	0932	75.53	58	7.29	0.879	3	6.64	18.6	97	
	0942	75.53	58	7.29	0.877	8	7.33	18.6	104	
1740	0952	75.53	58	7.28	0.872	1	6.73	19.6	115	Increase flow. Sunlight affecting temp.
	1002	75.55	62	7.27	0.869	2	6.85	19.1	102	
	1012	75.56	62	7.26	0.861	1	6.61	19.3	108	
	1022	75.56	62	7.28	0.860	1	6.79	20.2	110	Temp affected by sunlight
	1032	75.56	62	7.27	0.858	4	6.84	20.3	109	
	1042	75.56	62	7.28	0.852	2	7.14	20.3	64	
	1052	75.56	62	7.26	0.849	1	6.21	20.3	92	
	1102	75.56	62	7.25	0.842	5	6.29	20.6	101	
	1112	75.56	62	7.25	0.835	2	6.64	21.1	34	
	1122	75.56	62	7.23	0.831	3	6.50	21.3	87	
	1132	75.55	62	7.25	0.834	6	6.91	21.5	104	
	1142	75.55	62	7.24	0.831	2	7.10	21.3	116	
	1152	75.55	62	7.24	0.832	3	7.30	21.5	112	
	1202	75.55	62	7.22	0.829	2	7.01	21.5	93	End purging.
	BEGIN SAMPLING @ 1205 - SAMPLE ID AC08P23299.									

SIGNATURE(S): Scott M. Neil

PAGE 1 **OF** __

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651 / CTO 38

Sample ID No.: ACOGP03AGG
Sample Location: 03COGP2 - ABG
Sampled By: S. NSIK
C.O.C. No.: 78, 79, 81

SAMPLING DATA:

Date: 9/11/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1556 End: 1655	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	6.77	0.488	17.1	6	8.04	96	NONE

PURGE DATA:

Date: 9/11/99	Total Well Depth (TD): 74.40 FT.	End Purge (hrs): 1553
Method: Dedicated Bladder Pump	Static Water Level (WL): 45.53 FT.	Total Purge Time (min): 115
Well Casing: 2" PVC	Start Purge (hrs): 1358	Total Vol. Purged (gal): 6.0 - Purged
One Casing Volume(gal): 4.7		extra volume due to unstable parameters.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	(INN) Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	~~12~~ 1556
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500mL	1558
Explosives (Subset A) + NITROCELLULOSE	4°C/Dark	(3) 1000 mL Amber Glass	1602, 1614
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1620
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1626
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1631
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1632
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1638
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1645
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1650
Field test	Alkalinity, see SOP 7		1655

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

CHEMets Alkalinity = 118 ppm @ 1705.

Reaction of sample to preservative:

Indiana University transducer in this well.

QA Samples Collected:

MS/MSD
Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: 03C09P2 - ASG
DATE:

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1358	45.53							→	BEGIN PURGING
1403	45.52	168	6.77	0.648	14	8.33	19.84	158	increase flow.
1413	45.53	202	6.70	0.520	17	8.65	17.31	79	
1423	45.53	202	6.78	0.528	30	7.67	17.1	92	Bottom of cell contains fine sand.
1433	45.53	202	6.80	0.510	33	6.58	17.3	76	↓
1443	45.53	202	6.84	0.502	21	7.56	17.0	51	Clean flow thru cell.
1453	45.53	202	6.74	0.500	13	7.82	16.9	69	
1503	45.53	202	6.69	0.495	11	8.52	16.7	61	
1513	45.53	202	6.75	0.491	11	8.49	16.9	67	
1523	45.53	202	6.81	0.490	7	8.24	17.1	91	
1533	45.53	202	6.78	0.490	5	7.35	17.2	101	
1543	45.53	202	6.82	0.487	8	8.23	17.0	68	
1548	45.53	202	6.76	0.486	9	8.59	17.1	71	
1553	45.53	202	6.77	0.488	6	8.04	17.1	96	End purging - extra volume purged due to unstable DO?
1558	BEGIN SAMPLING - SAMPLE ID AC09P23A99.								

SIGNATURE(S): Scott Stein

PAGE 1 **OF** 1

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC103A99
Sample Location: 03C10 (ABE)
Sampled By: S. Pelgatu
C.O.C. No.: 64, 65, 67, 70

SAMPLING DATA:

Date: 09-08-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1601 End: 1725	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	clear	6.57	0.561	18.33	1.8	3.71	182.9	-N.A.-

PURGE DATA:

Date: 09-08-99	Total Well Depth (TD): 79.1 FT	End Purge (hrs): 1601
Method: Dedicated Bladder Pump	Static Water Level (WL): 49.87 FT.	Total Purge Time (min): 111
Well Casing: 2" PVC	Start Purge (hrs): 1410	Total Vol. Purged (gal): 5.78
One Casing Volume(gal): 4.79		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1601
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1611
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1618
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1619
Explosives (Subsets A) NITROCELLULOSE	4°C/Dark 2 3 ~~4~~	(2) 1000 mL Amber Glass	1623, 1628, 1632, ~~1637~~
Explosives (Subsets B) PICRIC ACID	4°C/Dark 04-05-99 2 ~~4~~	(2) ~~500 mL~~ Amber Glass 1000 mL	1642, 1637
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1646
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1651
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1655
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1656
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1701
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1708
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1713
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1718

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative: NONE

CARBON DIOXIDE @ WELL @ 1700 = 42 PPM
DISSOLVED OXYGEN @ WELL @ 1706 = 2.5 PPM
T. ALKALINITY @ WELL @ 1715 = 130 PPM
SULFIDE @ WELL @ 1723 = 0.03 mg/L

Additional volume purged to allow for D.O. stabilization

QA Samples Collected:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott Pelgatu

NSWC Crane
Field Form
Revision: 0
January 1999

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651

WELL ID.: AC103A99
DATE: 09-08-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1418	49.89	135	6.67	0.604	5.8	5.29	20.97	214.2	
1428	49.89	135	6.64	0.574	1.8	5.69	20.74	203.1	
1438	49.89	218	6.63	0.575	0.9	5.25	19.65	209.0	increasing purge rate
1448	49.89	218	6.63	0.565	1.7	4.23	18.85	200.5	
1458	49.89	218	6.62	0.561	4.3	4.03	18.98	215.0	clean turbidity probe
1508	49.89	218	6.60	0.565	6.5	4.94	19.07	208.2	
1518	49.88	218	6.60	0.562	0.0	4.23	18.67	214.9	clean turbidity probe
1528	49.88	218	6.60	0.560	0.2	4.54	18.66	218.5	
1538	49.88	218	6.58	0.566	0.0	3.93	18.46	202.1	
1548	49.88	218	6.60	0.561	0.0	4.04	19.56	195.1	
1558	49.88	218	6.57	0.561	1.8	3.71	18.33	192.9	

SIGNATURE(S): [signature]

PAGE 2 **OF** ___

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC113A99
Sample Location: ABF-03C11
Sampled By: S. Arzako, K. Simpson
C.O.C. No.: 72, 77, 81

SAMPLING DATA:

Date: 09-10-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1708 End: 1953	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.19	1.92	~~3.8~~ 19.41	~~8.45~~ 3.8	~~19.41~~ 8.45	-5.8	Slight sulfur odor

PURGE DATA:

Date: 09-10-99	Total Well Depth (TD): 60.90 FT	End Purge (hrs): 1708
Method: Dedicated Bladder Pump	Static Water Level (WL): 44.21 FT	Total Purge Time (min): 136
Well Casing: 2" PVC	Start Purge (hrs): 1452	Total Vol. Purged (gal): 3.11
One Casing Volume(gal): 2.72		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1705
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1712
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1714
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1720
Explosives (Subsets A)	4°C/Dark (3)	~~(2)~~ 1000 mL Amber Glass	1745
Explosives (Subsets B) Picric Acid	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1820
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1836
Cyanide	NaOH/4°C SP CANCEL	(1) ~~500 mL~~ Polyethylene 1000 mL	1845
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1900
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1902
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1914
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1926
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1940
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1730

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative: none

SULFIDE @ WELL @ 1728 = 0.03 mg/L
CARBON DIOXIDE (TITRETS) @ WELL @ 1738 = 22 PPM
T. ALKALINITY (TITRETS) @ WELL @ 1745 = 235 PPM
DISSOLVED OXYGEN (CHEMETRICS) @ WELL @ 1752 = 5 PPM
Purged additional volume to account for drawdown.
note: S.C. probe only stabilizing to nearest 100th's place

QA Samples Collected:

MS/MSD | Duplicate ID No.:

Signature(s): Scott Jeffries

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651

WELL ID:: ABG-03C11
DATE: 09-10-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1457	44.70	110	7.21	2.95	5.7	9.32	20.34	116.4	
1505	44.70	84	7.06	2.25	5.7	9.55	19.81	121.1	lower pumping rate
1510	44.70	84	7.09	2.16	5.4	8.90	20.28	64.8	
1515	44.70	84	7.11	2.08	4.1	9.40	20.03	26.1	clean turbidity probe
1525	44.79	84	7.16	2.03	4.2	8.73	19.92	-1.8	
1535	44.74	84	7.21	1.97	3.5	8.60	19.92	-14.0	clean turbidity probe
1545	44.74	84	7.23	1.95	3.6	8.34	19.85	-27.3	
1555	44.78 *	84	7.24	1.93	4.4	7.56	19.53	-31.5	clean turbidity probe
1605	44.79 *	84	7.24	1.93	3.7	8.59	19.69	-30.5	
1615	44.79 *	84	7.24	1.92	4.4	8.59	19.42	-32.1	
1625	44.79 *	84	7.23	1.91	3.9	8.43	19.58	-31.0	clean turbidity probe
1635	44.87 *	84	7.22	1.92	4.0	8.54	19.66	-25.2	
1645	44.87 *	84	7.22	1.92	3.8	8.46	19.44	-19.0	* W.L. fluctuations on
1655	44.79 *	84	7.20	1.92	4.0	8.54	19.58	-12.9	order of 0.1 FT resulting
1705	44.79 *	84	7.19	1.92	3.8	8.45	19.41	-5.8	from refill/discharge
									cycles of bladder pump
									note: Well abandonment
									activities 12 ft E/SE of
									ABG-03C11 may have negatively
									impacted the formational yield
									over screened interval of C11.
									Borehole interconnectivity observed
									05-21-99 while Army Corps.
									personnel were abandoning
									well with grout (↑ pH & turbidity)
									Yield of C11 seems lower than
									during previous sampling rounds.

SIGNATURE(S): [signature]

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651 / CTO 38

Sample ID No.: AC123A99 ~~A3C123A99~~ (SD)
Sample Location: 03C12 (AB6)
Sampled By: S. NEIL
C.O.C. No.: 63, 64, 65, 67, 70

SAMPLING DATA:

Date: 9/8/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1045 End: 1330	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	Clear	7.11	0.782	17.37	0	7.48	167	NONE

PURGE DATA:

Date: 9/8/99	Total Well Depth (TD): 53.20 FT.	End Purge (hrs): 1040
Method: Dedicated Bladder Pump	Static Water Level (WL): 41.90 FT.	Total Purge Time (min): 90
Well Casing: 2" PVC	Start Purge (hrs): 0910	Total Vol. Purged (gal): 1.9
One Casing Volume(gal): 1.8		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1045
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1048
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1050
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 1000 mL	1058
Explosives (Subsets A) / Nitrocellulose	4°C/Dark	3 (~~2~~) 1000 mL Amber Glass	1105, 1132
Explosives (Subsets B) - Picric Acid	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1145
Total Metals (Subsets A & B) + D	HNO_3/4°C	(1) 1000 mL Polyethylene	1215
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1228
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1240
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1241
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1252
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1305
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1318
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1330

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

CHEMets Check:
Alkalinity = 150 mg/L @ 1249
Carbon Dioxide = 13.5 mg/L @ 1301

Reaction of sample to preservative:

Indiana University transducer in well.
Rain showers during purging (1010 - 1035).
CHEMets Dissolved Oxygen = 8 mg/L @ 1158
Sulfide at wellhead = 0.01 mg/L @ 1230

QA Samples Collected:

MS/MSD
Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: 03C12
DATE: 9/8/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments	
0910	41.90								Begin Purging.	
0915	42.00	97.5	6.83	1.395	16	13.09	17.36	80	Decrease flow.	487.5
0920	42.03	87	6.93	0.907	26	9.41	16.68	121		435
0930	42.10	87	7.05	0.845	6	7.05	16.75	111	Decrease flow.	870
0940	42.14	78	7.16	0.815	5	7.40	17.77	102		780
0950	42.12	78	7.14	0.796	0	7.36	17.38	108		780
1000	42.14	78	7.17	0.793	2	7.29	17.41	134		780
1010	42.14	78	7.12	0.795	0	7.22	17.50	157		780
1020	42.14	78	7.13	0.788	0	7.30	17.47	140		780
1030	42.15	78	7.12	0.786	0	7.42	17.41	156		780
1040	42.14	78	7.11	0.782	0	7.48	17.37	167		780
Begin ~~End~~										
(SN)	sampling @ 1045 - sample ID A3C123A99.									

SIGNATURE(S): Scott W. Neal

PAGE 1 **OF** 1

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651/C0038

Sample ID No.: AC153A99
Sample Location: 03C15 (ABG)
Sampled By: S. NEIL
C.O.C. No.: 65, 70

SAMPLING DATA:

Date: 9/8/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1625 End: 1710	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.02	0.856	14.99	0	3.30	-50	NONE

PURGE DATA:

Date: 9/8/99	Total Well Depth (TD): 102.6 FT.	End Purge (hrs): 1620
Method: Dedicated Bladder Pump	Static Water Level (WL): 64.48 FT.	Total Purge Time (min): 105
Well Casing: 2" PVC	Start Purge (hrs): 1435	Total Vol. Purged (gal): 7.1
One Casing Volume(gal): 6.2		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1625
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500mL	1628
Explosives (Subset A) / NITROCELLULOSE	4°C/Dark	(3) 1000 mL Amber Glass	1632, 1639
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1647
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1650
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1654
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1655
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000mL	1659
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000mL	1702
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1706
Field test	Alkalinity, see SOP 7		1710

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Cittmeks Check:
Alkalinity = 250mg/L @ 1645

Reaction of sample to preservative: NONE

QA Samples Collected:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott L. Neil

NSWC Crane
Field Form
Revision: 0
January 1999

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651 / CTO 38
WELL ID.: 03C15 (ABG)
DATE: 9/8/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1435	64.48							→	Begin purging.
1440	64.50	195	6.21	0.736	19	5.60	15.07	-43	Increase flow. 975
1450	64.50	260	6.92	0.833	3	4.76	14.68	-43	2600
1500	64.50	260	6.98	0.857	1	3.62	14.60	-45	2600
1510	64.50	260	7.00	0.857	1	3.55	14.68	-46	2600
1520	64.50	260	7.01	0.860	4	3.56	14.76	-46	2600
1530	64.50	260	7.03	0.857	0	4.38	14.81	-47	2600
1540	64.50	260	7.03	0.858	3	4.65	15.02	-45	2600
1550	64.50	260	7.03	0.863	0	4.05	14.78	-47	2600
1600	64.50	260	7.03	0.856	0	3.58	15.01	-48	2600
1610	64.50	260	7.03	0.855	1	3.48	14.92	-48	2600
1620	64.50	260	7.02	0.856	0	3.30	14.99	-50	2600
Begin sampling @ 1625 - sample ID ACI53A99.									

SIGNATURE(S): [illegible]

PAGE 1 **OF** 1

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC173A99
Sample Location: 03C17 (ABG)
Sampled By: S. Pelepko
C.O.C. No.: 71, 81

SAMPLING DATA:

Date: 09-09-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1455 End: 1600	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	Sulfur-like
Method: Dedicated Bladder Pump	Clear	7.02	2.26	17.21	0.0	2.14	-71.0	~~[illegible]~~ SP 09-14-99

PURGE DATA:

Date: 09-09-99	Total Well Depth (TD): 151.70 FT	End Purge (hrs): 1455
Method: Dedicated Bladder Pump	Static Water Level (WL): 138.09 FT	Total Purge Time (min): 32
Well Casing: 2" PVC	Start Purge (hrs): 1333	Total Vol. Purged (gal): 3.07
One Casing Volume(gal): 2.22		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1455
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1459
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1503, 1509, 1516
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	~~1516~~ 1532* SP 09-14-99
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1523
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1530
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	~~1532~~ 1537
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1542
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1549
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1554
Field test	Alkalinity, see SOP 7		1600

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative: NONE

Sulfur-like odor noted at pump outflow

note: S.C. probe only stabilizing to nearest 100th's place.

* mistakenly collected total metals sample out of sequence

QA Samples Collected:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott Pelepko

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER:

WELL ID.: ABG-03C17
DATE: 09-09-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
1343	138.13	125	7.01	2.723	0.5	3.69	16.42	-86.8	
1353	138.14	144	7.01	2.530	0.0	3.22	16.14	-92.1	increase pumping rate
1403	138.13	~~144~~	~~7.00~~	~~2.23~~ SP	~~8.0~~	~~2.20~~	~~17.65~~	~~79.7~~	YSI meter malfunctioning → SP
1425	138.14	144	7.00	2.23	0.0	2.20	17.65	-79.7	return to field meter
1435	138.14	144	7.01	2.27	0.0	2.20	16.95	-74.0	
1440	138.13	144	7.02	2.26	0.0	2.18	16.91	-72.6	
1445	138.14	144	7.02	2.26	0.0	2.24	17.11	-72.1	
1450	138.15	144	7.02	2.26	0.0	2.14	17.21	-71.0	

SIGNATURE(S): [signature]

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC203A99
Sample Location: AB6-03C20
Sampled By: S. Petepko
C.O.C. No.: 85

SAMPLING DATA:

Date: 09-14-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1117 End: 1200	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	clear	7.25	0.577	16.16*	0.0	4.66	125.0	-n.g.-

PURGE DATA:

Date: 09-14-99	Total Well Depth (TD): 121.70 FT	End Purge (hrs): 1117
Method: Dedicated Bladder Pump	Static Water Level (WL): 89.72 FT	Total Purge Time (min): 139
Well Casing: 2" PVC	Start Purge (hrs): 0658	Total Vol. Purged (gal): 5.96
One Casing Volume(gal): 5.21		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	Start at 1117
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1121
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1123
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1136
Cyanide	NaOH/4°C SP	(1) ~~500 mL~~ Polyethylene 1000 mL	1141
TOC	H_2SO_4/4°C 0+144°	(1) 125 mL Amber Glass	1144
Chloride & Sulfate	4°C	(1) 500 mL Polyethylene	1145
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1147
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1151
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1155
Field test	Alkalinity, see SOP 7		

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative: None

Alkalinity @ well head = 160 mg/L

SP leaves well head from 1055 to 1110 during burn activities. Well purge continued during this interval.

* See comments concerning temp. on Low Flow Purge Data Form A-65.

QA Samples Collected:

MS/MSD | Duplicate ID No.:

Signature(s):

NSWC Crane
Field Form
Revision: 0
January 1999

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651

WELL ID.: AR6-03C20
DATE: 09-14-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0907	89.75	80	7.43	1.323	0.4	9.33	15.05	149.2	
0912	89.80	160	7.36	0.761	0.5	5.42	14.75	131.1	increase flow rate
0922	89.80	160	7.30	0.589	0.3	5.07	14.53	132.0	
0932	89.80	160	7.29	0.582	0.1	4.90	14.62	134.2	
0942	89.80	160	7.29	0.579	0.2	4.83	14.59	139.5	
0952	89.85	185	7.28	0.578	0.3	4.91	14.37	147.8	increase flow rate
1002	89.88	175	7.27	0.576	0.2	4.86	14.33	145.3	
1007	89.84	175	7.27	0.576	0.2	4.55	14.38	133.2	lower flow rate
1017	89.86	175	7.27	0.576	0.2	4.59	14.53	138.8	
1027	89.87	175	7.25	0.576	0.1	4.36	14.67	139.5	
1037	89.86	175	7.26	0.576	0.1	4.54	14.59	147.1	
1047	89.88	175	7.26	0.576	0.1	4.68	14.91	139.4	
1112	89.87	175	7.25	0.577	0.0	4.66	16.16*	125.0	*Sonde exposed to sun during SP's absence ⇒ resulting in artificially elevated temp.

SIGNATURE(S): [signature]

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC253A99 SP
Sample Location: ABG ~~[illegible]~~ 03025
Sampled By: S. Pelcher, K. Simpson
C.O.C. No.: 71, 72, 77, 81

SAMPLING DATA:

Date: 09-10-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1015 End: 1200	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.16	1.04	13.60	1.5	1.40	-70.3	LT. SULFUR

PURGE DATA:

Date: 09-10-99	Total Well Depth (TD): 74.00 FT	End Purge (hrs): 1015
Method: Dedicated Bladder Pump	Static Water Level (WL): 46.90 FT	Total Purge Time (min): 126
Well Casing: 2" PVC	Start Purge (hrs): 0809	Total Vol. Purged (gal): 4.5
One Casing Volume(gal): 4.42		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1015
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1017
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1018
TOX	H_2SO_4/4°C	(1) 1000 mL Amber Glass	1022
Explosives (Subsets A)	4°C/Dark (3)	~~(2)~~ 1000 mL Amber Glass	1028
Explosives (Subsets B) Picric Acid	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1049
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1108
Cyanide	NaOH/4°C SP	(1) ~~500 mL~~ Polyethylene 1000 mL	1120
TOC	H_2SO_4/4°C 09-10-99	(1) 125 mL Amber Glass	1125
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1127
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1136
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1142
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1150
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1155

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Reaction of sample to preservative:

0.13 mg/L sulfide at well head @ 1038
0.28 mg/L O_2 @ well @ 1040 (DISSOLVED OXYGEN)
16 ppm CO_2 at well head @ 1054
280 ppm total Alkalinity @ well head @ 1104

note: S.C. probe only stabilizing to nearest 100th's place.

QA Samples Collected:

MS/MSD
Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651

WELL ID.: ABG-03L25
DATE: 09-10-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0813	46.92	100	7.19	1.52	0.5	3.97	13.10	66.7	clean turbidity probe
0823	47.00	100	7.22	1.06	4.2	3.03	12.67	-46.9	
0833	47.00	100	7.21	1.05	2.1	2.06	12.69	-58.0	
0843	47.00	100	7.20	1.06	2.3	2.11	12.77	-62.0	
0853	47.00	100	7.19	1.07	0.0	1.87	12.82	-64.6	clean turbidity probe and collection vessel
0903	47.02	170	7.19	1.07	1.0	1.99	12.76	-60.5	increase pumping rate
0913	47.04	170	7.17	1.09	1.0	1.99	12.95	-62.0	
0923	47.10	140	7.17	1.09	6.9	2.54	12.95	-62.9	decrease pumping rate
0933	47.02	140	7.16	1.09	1.8	1.42	13.17	-66.4	
0943	47.02	140	7.16	1.10	1.5	1.33	13.34	-66.0	
0953	47.02	140	7.16	1.09	1.5	1.43	13.40	-67.3	
1003	47.02	140	7.16	1.09	1.5	1.32	13.54	-69.2	
1013	47.02	140	7.16	1.09	1.5	1.40	13.60	-70.3	

SIGNATURE(S): [illegible]

PAGE 2 **OF** 2

GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC263A99
Sample Location: ABG-03C26
Sampled By: S. Polyak
C.O.C. No.: 75, 76, 78, 81

SAMPLING DATA:

Date: 09-12-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1325 End: 1615	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	clear	7.22	0.744	27.08	0.0	5.50	125.9	-0.9-

PURGE DATA:

Date: 09-12-99	Total Well Depth (TD): 107.80 FT	End Purge (hrs): 1325
Method: Dedicated Bladder Pump	Static Water Level (WL): 82.86 FT	Total Purge Time (min): 245 *
Well Casing: 2" PVC	Start Purge (hrs): 0920	Total Vol. Purged (gal): 3.22
One Casing Volume(gal): 4.07		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected	
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1325	
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1330	
Explosives (Subset A) & NITROCELLULOSE	4°C/Dark	(3) 1000 mL Amber Glass	1339 ~~1444~~	
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1444	~600mL X
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1458	~600mL X
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1507	
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1511	~500mL X
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1528	~500mL X
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1544	~500mL X
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1600	~600mL X
Field test	Alkalinity, see SOP 7			

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0.0 (ppm)
PID reading in Breathing Zone = 0.0 (ppm)

Chemets Alkalinity @ wellhead = 210 ppm @ 1435

Reaction of sample to preservative: none

* Purged well for four hours. ** Total volume purged is less than one casing volume; FSP states that sampling should commence after four hours even if parameter stability / volume requirements have not been satisfied.

X Sample volumes collected slightly larger than minimum volume requirements in order to expedite sampling activities.

QA Samples Collected:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651
WELL ID.: ABK - 03C26
DATE: 09-12-99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp.* (Celcius)	ORP mV	Comments
0940	83.04	60	7.28	1.297	1.4	6.60	20.56	20.4	
0950	83.12	50	7.22	0.844	4.7	4.37	19.85	34.1	
1000	83.21	50	7.21	0.772	0.3	4.09	19.43	59.5	
1010	83.28	50	7.20	0.756	1.0	5.38	19.43	83.7	clean turbidity probe
1020	83.31	50	7.20	0.747	0.2	5.23	19.50	98.6	clean turbidity probe
1030	83.35	50	7.21	0.746	1.0	5.37	19.80	109.8	
1040	83.38	50	7.20	0.738	0.3	5.46	19.85	115.8	clean turbidity probe
1050	83.38	50	7.20	0.726	0.2	5.32	19.81	91.3	
1100	83.38	50	7.20	0.736	0.1	5.50	20.33	103.3	clean turbidity probe
1110	83.39	50	7.20	0.735	0.2	5.62	20.55	112.4	
1120	83.39	50	7.20	0.734	0.2	5.66	20.79	120.3	
1130	83.38	50	7.19	0.735	0.1	5.74	20.92	126.4	
1140	83.39	50	7.21	0.725	0.1	5.55	21.06	134.3	clean turbidity probe
1150	83.38	50	7.22	0.728	2.7	5.58	22.73	130.8	
1200	83.38	50	7.21	0.740	3.6	5.63	23.00	129.5	*note: sun + rising air temp
1210	83.38	50	7.22	0.740	0.0	5.73	23.19	138.6	possibly affecting temperature
1220	83.37	50	7.22	0.740	3.8	5.50	24.02	133.8	probe.
1230	83.38	50	7.22	0.740	3.7	5.39	23.89	137.9	
1240	83.38	50	7.21	0.740	2.8	5.52	24.15	139.0	
1250	83.38	50	7.22	0.741	2.1	5.38	24.38	133.1	
1300	8:37	50	7.21	0.739	0.1	5.28	24.44	106.3	
1310	83.36	50	7.24	0.740	0.2	5.33	26.53	125.0	
1320	83.35	~~35~~ 40*	7.22	0.744	0.0	5.50	27.08	125.9	well appears to be recharging → SP reduced flow rate *
		* 09-13-99							flow has decreased → poss.
									indication of malfunctioning
									pump. SP increased refill/discharge
									frequency slightly to compensate
									for decreasing bladder volume.

SIGNATURE(S): [signature]

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GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

Sample ID No.: AC273A99
Sample Location: 03C27 ABG
Sampled By: KS & SP
C.O.C. No.: 65, 66, 70

SAMPLING DATA:

Date: 9-8-98	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1100 End: 1305	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	7.62	0.314	14.70	1.4	10.46	210.5	-n.a.-

PURGE DATA:

Date: 09-08-99	Total Well Depth (TD): 75.00	End Purge (hrs): 1100
Method: Dedicated Bladder Pump	Static Water Level (WL): 60.89	Total Purge Time (min): 113
Well Casing: 2" PVC	Start Purge (hrs): 0907	Total Vol. Purged (gal): 2.52
One Casing Volume(gal): 2.30		

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1100
TOX	H_2SO_4/4°C KS	(1) ~~1000~~ mL Amber Glass 500 mL	* ~~1103~~ 1200 SP
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1106, 1115, 1124
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene	1136
Cyanide	NaOH/4°C	(1) ~~500~~ mL Polyethylene 1000	1150
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	* ~~1200~~ 1103 SP
Chloride & Sulfate	4°C	(1) ~~500~~ mL Polyethylene 1000	1205
Total Phosphorus	H_2SO_4/4°C	(1) ~~500~~ mL Polyethylene 1000	1223
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500~~ mL Polyethylene 1000	1245
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1254
Field test	Alkalinity, see SOP 7		1235

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Reaction of sample to preservative: NONE

LT. RAIN @ 1030 AND STOPPED @ 1050

* mistakenly transposed TOX and TOC sample collection sequence

TOTAL ALKALINITY @ WELL HEAD (1145) = 85 PPM

QA Samples Collected:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7651
WELL ID.: 03C27 ABG
DATE: 9.8.97

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0915	60.95	88	7.47	1.320	4.1	10.64	15.07	203.3	
0925	61.00	88	7.59	0.494	12.2	10.28	14.31	186.7	CLEANED TURB. PROBE
0935	61.06	88	7.60	0.370	3.8	10.19	14.19	163.7	
0945	61.07	88	7.59	0.347	2.8	9.96	14.09	194.1	
0955	61.08	88	7.60	0.342	2.8	9.49	14.32	184.2	CLEANED TURB. PROBE
1005	61.11	88	7.61	0.336	2.1	10.16	14.48	175.5	
1015	61.14	88	7.61	0.329	5.6	10.21	14.53	203.3	
1025	61.15	88	7.63	0.319	6.8	10.53	14.57	205.5	
1035	61.16	88	7.64	0.317	3.1	10.13	14.77	202.6	CLEANED TURB. PROBE
1045	61.19	88	7.64	0.315	1.4	10.42	14.69	184.8	
1055	61.19	88	7.62	0.314	1.4	10.46	14.70	210.5	
	START SAMPLING @			1100					
	END SAMPLING @			1305					

SIGNATURE(S): [signature]

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GROUND WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651 / CT038

Sample ID No.: AC303A99
Sample Location: 03C30 - ABGA.
Sampled By: S. NAIL
C.O.C. No.: 74, 75, 81

SAMPLING DATA:

Date: 9/10/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 1220 End: 1523	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Method: Dedicated Bladder Pump	CLEAR	9.44	0.675	16.0	0	3.04	-61	NONE

PURGE DATA:

Date: 9/10/99	Total Well Depth (TD): 263.50 FT.	End Purge (hrs): 1214
Method: Dedicated Bladder Pump	Static Water Level (WL): 223.36 FT.	Total Purge Time (min): 240
Well Casing: 2" PVC	Start Purge (hrs): 0815	Total Vol. Purged (gal): 2.5 - Purged well for
One Casing Volume(gal): 6.5		4 hours then sampled, per FSP.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subset B)	HCl/4°C	(3) 40 mL Glass Vials	1220
TOX	H_2SO_4/4°C	(1) ~~1000 mL~~ Amber Glass 500 mL	1223
Explosives (Subset A)	4°C/Dark	(3) 1000 mL Amber Glass	1229, 1309
Total Metals (Subset A)	HNO_3/4°C	(1) 1000 mL Polyethylene 62	1326
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 50 1000 mL	1345
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1402
Chloride & Sulfate	4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1403
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1422
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1438
Dissolved Metals (Subsets A & C)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1500
Field test	Alkalinity, see SOP 7		1523

OBSERVATIONS / NOTES:

PID reading in PVC riser pipe = 0 (ppm)
PID reading in Breathing Zone = 0 (ppm)

Reaction of sample to preservative: NONE

Could not purge one casing volume due to 4 hour purge limit (per FSP).

QA Samples Collected:

MS/MSD	Duplicate ID No.:

Signature(s): Scott W. Nail

LOW FLOW PURGE DATA FORM

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER:
WELL ID.: 03C30 - ARG
DATE: 9/10/99

Time (Hrs.)	Water Level (Ft. below TOC)	Pump Rate (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Comments
0815	223.36							→	Begin purging.
0825	223.77	49	7.57	1.582	71	10.64	13.97	162	Decrease flow.
0835	224.00	43	7.85	1.160	19	9.94	14.00	130	Decrease flow.
0845	224.55	39	8.56	0.833	8	9.70	14.0	132	
0855	224.86	39	10.85	0.805	3	9.27	14.2	68	
0905	225.11	39	11.85	1.314	7	9.16	14.3	8	
0915	225.40	39	11.97	1.499	1	6.26	14.4	-22	
0925	225.49	39	11.97	1.497	3	6.33	14.5	-35	
0935	225.66	39	11.91	1.416	2	4.91	14.6	-48	
0945	225.84	39	11.83	1.288	1	5.13	14.7	-60	
0955	225.98	39	11.79	1.223	1	6.60	14.8	-67	
1005	225.90	39	11.71	1.149	2	4.69	15.0	-80	
1015	225.93	39	11.60	1.081	2	4.88	15.0	-84	
1025	225.96	39	11.41	0.947	4	5.63	15.0	82	
1035	225.96	39	11.16	0.851	1	4.28	15.1	-77	
1045	225.98	39	10.85	0.774	2	3.37	15.3	-73	
1055	225.98	39	10.54	0.731	1	3.87	15.3	-70	
1105	225.97	39	10.32	0.713	1	3.04	15.4	-66	
1115	225.98	39	10.15	0.704	0	3.41	15.3	-64	
1125	225.97	39	9.94	0.695	0	3.01	15.5	-61	
1135	225.98	39	9.83	0.693	1	3.30	15.7	-59	
1145	225.98	39	9.70	0.690	0	2.44	15.8	-58	
1155	225.98	39	9.62	0.685	0	2.91	15.8	-59	
1205	225.98	39	9.51	0.678	0	2.85	15.8	-59	
1215	225.98	39	9.44	0.675	0	3.04	16.0	-61	
1220	BEGIN SAMPLING - SAMPLE ID AC303A99.								

SIGNATURE(S): Scott W. Neil

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ATTACHMENT 5

SURFACE WATER SAMPLE LOG FORMS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

SURFACE WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

▮ Stream
▯ Spring

Sample ID No.: ACRB3A99
Sample Location: Creek at boundary
Sampled By: S. Neil, S. Pelepko
C.O.C. No.: 77, 84, 85

SAMPLING DATA:

Date: 09-13-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Odor
Time-Start: 0837 End: 0850	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	
Depth: 0.5 FT.	clear	7.41	0.307	19.3	5	6.34	19.	-n.a.-
Method: Direct Fill								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	0837
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	0838
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	0839
TOX	H_2SO_4/4°C	(1) 1000 mL Amber Glass	0840
Explosives (Subsets A)	4°C/Dark (3)	~~(2)~~ 1000 mL Amber Glass	0841
Explosives (Subsets B)	4°C/Dark	(2) ~~500 m~~L Amber Glass 1000 mL	0842
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	0843
Cyanide	NaOH/4°C SD	(1) ~~500 mL~~ Polyethylene 1000 mL	0844
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	0845
Chloride & Sulfate	4°C	(1) 500 mL Polyethylene	0846
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	0847
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	0848
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	0849
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		0850

OBSERVATIONS / NOTES:

Reaction of sample to preservative: NONE

Estimated Flow Rate: 20 GPM

DO @ creek = 6 mg/L @ 0853

SULFIDE = 0.01 mg/L @ 0905

CHEMETS @ CREEK:

Alkalinity = 78 mg/L @ 1010

CO_2 = Contents did not turn colorless.

Comments:

LOW flow due to low rainfall amounts.

QA Samples Collected:

MS/MSD

Duplicate ID No.:

Signature(s):

Scott Neil

SURFACE WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

[] Stream
[■] Spring

Sample ID No.: ASPA3A99
Sample Location: Spring A
Sampled By: S. Pelepko
C.O.C. No.: 77, 82, 85

SAMPLING DATA:

Date: 09-13-99 / Time-Start: 1504 End: 1546 / Depth: 0.3 FT / Method: Direct Fill *	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	ORP mV	Odor
	clear	7.60	0.434	11.74	4.2	11.12	132.6	-n.a.-

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	1504
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1508
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1512
TOX	H_2SO_4/4°C	(1) 1000 mL Amber Glass	1515
Explosives (Subsets A)	4°C/Dark (3)	~~(2)~~ 1000 mL Amber Glass	1520
Explosives (Subsets B)	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1524
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1528
Cyanide	NaOH/4°C SP	(1) ~~500 mL~~ Polyethylene 1000 mL	1530
TOC	H_2SO_4/4°C pH<2	(1) 125 mL Amber Glass	1533
Chloride & Sulfate	4°C	(1) 500 mL Polyethylene	1535
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1537
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1539
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1541
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1544

OBSERVATIONS / NOTES:

Reaction of sample to preservative: none

Estimated Flow Rate: 4 GPM

DISSOLVED O_2 = 12 mg/L @ 1610
CHEMets CO_2 = <10 mg/L @ 1618
CHEMets Alkalinity = 112 mg/L @ 1427
Sulfide = 0.00 mg/L @ 1620

Comments:

Samples collected from center of pool approximately 5 feet upstream from I.U. weir.

* Sample bottles equal or greater than 500 mL were filled using laboratory-certified clean 1000 mL Amber transfer bottle due to shallow nature of sample collection point.

QA Samples Collected:

MS/MSD
Duplicate ID No.:

Signature(s): Seth Pelepko

NSWC Crane
Field Form
Revision: 0
January 1999

SURFACE WATER SAMPLE LOG FORM

Project Site Name: NSWC CRANE, IN
Project No.: 7651

☐ Stream
☒ Spring

Sample ID No.: ASPC3A99
Sample Location: Spring C
Sampled By: S. Neil, S. Pekarko
C.O.C. No.: 77, 80, 83

SAMPLING DATA:

Date: 09-13-99 / Time-Start: 0958 End: 1043 / Depth: 0.8 FT / Method: Direct Fill	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	ORP mV	Odor
	clear	7.55	0.620	11.9	1	11.06	147	-n.a.-

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Time Collected
Volatiles (Subsets B&C)	HCl/4°C	(3) 40 mL Glass Vials	0958
Dissolved Methane/Ethane/Ethene	4°C/Dark	(2) 40 mL Amber Glass Vials	1005
Sulfide	4°C/Zn($C_2H_3O_2$),NaOH	(1) 500 mL Polyethylene	1009
TOX	H_2SO_4/4°C	(1) 1000 mL Amber Glass	1011
Explosives (Subsets A)	4°C/Dark	(3) ~~(2)~~ 1000 mL Amber Glass	1014
Explosives (Subsets B)	4°C/Dark	(2) ~~500 mL~~ Amber Glass 1000 mL	1021
Total Metals (Subsets A & B)	HNO_3/4°C	(1) 1000 mL Polyethylene	1029
Cyanide	NaOH/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1032
TOC	H_2SO_4/4°C	(1) 125 mL Amber Glass	1034
Chloride & Sulfate	4°C	(1) 500 mL Polyethylene	1035
Total Phosphorus	H_2SO_4/4°C	(1) ~~500 mL~~ Polyethylene 1000 mL	1036
Dissolved Phosphorus	H_2SO_4/4°C/Filtered	(1) ~~500 mL~~ Polyethylene 1000 mL	1038
Dissolved Metals (Subsets A, C & D)	HNO_3/4°C/Filtered	(1) 1000 mL Polyethylene	1040
Natural Attenuation (field test)	Various Parameters & Containers, see SOP 7		1042

OBSERVATIONS / NOTES:

Reaction of sample to preservative: NONE

Estimated Flow Rate: 4 GPM

DO at spring = 11 mg/L @ 1052
Duplicate DO = 11 mg/L @ 1052
Sulfide @ Spring = 0.02 mg/L @ 1100
Duplicate Sulfide = ~~0.5 mg/L~~ 0.02 mg/L @ 1114
Alkalinity = 65 mg/L @ 1113
CO_2 = <10 mg/L @ 1121

Comments:

Low flow due to low rainfall amounts

QA Samples Collected:

MS/MSD	Duplicate ID No.:
~~YES~~	FD09139901

Signature(s):

3X VOL. COLLECTED FOR SAMPLE AND MS/MSD + 1X VOL FOR DUP

TOTAL COLLECTED AT THIS POINT = 4X VOL

ATTACHMENT 6

FIELD CHEMICAL ANALYTICAL LOG FORMS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: LAB BLANK

Sample Location: TENUS TRAILER

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)
Date: 9/14/99						
Time: 0830						
Method: Direct Pour	Clear	NA	NA	NA	NA	NA

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity: Std. addition performed on Lab Blank

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 0830

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 0	x 1.0	= 0mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	100 % = 0 mg/L

Notes:

Standard Additions: ☒ Titrant Molarity: 1.6 Digits Required: 1st.: 25 2nd.: 24 3rd.: 26

Carbon Dioxide: Std. addition performed on Lab Blank

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time: 0920

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
44	x 0.1	= 4.4mg/L
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☒ Titrant Molarity: 0.3636N Digits Required: 1st.: 49 2nd.: 48 3rd.: 48

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: LAB BLANK

Sample Location: TRAILER

Sampled By: SCOTT NEIL

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

~~**Sulfide:**~~

~~Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____~~

~~Program No.: 93~~

~~Concentration: _____ mg/L Filtered: ☐~~

~~Notes:~~

~~**Ferrous Iron:**~~

~~Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____~~

~~Program No.: 33~~

~~Concentration: _____ mg/L Filtered: ☐~~

~~Notes:~~

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1330

Program No.: 60

Concentration: _____ mg/L Reagent Blank Correction: ☐

Standard Solution: ☒ Results: 0.097 mg/L

Notes: NITRITE STD SOLUTION RANGE = 0.110 – 0.090 mg/L

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1040

Program No.: 55

Concentration: _____ mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☒ Results: 0.19 mg/L Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____

Notes: Expected result = 0.20 mg/L ⇒ Good check.

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: ~~Scott Nehe~~ SETH PETERPILO

Sample ID No.: AB023499

Sample Location: 03B02 - ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/9/99							
Time: 0914							
Method: Ded. Bladder Pump	CLEAR	7.26	0.373	16.50	3.3	1.10	-141.5

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SWN Analysis Time: 1155

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes: Performed @ wellhead: DO = 0.20 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1441

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 129	x 1.0	= 129 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	129 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time: 1447

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☒	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
60	x 2.0	= 120 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: A5023A99

Sample Location: 03B02 - ABG

Sampled By: SETH PETEPICO

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1150

Program No.: 93

Concentration: 0.04 mg/L Filtered: ☐

Notes: Performed at wellhead.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1452

Program No.: 33

Concentration: 3.30 LIMIT mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1457

Program No.: 60 (SW)

Concentration: ~~3.5~~ 0.000 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1520

Program No.: 55

Concentration: 0.00 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes:

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: Scott Neil

Sample ID No.: AB043A99

Sample Location: ABG-03B04

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/9/99							
Time: 0945							
Method: Ded. Bladder Pump	CLEAR	6.88	0.215	16.05	1	3.11	-98

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SWN Analysis Time: 1110

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: Analysis performed @ wellhead with chemets: DO = 1.5 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1312

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☒	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 202	x 0.4	= 80.8 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	&	x 1.0	=
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	80.8 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time: 1320

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☒	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
	x 0.2	=
	x 1.0	=
30	x 2.0	= 60 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AB043499

Sample Location: ABG-03B04

Sampled By: SCOTT NEIL

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1109

Program No.: 93

Concentration: 0.01 mg/L Filtered: ☐

Notes: Performed at wellhead: Sulfide = 0.01 mg/L.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1334

Program No.: 33

Concentration: 3.30 (LIMIT) mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1343

Program No.: 60

Concentration: 0.000 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1403

Program No.: 55

Concentration: 0.00 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC02P23A99

Sample Location: ABG

Duplicate: ☒

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9/7/99							
Time: 1540							
Method: Ded. Bladder Pump	Clear	6.73	0.843	15.8	2	9.4	146

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SWN Analysis Time: 1855

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: DO Done with Chemets @ well head: 9.0 mg/L (Original & duplicate).

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1935

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 235	x 1.0	= 235mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	235 mg/L

Notes: Duplicate: Sample vol = 100mL; cartridge = 1.600N; Titration Count = 214 ⇒ 214mg/L.

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time: 1949

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☒	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
569	x 0.2	= 113.8mg/L
	x 1.0	=
	x 2.0	=

Notes: Duplicate: Sample vol = 100mL; Cartridge = 0.3636N; titration count = 533 ⇒ 106.6mg/L

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AC02P23A99

Sample Location: A86

Sampled By: SCOTT NEIL

Duplicate: ☒

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____

Program No.: 93

Concentration: _____ mg/L NA Filtered: ☐

Notes:

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____

Program No.: 33

Concentration: _____ mg/L NA Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____

Program No.: 60

Concentration: _____ mg/L Reagent Blank Correction: ☐

NA Standard Solution: ☐ Results: _____

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst _____ Analysis Time: _____

Program No.: 55

Concentration: _____ mg/L NA

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC033A99

Sample Location: 03C03 ABG

Duplicate: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Date: 9.11.99							
Time: 1040	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	
Method: DED. BLADDER PUMP	CLEAR	9.21	0.903	15.5	1	3.15	2 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst: RES Analysis Time: 1116

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: 0.15 PPM CHEMETS

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst: RES Analysis Time: 1322

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 338	x 1.0	= 338 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	338 mg/L

Notes: @ well @ 1105 = 190 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst: RES Analysis Time: 1332

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
330	x 0.1	= ~~3.3 mg/L~~ 33.0 mg/L
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes: ——

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: A C03 3A99

Sample Location: 03C03 ABG

Sampled By: SCOTT NEIL

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1135 @ well

Program No.: 93

Concentration: 0.01 mg/L Filtered: ☐

Notes:

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1355

Program No.: 33

Concentration: 0 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1406

Program No.: 60

Concentration: 0 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1443

Program No.: 55

Concentration: 0.05 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AC043A99

Sample Location: 03C04- ABG

Sampled By: SCOTT NEIL & KEITH SIMPSON

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/~~10~~ 11/99 SWN Time: 1632 Method: Ded. Bladder/pump	CLEAR	7.18	1.884	18.9	2	6.57	-3

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst: KES Analysis Time: SW ~~17~~ 1645

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: Performed @ wellhead; DO = 2 ppm

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst: SWN Analysis Time: 1743

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 343	x 1.0	= 343 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	343 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst: SWN Analysis Time: 1748

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☒	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
	x 0.2	=
106	x 1.0	= 106 mg/L
	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AC043A99

Sample Location: 03C04 - ABG

Sampled By: SCOTT NEIL / KEITH SIMPSON

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1625

Program No.: 93

Concentration: 0.00 mg/L Filtered: ☐

Notes: performed at well head.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1800

Program No.: 33

Concentration: 0.03 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1805

Program No.: 60

Concentration: 0.000 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1827

Program No.: 55

Concentration: 0.02 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SGT PELEPKO

Sample ID No.: AC073A99

Sample Location: 03C07 - ABG

Duplicate: ☐

SAMPLING DATA:

Date: 9/11/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Time: 1214	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	mV
Method: Ded. Bladder Pump	CLEAR	7.34	0.87	23.33	0.0	3.82	107.5

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SWN Analysis Time:

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1857

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 295	x 1.0	= 295
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	295 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time:

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

125

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC08P23A99

Sample Location: 03C08P2 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9-12-99							
Time: 1205							
Method: DEQ BLADDER PUMP	CLEAR	7.22	0.829	21.5	2	7.01	93 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ ~~Analysis Time:~~ _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1715

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 290	x 1.0	= 290 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	290 mg/L

Notes: IN FIELD CHEMETS 250 mg/L

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC09P23A99

Sample Location: 03C09P2

Duplicate: ☐

SAMPLING DATA:

Date: 9/11/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP mV
Time: 1556	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	
Method: Ded. Bladder Pump							

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	~~0.200 N~~	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1734

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 149	x 1.0	= 149 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	149 mg/L

Notes: Alkalinity at wellhead w/ OH-Mets = 118 mg/L

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

SWN

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH PELEPKO

Sample ID No.: A C10 3A99

Sample Location: 03C10 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9.8.99							
Time: 1601							
Method: DED. BLADDER PUMP	CLEAR	6.57	0.561	18.33	1.8	3.71	182.9

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst RES Analysis Time: 1706

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: RUN @ WELL HEAD @ 1706 2.5 PPM

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst RES Analysis Time: 1800

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☒	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 435	x 0.4	= 174 mg/L
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 170	x 1.0	= 170 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	170 mg/L

Notes: T. ALKALINITY @ WELL @ 1715 = 130 PPM

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst RES Analysis Time: 1828

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☒	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
505	x 0.2	= 101
	x 1.0	=
	x 2.0	=

Notes: @ WELL @ 1700 = 42 PPM

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: A C10 3A 99

Sample Location: 03C10 ABG

Sampled By: SETH PELEPKO

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SN Analysis Time: 1723

Program No.: 93

Concentration: 0.03 mg/L Filtered: ☐

Notes: @ WELL @ 1723 0.03 MGL

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1840

Program No.: 33

Concentration: 0.02 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1845

Program No.: 60

Concentration: 0.000 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1904

Program No.: 55

Concentration: 2.43 LIMIT mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH P.

Sample ID No.: AC113A99

Sample Location: 03C11 ABG

Duplicate: ☐

SAMPLING DATA:

Date: 9.10.99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Time:	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	
Method: DED. BLADDER PUMP	CLEAR	7.19	1.92	19.41	3.8	8.45	-5.8 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst KES Analysis Time: 1752 @ WELL

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: @ WELL @ 1752 = 5 PPM

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1853

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 244	x 1.0	= 244 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	244 mg/L

Notes: ALKALINITY (TOTAL) @ WELL @ 1745 = 235 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst KES Analysis Time: 1858

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☒	20-100 mg/L	100 ml	0.3636 N	0.2
☒	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
515	x 0.2	= 103
131	x 1.0	= 131 mg/L
	x 2.0	=

Notes: @ WELL @ 1738 = 22 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AC11 3A99

Sample Location: 03C11 ABG

Sampled By: SETH P.

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1728 @ WELL

Program No.: 93

Concentration: 0.03 mg/L @ WELL Filtered: ☐

Notes:

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1908

Program No.: 33

Concentration: 0.04 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1925

Program No.: 60

Concentration: 0.006 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1935

Program No.: 55

Concentration: 2.43 mg/L LIMIT (>2.43 mg/L)

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: A3C12 3A99

Sample Location: 03C12 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9.9.99							
Time: 1045							
Method: DED. BLADDER PUMP	CLEAR	7.11	0782	17.4	0	7.48	167

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SN Analysis Time: ~~1230~~ 1158 KS

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: DO CHEMETS @ WELL HEAD @ 1158 = 8 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst RES Analysis Time: 1430

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☒	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 397	x 0.4	= 158.8 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	&	x 1.0	=
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	158.8 mg/L

Notes: T. ALKALINITY @ WELL HEAD @ 1249 = 150 mg/L

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst RES Analysis Time: 1440

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☒	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
318	x 0.2	= 63.6 mg/L
	x 1.0	=
	x 2.0	=

Notes: CO @ WELL HEAD @ 1301 = 13.5 mg/L

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: A3C123A99

Sample Location: 03C12 A86

Sampled By: SCOTT NEIL

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SN Analysis Time: 1230

Program No.: 93

Concentration: 0.01 mg/L Filtered: ☐

Notes: @ WELL HEAD

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1455

Program No.: 33

Concentration: 0 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1500

Program No.: 60

Concentration: 0.001 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1600

Program No.: 55

Concentration: 2.43 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC15 3A99

Sample Location: 03C15 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9.8.99							
Time: 1625							
Method: DED. BLADDER PUMP	CLEAR	7.02	0.856	14.99	0	3.30	-50

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1816

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 255	x 1.0	= 255 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	255 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH PELEPKO

Sample ID No.: AC173A99

Sample Location: 03C17-ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/9/99							
Time: 1455							
Method: Ded. bladder Pump	CLEAR	7.02	2.26	17.21	0.0	2.14	-71.0

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT NA Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1634

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 353	x 1.0	= 353 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	353 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT NA Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH PELEPKO

Sample ID No.: AC203A99

Sample Location: 03C20-AB6

Duplicate: ☐

SAMPLING DATA:

Date: 9/14/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Time: 1117	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	mV
Method: Ded. Bladder Pump	CLEAR	7.25	0.577	16.16	0	4.66	125

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen: NA

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1249

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 198	x 1.0	= 198mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	198 mg/L

Notes: Field test w/ Chemets = 160mg/L

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide: NA

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	=
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: KETH S. & SETH P.

Sample ID No.: AC25 3A99

Sample Location: ABG 03C25

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9.10.99							
Time: 1015							
Method: DED. BLADDER PUMP	CLEAR	7.16	1.09	13.6	1.5	1.40	-70.3

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst KES Analysis Time: 1040 @ WELL

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: DO @ WELL @ 1040 = 0.28 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1420

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 328	x 1.0	= 328 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	328 mg/L

Notes: ALKALINITY @ WELL @ 1104 = 290 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst KES Analysis Time: 1425

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
	x 0.1	=
465	x 0.2	= 93 mg/L
	x 1.0	=
	x 2.0	=

Notes: CO_2 @ WELL @ ~~1104~~ KS = 1154 = 16 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: AC253A99

Sample Location: ABG 03C25

Sampled By: KEITH S. & SETH P.

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1038 @ WELL

Program No.: 93

Concentration: _____ mg/L Filtered: ☐

Notes: SULFIDE @ WELL @ 1038 = 0.13 mg/L

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1433

Program No.: 33

Concentration: 0.15 mg/L Filtered: ☐

Notes: _____

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1500

Program No.: 60

Concentration: 0.002 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results: _____

Notes: _____

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1520

Program No.: 55

Concentration: 0.03 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH PELEPKO

Sample ID No.: AC263A99

Sample Location: 03C26 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9-12-99							
Time: 1325							
Method: DED. BLADDER PUMP	CLEAR	7.22	0.744	27.1	0	5.50	125.9 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

NA

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	1-5 mg/L	200 ml	~~0.200 N~~	0.01	_____	x 0.01	=
☐	2-10 mg/L	100 ml	0.200 N	0.02	_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst RES Analysis Time: 1650

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 301	x 1.0	= 301 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	301 mg/L

Notes: @ WELL w/ CHEMETS = 210 PPM

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

NA

	Range	Sample Vol.	Cartridge	Multiplier	Titration Count		Concentration
☐	10-50 mg/L	200 ml	0.3636 N	0.1	_____	x 0.1	=
☐	20-100 mg/L	100 ml	~~0.3636 N~~	0.2	_____	x 0.2	=
☐	100-400 mg/L	200 ml	3.636 N	1.0	_____	x 1.0	=
☐	200-1000 mg/L	100 ml	3.636 N	2.0	_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: K. SIMPSON

Sample ID No.: AC273A99

Sample Location: ABG 03C27

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9.8.99							
Time: 1100							
Method: DED. BLADDER PUMP	CLEAR	7.62	0.314	14.7	1.4	10.46	210.5

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	1-5 mg/L	200 ml	0.200 N	0.01	_____	x 0.01	=
☐	2-10 mg/L	100 ml	0.200 N	0.02	_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1420

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☒	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 291	x 0.4	= 116.4 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	_____ & _____	x 1.0	=
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	116.4 mg/L

Notes: T. ALKALINITY @ WELL HEAD @ 1145 = 85PPM

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

	Range	Sample Vol.	Cartridge	Multiplier	Titration Count		Concentration
☐	10-50 mg/L	200 ml	0.3636 N	0.1	_____	x 0.1	=
☐	20-100 mg/L	100 ml	0.3636 N	0.2	_____	x 0.2	=
☐	100-400 mg/L	200 ml	3.636 N	1.0	_____	x 1.0	=
☐	200-1000 mg/L	100 ml	3.636 N	2.0	_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

KS

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: AC303A99

Sample Location: 03C30 ABG

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP
Date: 9-10-99							
Time: 1220							
Method: DED. BLADDER PUMP	CLEAR	9.44	0.675	16.0	0	3.04	-61 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst _____ Analysis Time: _____

NA

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	1-5 mg/L	200 ml	0.200 N	0.01	_____	x 0.01	=
☐	2-10 mg/L	100 ml	0.200 N	0.02	_____	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1605

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 229	x 1.0	= 229 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	229 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst _____ Analysis Time: _____

NA

	Range	Sample Vol.	Cartridge	Multiplier	Titration Count		Concentration
☐	10-50 mg/L	200 ml	0.3636 N	0.1	_____	x 0.1	=
☐	20-100 mg/L	100 ml	0.3636 N	0.2	_____	x 0.2	=
☐	100-400 mg/L	200 ml	3.636 N	1.0	_____	x 1.0	=
☐	200-1000 mg/L	100 ml	3.636 N	2.0	_____	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL / SETH PELEPKO

Sample ID No.: ACRB3A99

Sample Location: CREEK AT BOUNDARY

Duplicate: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Date: 9/13/99							mV
Time: 0837	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	
Method: DIRECT FILL	CLEAR	7.41	0.307	19.3	5	6.34	19

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst SWN Analysis Time: 0853

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: performed in the field w/ CHEMets: DO = 6 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst SWN Analysis Time: 1326

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 167	x 1.0	= 167 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	167 mg/L

Notes: CHEMets @ ~~wet~~ (SW) CREEK = 78 mg/L

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst SWN Analysis Time: 1333

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☒ SWN	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
383	x 0.1	= 38.3 mg/L
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes: CHEMets @ CREEK = No color change from pink.

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: ACRB3A99

Sample Location: CREEK AT BOUNDARY

Sampled By: SCOTT NEIL / SETH PELEPKO

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 0905

Program No.: 93

Concentration: 0.01 mg/L Filtered: ☐

Notes: Performed in the field.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1348

Program No.: 33

Concentration: 0.01 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1354

Program No.: 60

Concentration: 0.001 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: ~~1312~~ 1410 (SN)

Program No.: 55

Concentration: 1.70 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SETH PELEPKO

Sample ID No.: ASPA3A99

Sample Location: SPRING A

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/13/99							
Time: 1504							
Method: Direct Fill	CLEAR	7.60	0.434	11.74	4.2	11.12	132.6

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst: SWN Analysis Time: 1610

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	=
_____	x 0.02	=

Notes: Performed in field: DO = 12mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst: SWN Analysis Time: 1651

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 158	x 1.0	= 158mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	158 mg/L

Notes: CHEMETS in field: Alkalinity = 112mg/L

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst: SWN Analysis Time: 1658

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
379	x 0.1	= 37.9mg/L
_____	x 0.2	=
_____	x 1.0	=
_____	x 2.0	=

Notes: CHEMETS in field: CO_2 = <10.mg/L

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: ASPA3499

Sampled By: SETH PELEPKO

Sample Location: SPRING A

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1620

Program No.: 93

Concentration: 0.00 mg/L Filtered: ☐

Notes:

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1705

Program No.: 33

Concentration: 0.01 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1714

Program No.: 60

Concentration: 0.001 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1733

Program No.: 55

Concentration: 2.43 LIMIT mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL / SETH PELEPKO

Sample ID No.: ASPC3A99

Sample Location: SPRING C

Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (Meter, mg/l)	ORP mV
Date: 9/13/99							
Time: 0956							
Method: DIRECT FILL	CLEAR	7.55	0.620	11.9	1	11.06	147

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst: SWN Analysis Time: 1052

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: performed in the field w/ CHEMETS: DO = 11 mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst: SWN Analysis Time: 1400

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 165	x 1.0	= 165 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	165 mg/L

Notes: CHEMETS @ Spring = 65 mg/L

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst: SWN Analysis Time: 1430

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
398	x 0.1	= 39.8 mg/L
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes: CHEMETS @ Spring = <10 mg/L

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL / SETH PELEPKO

Sample ID No.: ASPC3A99

Sample Location: SPRING C

Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1100

Program No.: 93

Concentration: 0.02 mg/L Filtered: ☐

Notes: Performed in the field.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1446

Program No.: 33

Concentration: 0.01 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1453

Program No.: 60

Concentration: 0.001 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1512

Program No.: 55

Concentration: 1.82 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

— DUP. —

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL

Sample ID No.: A C03 3A 99

Sample Location: 03 C03 ABC

Duplicate: ☒

SAMPLING DATA:

Date: 9-11-99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Time: 1040	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	
Method: DED. BLADDER PUMP	CLEAR	9.21	0.903	15.5	1	3.15	2 mV

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst KES Analysis Time: 1112 @ WELL

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: 0.15 PPM (CHEMETS)

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst KES Analysis Time: 1330

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 347	x 1.0	= 347
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	347 mg/L

Notes: @ WELL @ 1105 = 190 PPM

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst KES Analysis Time: 1345

	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
341	x 0.1	= 34.1
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes: ——

Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FIELD CHEMICAL ANALYTICAL LOG FORM

DUP.

Project Site Name: NSWC CRANE

Sample ID No.: AC03 3A99

Sample Location: 03 C03 ABG

Sampled By: SCOTT NEIL

Duplicate: ☒

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1140 @ WELL

Program No.: 93

Concentration: 0 mg/L Filtered: ☐

Notes:

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1400

Program No.: 33

Concentration: 0 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1421

Program No.: 60

Concentration: 0.005 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst KES Analysis Time: 1501

Program No.: 55

Concentration: 0.05 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

FIELD CHEMICAL ANALYTICAL LOG FORM

— DUP. —

Project Site Name: NSWC CRANE

Sampled By: SCOTT NEIL / SETH PELEPKO

Sample ID No.: ASPC3A 99

Sample Location: SPRING C

Duplicate: ☒

DUPLICATE ID: FD09137901

SAMPLING DATA:

Date: 9/13/99	Color	pH	S.C.	Temp.	Turbidity	DO	ORP
Time: 0956	(Visual)	(SU)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	mV
Method: DIRECT FILL	CLEAR	7.55	0.62	11.9	1	11.06	147

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT Analyst: SWN Analysis Time: 1052

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
	x 0.01	=
	x 0.02	=

Notes: Performed in the field w/ Chemets : DO = 11mg/L

Alkalinity:

Equipment: HACH Digital Titrator AL-DT Analyst: SWN Analysis Time: 1403

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	=
☒	100-400 mg/L	100 ml	1.600 N	1.0	0 & 136	x 1.0	= 136mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	0 mg/L	0 mg/L	136 mg/L

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT Analyst: SWN Analysis Time: 1434

	Range	Sample Vol.	Cartridge	Multiplier
☒	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
407	x 0.1	= 40.7mg/L
	x 0.2	=
	x 1.0	=
	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

FIELD CHEMICAL ANALYTICAL LOG FORM

Project Site Name: NSWC CRANE

Sample ID No.: ASPC3A99

Sample Location: SPRING C

Sampled By: SCOTT NEIL / SETH PILEPICO

Duplicate: ☒

DUPLICATE ID: PD09139901

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1114

Program No.: 93

Concentration: 0.01 mg/L Filtered: ☐

Notes: performed at the spring.

Ferrous Iron:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1446

Program No.: 33

Concentration: 0.00 mg/L Filtered: ☐

Notes:

Nitrite:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1453

Program No.: 60

Concentration: 0.001 mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results:

Notes:

Nitrate:

Equipment: HACH DR-850 Colorimeter Analyst SWN Analysis Time: 1512

Program No.: 55

Concentration: 1.71 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes: 1

ATTACHMENT 7

COPIES OF CHAIN-OF-CUSTODY RECORDS PREPARED BY TETRA TECH NUS, INC. MONITORING EVENT NO. 4 (SEPTEMBER 6-15, 1999)

(ORIGINALS AVAILABLE IN NSWC CRANE GROUND WATER MONITORING INFORMATION REPOSITORY)

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0062

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.7	1600	AC02P23A99	3						A													A1364, A1334, A1365	MS/MSD
	11		3						A													A1349, A1335, A1350	
	1640		3						A													A1336, A1351, A1366	
	1715		3								X											A1355, A1340, A1370	
	1655		3							A, D												A1368, A1353, A1338	
	1550		3				X															A1371, A1356, A1341	
	1755		3																X			A1344, A1359, A1374	
	1835	AC02P23A99F	3							AC, D												A1354, A1339, A1369	
	1735	AC02P23A99	3												X							A1357, A1342, A1372	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A186, A187 A188 A189

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0063

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.7.99	0000	FD090799D1	3						A		DUP	OF	03C02P2		(AC02P23A99)							A1366, A1364, A1365	
↓	↓	↓	1																X			A1374	
			1								X											A1370	
			1							A,D												A1368	
		↓	1												X							A1372	
		FD090799D1F	1																X			A1375	
↓	↓	↓	1							A,C,D												A1369	
9.8.99	1105	AC123A99	2						A,B													A1507, A1506	
↓	1132	↓	1						A,B													A1508	
↓	1145	↓	2						A,B													A1511, A1510	
9.7.99	1815	AC02P23A99F	3																X			A1360, A1345, A1375	MS/MSD
↓	0000	FD090799D1	1				X															A1371	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A190, A191, A192, A193

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0064

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.8	1318	AC123A99-F	1							A,C,D												A1513	
	1305	↓	1																X			A1520	
	1215	AC123A99	1							A,B,D												A1512	
	1228		1								X											A1514	
	1252		1																X			A1519	
	1241	↓	1													X		X				A1518	
	1623	AC103A99	1						A,B													A1466	
	1628		1						A,B													A1467	
	1632		1						A,B													A1468	
	1637		1						A,B													A1471	
	1642		1						A,B													A1470	
	1646		1							A,B,D												A1472	
	1656		1													X		X				A1478	
	1619		1				X															A1475	
	1651		1								X											A1474	
	1701	↓	1																X			A1479	
	1708	AC103A99-F	1																X			A1480	
↓	1713	↓	1							A,C,D												A1473	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ___ °C

COOLER CUSTODY SEAL NOS: A194, A195, A196, A197

REMARKS:

SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0065

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.8	1632	AC153A99	2						A													A1524 A1525	
↓	1639	↓	1						A													A1526	
	1647		1							A,D												A1528	
	1650		1								X											A1530	
	1655		1													X		X				A1533	
	1628		1				X															A1531	
	1654		1												X							A1532	
	1659	↓	1																X			A1534	
	1702	AC153A99-F	1																X			A1535	
	1706	↓	1							A,C,D												A1529	
↓	1655	AC103A99	1												X							A1476	
9.7	0000	FD09079901	1													X		X				A1373	
9.8	1050	AC123A99	1			X																A1517	
↓	1618	AC103A99	1			X																A1477	
9.7	1740	AC02P23A99	1													X		X				A1358	
9.8	1058	AC123A99	1				X															A1515	
↓	1240	AC123A99	1												X							A1516	
↓	1106	AC273A99	1						A													A1604	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A198, A199, A200, A201

REMARKS: SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0066

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.8	1115	AC273A99	1						A													A 1605	
	1124		1						A													A 1607	
	1223		1																X			A 1614	
	1208		1													X		X				A 1613	
	1200		1				X															A ~~1200~~ 1612	
	1150		1								X											A 1610	
	1136		1							A,D												A 1608	
	1103		1												X							A 1611	
	1245	AC273A99.F	1																X			A 1615	
	1254		1							A,C,D												A 1609	
9.7	1740	AC02P23A99	2													X		X				A 1343, A 1373	
9.9	0938	AB023A99	1						A,B													A 1296	
	0948		1						A,B													A 1297	
	0958		1						A,B													A 1298	
	1015		1						A,B													A 1301	
	1007		1						A,B													A 1300	
	0934		1				X															A 1305	
	1040		1												X							A 1306	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5299

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A202, A203, A204, A205

REMARKS:

SHIPPED TO VAUGH'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0067

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.8	1048	AC123A99	2		A																	A1505, A1504	
↓	1611	AC103A99	2		A																	A1465, A1464	
9.9	0925	AB023A99	2		A																	A1294, A1295	
↓	0940	AB043A99	2		A																	A1314, A1315	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 811736835278

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A212, A213

REMARKS:

SHIPPED TO MICROSEEPS

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0068

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.9	1041	AB023A99	1													X		X				A 1308	
↓	1049	↓	1																X			A 1309	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 9117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A202, A203, A204, A205

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0069

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.9	0930	AB023A99	1			X																A1307	
	1031		1								X											A1304	
	1024		1							A,B,D												A1302	
	1059	AB023A99.F	1																X			A1310	
	1106		1							A,C,D												A1303	
	0957	AB043A99	2						A,B													A1316, A1317	
	1007		1						A,B													A1318	
	1012		2						A,B													A1320, A1321	
	1022		1							A,B,D												A1322	
	1028		1								X											A1324	
	0950		1			X																A1327	
	0953		1				X															A1325	
	1035		1													X		X				A1328	
	1042		1																X			A1329	
	1033		1												X							A1326	
	1048	AB043A99.F	1																X			A1330	
	1058		1							A,C,D												A1323	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A206, A207, A208, A209

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0070

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.7	1200	TB090799 01	2	B,C																		A1291, A1208	
↓	0000	FD090799 01	3	B		DUP	OF	03C02P2				(AC02P23A99)										A1361, A1363, A1362	
	1540	AC02P23A99	3	B																		A1333, A1331, A1332	RUN ALSO MS/MSD
	1540	↓	3	B																		A1362, A1361, A1363	↓
↓	1540	↓	3	B																		A1346, A1347, A1348	
9.8	1045	AC123A99	3	B,C																		A1503, A1502, A1501	
↓	1100	AC273A99	3	B																		A1603, A1601, A1602	
↓	1601	AC103A99	3	B,C																		A1461, A1462, A1463	
↓	1625	AC153A99	3	B																		A1523, A1521, A1522	
9.9	0914	AB023A99	3	B,C																		A1292, A1293, A1291	
↓	0945	AB043A99	3	B,C																		A1311, A1312, A1313	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.9.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3693 5289

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A210, A211

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0071

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.9	1503	AC173A99	1						A													A1539	
	1509		1						A													A1540	
	1516		1						A													A1541	
	1523		1								X											A1545	
	1459		1				X															A1546	
	1542		1																X			A1549	
	1532		1							A,D												A1543	
	1537		1													X		X				A1548	
	1530		1												X							A1547	
	1549	AC173A99-F	1																X			A1550	
	1554		1							A,C,D												A1544	
9.10	1028	AC253A99	3						A,B													A1571, A1573,	A1572
	1127		1													X		X				A1583	
	1120		1								X											A1579	
	1018		1			X																A1582	
	1125		1												X							A1581	
	1136		1																X			A1584	
	1108		1							A,B,D												A1577	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A214, A215, A216, A217

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

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NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9-10	1048	AC253A99	2						A,B													A1575, A1576	
	1022	↓	1				X															A1580	
	1142	AC253A99-F	1																X			A1585	
	1150	↓	1							A,C,D												A1578	
	1745	AC113A99	3						A,B													A1486, A1487, A1488	
	1836		1							A,B,D												A1492	
	1848		1								X											A1494	
	1902		1													X		X				A1498	
	1914		1																X			A1499	
	1720		1				X															A1495	
	1714		1			X																A1497	
	1900		1												X							A1496	
	1820	↓	2						A,B													A1490, A1491	
	1926	AC113A99-F	1																X			A1500	
↓	1940	↓	1							A,C,D												A1493	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.13.99 1630	FED EX		
RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ___ °C

COOLER CUSTODY SEAL NOS: A218, A219, A220, A221

REMARKS:

SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

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NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.11	0000	FD091199 01	5						A,B		DUP	OF	03C03		(AC033A99)							A1736, A1737, A1738, A1740, A1741	
↓	↓	↓	1													X		X				A1748	
			1			X																A1747	
			1							A,B,D												A1742	
			1								X											A1744	
			1																X			A1749	
			1				X															A1745	
		↓	1												X							A1746	
		FD091199 01-F	1																X			A1750	
↓	↓	↓	1							A,C,D												A1743	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.13.99 1630	FED EX		
RECEIVED BY (SIGNATURE):	**RELINQUISHED BY (SIGNATURE):**	**DATE/TIME**	**RECEIVED FOR LAB BY (SIGNATURE):**	**DATE/TIME**

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A222, A223, A224, A225

REMARKS:

SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0074

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 3.8

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.11	1056	AC033A99	2						A,B													A1381, A1382	
	1108		1						A,B													A1383	
	1116		2						A,B													A1385, A1386	
	1136		1								X											A1389	
	1144		1													X		X				A1393	
	1142		1												X							A1391	
	1130		1							A,B,D												A1387	
	1046		1			X																A1392	
	1149		1																X			A1394	
	1152		1				X															A1390	
	1157	AC033A99-F	1																X			A1395	
	1205		1							A,C,D												A1388	
9.10	1326	AC303A99	1							A,D												A1623	
	1403		1													X		X				A1628	
	1345		1								X											A1625	
	1402		1												X							A1627	
	1422		1																X			A1629	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9.13.99 1630	FED EX		
RECEIVED BY (SIGNATURE):	**RELINQUISHED BY (SIGNATURE):**	**DATE/TIME**	**RECEIVED FOR LAB BY (SIGNATURE):**	**DATE/TIME**

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A226, A227, A228, A229

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0075

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible] / T. S. Simpson

DATE (1999)	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.10	1229	AC303A99	2						A													A1619, A1620	
↓	1309	↓	1						A													A1621	
	1223		1				X															A1626	
	1438	AC303A99.F	1																X			A1630	
↓	1500	↓	1							A,C,D												A1624	
9.12	1215	AC08P23A99	2						A													A1434, A1435	
↓	1258	↓	1						A													A1436	
	1407		1													X		X				A1443	
	1340		1								X											A1440	
	1442		1																X			A1444	
	1318		1							A,D												A1438	
	1402		1												X							A1442	
	1207	↓	1				X															A1441	
	1440	AC08P23A99.F	1																X			A1445	
	1456	↓	1							A,C,D												A1439	
	1544	AC263A99.F	1																X			A1600	
	1600	↓	1							A,C,D												A1594	
↓	1528	AC263A99	1																X			A1599	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
T. S. Simpson	9.13.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A230, A231, A232, A233

REMARKS:

SHIPPED TO LAYCUS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0076

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.12	1444	AC263A99	1							A,D												A1593	
↓	1458	↓	1								X											A1595	
↓	1511	↓	1													X		X				A1598	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A230, A231, A232, A233

REMARKS: SHIPPED TO CAUCUS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0077

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [signature]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9·10	1017	AC253A99	2		X																	A1569, A1570	
↓	1712	AC113A99	2		X																	A1494, A1495	
9·11	0000	FD091199 01	2		X	DUP OF AC033A99																A1734, A1735	
	1044	AC033A99	2		X																	A1379, A1380	
↓	1555	AC043A99	2		X																	A1399, A1400	
9·13	0000	FD091399 01	2		X	DUP OF ASPC3A99																A1754, A1755	
	0830	ACRB3A99	2		X																	A1654, A1655	
↓	1005	ASPC3A99	2		X																	A1694, A1695	
9·13	1008	ASPA3A99	2		X																	A1674, A1675	
					~~X~~	~~S/B AC023A99~~																	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[signature]	9·13·99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3693 5304

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A249, A250

REMARKS: SHIPPED TO MICROSEEPS, PGH.

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

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NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.12	1338	AC263A99	3						A													A1589, A1590, A1591	
↓	1330	↓	1				X															A1596	
9.11	1230	AC073A99	3						A													A1419, A1420, A1421	
	1330		1							A,D												A 1423	
	1403		1													X		X				A 1428	
	1423		1																X			A 1429	
	1400		1												X							A 1427	
	1345		1								X											A 1425	
	1221	↓	1				X															A 1426	
	1441	AC073A99.F	1																X			A 1430	
	1501	↓	1							A,C,D												A 1424	
	1645	AC09P23A99.F	1																X			A 1460	
	1650	↓	1							A,C,D												A 1454	
↓	1631	AC09P23A99	1												X							A 1457	
9.12	1507	AC263A99	1												X							A 1597	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	FEDEX		
RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A234, A235, A236, A237

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0079

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.11	1602	AC09P23A99	2						A													A1449, A1450	
↓	1614	↓	1						A													A1457	
	1558		1				X															A1456	
	1626		1								X											A1455	
	1632		1													X		X				A1458	
	1620		1							A,D												A1453	
	1638		1																X			A1459	
9.10	1824	AC043A99	1												X							A1411	LOW SAMPLE VOL.
	1805		1				X															A1410	
	1829		1							A,B,D												A1407	
9.11	1632		2						A,B													A ~~1405~~ 1401, A1402	
	1800		1						A,B													A1405	
	1606		1			X																A1412	
↓	1600	↓	1								X											A1409	
9.12	1553	AC043A99.F	1																X			A1415	
↓	1614	↓	1							A,C,D												A1408	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A238, A239, A240, A241

REMARKS:

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0080

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.12	1522	AC043A99	1													X		X				A1413	LOW SAMPLE VOL.
↓	1530	↓	1						A,B													A 1406	↓
↓	1536	↓	1																X			A 1414	
* 9.13	1014	ASPC3A99	6						A,B													A1698, A1717, A1736, A1737, A1738	
↓	1029	↓	3							A,B,D												A1702, A1723, A1742	
↓	1035	↓	3													X		X				A1708, A1728, A1748	
↓	1032	↓	3								X											A1704, A1724, A1744	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	FEDEX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A241, A242, A243, A244

REMARKS: * ASPC3A99 - RUN ALSO MS/MSD

SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0081

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.9	0715	TB090999 01	2	B,C																		A1282, A1283	
↓	1455	AC173A99	3	B																		A1536, A1537, A1538	
9.10	1015	AC253A99	3	B,C																		A1566, A1567, A1568	
	1220	AC303A99	3	B																		A1616, A1617, A1618	
↓	1708	AC113A99	3	B,C																		A1481, A1482, A1483	
9.11	0000	FD091199 01	3	B,C		DUP	OF	AC033A99														A1731, A1732, A1733	
	1040	AC033A99	3	B,C																		A1376, A1377, A1378	
	1214	AC073A99	3	B																		A1416, A1417, A1418	
	1550	AC043A99	3	B,C																		A1396, A1397, A1398	
↓	1556	AC09P23A99	3	B																		A1446, A1447, A1448	
9.12	1205	AC08*3A99	3	B	*	S/B	AC08P23A99															A1431, A1432, A1433	
↓	1325	AC263A99	3	B																		A1586, A1587, A1588	
9.13	0000	FD091399 01	3	B,C		DUP	OF	ASPC3A99														A1751, A1752, A1753	
↓	0958	ASPC3A99	9	B,C																		A1691, A1692, A1693, A1711, A1712,	
																						A1713, A173[illegible], A1732, A1733	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.13.99 1630	[illegible]		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5290

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A245, A246, A247, A249

REMARKS: ASPC3A99 - RUN ALSO MS/MSD

SHIPPED TO UMC'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0082

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible] / T. S. Simpson

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.13	1520	ASPA3A99	3						A,B													A1676, A1677, A1678	
	1524		2						A,B													A1680, A1681	
	1535		1													X		X				A1688	
	1512		1			X																A1687	
	1530		1								X											A1684	
	1528		1							A,B,D												A1682	
	1515		1				X															A1685	
	1537		1																X			A1689	
	1533		1												X							A1686	
	1539	ASPA3A99-F	1																X			A1690	
	1541		1							A,C,D												A1683	
	0000	FD09139901-F	2							A,C,D									X			A1763, A1770	
	0000	FD09139901	5			X				A,B,D	X				X	X		X				A1762, A1764, A1766, A1767, A1768	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
T. S. Simpson	9.14.97 1620	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5326

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A251, A252, A253, A254

REMARKS:

SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

0083

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible] / T.L.S. Simpson

	DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
*	9.13	1021	ASPC3A99	6						A,B													A1700, A1701, A1720, A1721, A1740, A1741	
		1014		3						A,B													A1696, A1697, A1718	
		1009		3			X																A1707, A1727, A1747	
		1036		3																X			A1709, A1729, A1749	
		1034		3												X							A1706, A1726, A1746	
		1011		3				X															A1705, A1725, A1745	
		1040	ASPC3A99-F	3							A,C,D												A1703, A1723, A1743	
		1038		3																X			A1710, A1730, A1750	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
T.L.S. Simpson	9.14.99 1620	FED EX		
RECEIVED BY (SIGNATURE):	**RELINQUISHED BY (SIGNATURE):**	**DATE/TIME**	**RECEIVED FOR LAB BY (SIGNATURE):**	**DATE/TIME**

AIR BILL NO.: 8117 3683 5326

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A255, A256, A257, A258

REMARKS: * ASPC3A99 - RUN MS/MSD

SHIPPED TO LAUCKS TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

NSWC CRANE, INDIANA

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7651 CT038

SAMPLERS (SIGNATURE): [illegible]

DATE	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.13.99	0000	FD091399 01	5						A,B	DUP OF			ASPC3A99									A1756, A1757, A1758, A1760, A1761	
	↓	↓	2				X												X			A1765, A1769	
	0841	ACRB3A99	3						A,B													A1756, A1757, A1758	
	0840		1				X															A1665	
	0845		1												X							A1666	
	0839		1			X																A1667	
	0843		1							A,B,D												A1662	
	0844		1								X											A1664	
	0847		1																X			A1669	
↓	0846	↓	1													X		X				A1668	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.14.99 1620	FED EX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3693 5326

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ___ °C

COOLER CUSTODY SEAL NOS: A259, A260, A261, A262

REMARKS: SHIPPED TO LAUCK'S TESTING LAB

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220

CHAIN OF CUSTODY RECORD

NSWC CRANE, INDIANA

0085

PROJECT NO.: 7651 CTO 38

SAMPLERS (SIGNATURE): [illegible]

DATE 1999	TIME	SAMPLE ID	NO. OF CONTAINERS	VOLATILES	DISSOLVED GASES	SULFIDE	TOX	SEMIVOLATILES	EXPLOSIVES	METALS	CYANIDE	PESTICIDES/PCBS	HERBICIDES	DIOXINS/FURANS	TOC	SULFATE	AMMONIA	CHLORIDE	PHOSPHORUS			TAG NO.	REMARKS
9.13	0842	ACRB3A99	2						A,B													A1660, A1661	
↓	0848	ACRB3A99-F	1																X			A1670	
↓	0849	↓	1							A,C,D												A1663	
9.14	1123	AC203A99	3						A													A1554, A1555, A1556	
↓	1144	↓	1												X							A1562	
↓	1121	↓	1				X															A1561	
↓	1141	↓	1								X											A1560	
↓	1136	↓	1							A,D												A1558	
↓	1145	↓	1													X		X				A1563	
↓	1147	↓	1																X			A1564	
↓	1151	AC203A99-F	1																X			A1565	
↓	1155	↓	1							A,C,D												A1559	
9.13	0710	TB091399 01	2	B,C																		A1771, A1772	
↓	0837	ACRB3A99	3	B,C																		A1651, A1652, A1653	
↓	1504	ASPA3A99	3	B,C																		A1671, A1672, A1673	
9.14	1117	AC203A99	3	B																		A1551, A1552, A1553	

RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME
[illegible]	9.14.99 1120	FEDEX		

RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LAB BY (SIGNATURE):	DATE/TIME

AIR BILL NO.: 8117 3683 5326

TEMP. BLANK: AT SHIPMENT 4 °C AT LAB ____ °C

COOLER CUSTODY SEAL NOS: A263, A264, A265, A266

REMARKS:

SHIPPED TO CAUCKS TESTING LAB

ATTACHMENT 8

EQUIPMENT CALIBRATION LOGS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC Crane
Field Form
Revison: 0
January 1999

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODEL : PE Photovac 2020 PID

PROJECT NAME : NSWC Crane

SERIAL NUMBER: NU10803

PROJECT NUMBER : 7651

MANUFACTURER : PE Photovac

CALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS
09-07-99	0.0 ppm	100 ppm Isobutylene	zero and span to 100 ppm	-n.a.-	0.0 ppm	RSP	
9-8-99	"	"	"	"	"	RSP	
9-9-99	"	"	"	"	"	SP	
9-10-99	"	"	"	"	"	SP	
9-11-99	"	"	"	"	"	SP	
9-12-99	"	"	"	"	"	SP	
9-13-99	"	"	"	"	"	SP	
9-14-99	"	"	"	"	"	SP	

Instrument Rented From: Pittsburgh Warehouse (Tom Patton)

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODEL : YSI 610-D and Sonde

PROJECT NAME : NSWC Crane

SERIAL NUMBER: 21771 IR / 98J1342

PROJECT NUMBER : 7651

MANUFACTURER : YSI

CALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED #	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS
09-07-99	Calibrate	according	to manufacturers	procedures		RSL	Field Parameters
9.8.99		"				RSL	2-Point pH (standard):
9-9-99		"				SP	* pH 4.0 Buffer (QED)
9-10-99		"				SP	- Exp. Date: 02/16/2001
9-11-99		"				SP	- Lot No.: 90218
9-12-99		"				SP	* pH 7.0 Buffer (QED)
9-13-99		"				SP	- Exp. Date: 11/13/2000
9-14-99		"				SP	- Lot No: E1113
							2-Point Turbidity (NTU):
							* AMCO AEPA-1 0.0 NTU
							TURB. STD.
							- Lot No.: 106 PW
							* YSI 100 NTU 6073 TURB STD
							- Lot No: 98J38 101K
							- Exp. Date: 09/15/2000
							- Opened: 03/10/99
							* 718 µS Cond. Std (QED)
							- Lot No. 90407
							- Exp. Date: 04/07/2001
							* YSI 3682 Zobell Sol. (ORP)
							231 mV
							- Lot No: 990 0571
							- Exp. Date: 04/2001
							* Standard D.O. (mg/L) cal.

Instrument Rented From: QED

NSWC Crane
Field Form
Revison: 0
January 1999

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODEL : YSI 610-D and Sonde

PROJECT NAME : NSWC Crane

SERIAL NUMBER: 21771 4R/98K1154

PROJECT NUMBER : 7651

MANUFACTURER : YSI

CALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED *	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS
09-07-99	Calibrate	according to	manufacturers	procedures		[illegible]	Field Parameters:
09-08-99			"			SP	2-Point pH (standard):
09-09-99			"			SP	* pH 4.0 Buffer (QED)
09-10-99			"			SP	- Exp. Date: 02/14/2001
09-11-99			"			SP	- Lot. No.: 90218
09-12-99			"			SP	* pH 7.0 Buffer (QED)
09-13-99			"			SP	- Exp. Date: 11/13/200
09-14-99			"			SP	- Lot. No.: 81113
							2-Point Turbidity (NTU):
							* AMCO AEPA-1 0.0 NTU
							TURB. STD.
							- Lot No.: 106PW
							* YSI 100 NTU 6073 TURB. STD.:
							- Lot No: 98J38101K
							- Exp. Date: 09/15/2000
							- Opened: 03/10/99
							* 718 µS Cond. Std (QED)
							- Lot No: 90407
							- Exp. Date: 04/07/2001
							* YSI 3682 ZOBELL SOL. (ORP)
							231 mV
							- Lot No. 9900571
							- Exp. Date: 04/2001
							* Standard D.O. (mg/L) Cal.

Instrument Rented From: QED

ATTACHMENT 9

FIELD NOTEBOOK PAGES
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

TITLE SWC CRANE

PROJECT NO. 7651

BOOK 2397

MONDAY 9.6.99

Work continued from Page LABOR DAY

1830 DEPART HOME, MEET SCOTT

2015 NEAL AT PGH. AIRPORT FOR FLT. TO INDIANAPOLIS

FLT. DELAYED DEPART PGH

2210 AT 1010

2215 AT INDIANAPOLIS

SETH PELEPKO FLT WAS LATE

IN AT 2310

ENTERPRISE HAD THE WRONG RENTAL CAR VANS NOT SUV 4X4

THEY WILL SWITCH OUT TUESDAY

0100 TO HOTEL CHECKIN

1:00 AM TUESDAY

START OF ROUND 4

ABG SAMPLING

CENT. TIME

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

WITNESS

DATE 9.6.99

DATE

TITLE NSWC CRANE

PROJECT 7651

BOOK 2397

TUESDAY 9.7.99

Work continued from Page WEATHER: SUNNY 68-85°F

0725 DEPART HOTEL TO BASE KEITH SIMPSON, SCOTT NEIL & SETH PELEPKO. STOP @ PASS & ID PICK UP PASS FOR SETH

PICK UP EQUIPMENT & BOTTLES @ BLD 3260 & 41 TO TRAILER

LOAD VANS CAL EQUIPMENT

0850 H&S REVIEW FOR SWTT & SITE FOR SETH

CAL. EQUIPMENT SORT BOTTLE SETS

1140 LUNCH

KS @ SP TO ABG START SITE WIDE WATER LEVELS

SN TO ABG SAMPLING 03C02P2

ALSO TOOK DUP & MS/MSD

1620 COMPLETE WL'S TO 03C02P2

HELP SCOTT OUT

KS & SP TO MAIN GATE TO MEET ENTERPRISE SWITCH VANS FOR SUV

1745 RETURN TO ABG S.P. & S.N. SAMPLING @ 03C02P2

KS RETURN TO TRAILER FOR PAPER WORK AND PREP BOTTLES FOR WED.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page 96

SIGNATURE

WITNESS

DATE 9.7.99

DATE

TITLE NWSC GRANT 9.7.99 **PROJECT NO.** 7651 **BOOK** 2397

Work continued from Page 95

1900 SN & SP RETURN FROM ABG
SAMPLES INTO FRIDGE, CLEAN TRAILER
SIX COMPLETE NA PARAMETERS
2015 DEPART TRAILER FOR HOTEL

— DAILY SUMMARY —
ON SITE: TITUS, KEITH S.,
SCOTT N. & SETH P.
SITE WIDE WL & INSPECTION OF
ABG WELLS
SAMPLED 03C02P2

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [illegible] DATE 9.7.99

WITNESS DATE

TITLE NSWC GRANT **PROJECT NO.** [illegible] **BOOK** 2397

Work continued from Page

ROUND 4 ABG SAMPLING SEPT. '99

MONITORING POINT	SAMPLE DATE	QA	COMMENTS
03B02	9.9.99	—	TOM BRENT @ WELLS DURING SAMPLING
03B04	9.9.99	—	
03C02P2	9.7.99	MS/MSD + DUP	
03C03	9.11.99	DUP	
03C04	9.10,11,12.99	—	
03C07	9.11.99	—	
03C08P2	9.12.99	—	
03C09P2	9.11.99	—	
03C10	9.8.99	—	
03C11	9.10.99	—	
03C12	9.8.99	—	
03C15	9.8.99	—	
03C17	9.9.99	—	
03C20	9.14.99		
03C25	9.10.99	—	
03C26	9.12.99	—	
03C27	9.8.99	—	
03C30	9.10.99	—	
CR A	~~9.13.99~~ 9.13	—	DRY 9.13.99 NOT SAMPLED
CR B	9.13.99	—	
SP A	9.13.99		
SP C	9.13.99	MS/MSD & DUP	TOM BRENT @ SAMPLING

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE [illegible] DATE

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651
WED. 9.8.99 BOOK 2397

Work continued from Page WEATHER: NICE, SUNNY 70-81°F

0630 KS, SN & SP CHECK OUT OF BEST WESTER & INTO HI ON WAY TO SITE BEST WESTERN WAS "BELOW PAR". TO BASE & BID 3260 PICK-UP COOLERS

0740 TO TRAILER LOAD SUV & CAL. EQUIPMENT.

0820 KS, SP & SN TO ABG KS & SP SET-UP AND SAMPLE 03C27 TRAINING FOR SETH

TOM BRENT STOP AT SITE (ABG)

1030 HE WOULD LIKE TO OBSERVE WELL SAMPLING FROM START TO END ON THUR. WE WILL CALL TOM THUR. AM FOR MEETING TIME

1300 COMPLETE SAMPLING TO LUNCH

1325 TO TRAILER SAMPLES HELD ON ICE KS & SP TO ABG MET SCOTT SCOTT & SETH SET-UP ON WELLS KS TO TRAILER RUNNING NA PARAMETERS.

1630 KS RETURN TO ABG HELP SETH WITH FIELD NA PARAMETERS SN, KS & SP RETURN TO TRAILER KS/SN PREP FOR THUR SAMPLING

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE WITNESS DATE 9.8.99 DATE

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1700 AND RUN NA PARAMETERS S P CLEANING EQUIPMENT & PREP. BOTTLE SETS.

1945 DEPART TRAILER TO HOTEL

— DAILY SUMMARY —
ON SITE THIS:
KEITH SIMPSON SCOTT NEIL & SETH PELEPKO
SAMPLED 4 WELLS @ ABG

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THUR 9.9.99 **BOOK** 2397

Work continued from Page WEATHER: NICE, SUNNY 60-76°F

0700 KS, SN & SP @ BLD 3260
PICK-UP 2 MORE COOLERS OF
BOTTLEWARE AND LET TOM B.
KNOW WE WILL BE AT ABG
SAMPLING GW @ 0810. TO TRAILER
CAL EQUIPMENT LOAD TRUCKS
0735 SN & SP TO ABG FOR GW SAMPLING
KS PACKING SAMPLES FOR SHIPMENT
0935 TO BASE SERVICE STATION FOR
ICE & TAPE
0950 RETURN TO TRAILER CONTINUE PACKING
SAMPLES FOR SHIPMENT
1205 TO LUNCH MET SN & SP @ CAFE
RETURN TO TRAILER SP TO ABG
FOR GW SAMPLING SN RUNNING
1305 NA PARAMETERS TOM BRENT @
TRAILER TO OBSERVE NA. TEST.
KS PACKING FOR FEDEX (SAMPLES)
1305 CALLED LAB SAFETY AND ORDERED
300 BOTTLE TAGS ORDER # A842690
TALK WITH TOM B. & RALPH B.
ABOUT MODS TO FSP/QP (EX DO
METHOD CHANGE) WE WILL GET A
LIST OF ALL CHANGES AND WHEN
WE ADDRESS EPA COMMENTS

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WE CAN "CLEAN-UP DATE" FSP/QP
1820 COMPLETE PACKING, TO ABG TO
HELP/CHECK ON SETH
COMPLETE SAMPLING @ 317 RETURN
1620 TO TRAILER. PAPER WORK, NA
TEST, CLEAN SUV'S & EQUIPMENT
RESTOCK FOR FRIDAY SAMPLING
* TOM BRENT @ TRAILER OBSERVING
NA PARAMETERS, (SNELL RAN TEST)
FROM 1240 TO 1425.
1725 DEPART TRAILER/BASE TO HOTEL

— DAILY SUMMARY —
ON SITE TETRA TECH NUS:
KEITH S., SCOTT N. & SETH P.
NSWC CRANE TOM BRENT
3 WELLS SAMPLED
7 COOLERS SHIPPED TO LAUCKS
1 COOLER SHIPPED TO MICROSEEPS

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FRIDAY 9.10.99

Work continued from Page WEATHER: SUNNY 55-80°F

0705 STOP AT BLD 3260 PICK-UP SUPPLIES
KS, SN & SP TO TRAILER PREP
FOR GW SAMPLING @ ABG
0730 KS & SP TO MW 3C25, SN TO
3C30 GW SAMPLING
1245 COMPLETE SAMPLING TO LUNCH
TOOK "NEW" N19 CYC. TO SCOTTS
LOCATION RETURN TO TRAILER
1340 RUN NA PARAMETERS
SETH TO ABG FOR GW SAMPLING
KS TO ABG TO RUN FIELD NA
1620 PARAMETERS @ 03C11
SN STARTED SAMPLING 03C04
SP SAMPLING 03C11
1840 KS RETURN TO TRAILER TO RUN
NA PARAMETERS, SN & SP REMAIN
@ ABG GW SAMPLING.
1925 SN COMPLETE SAMPLING RETURN
TO TRAILER
2010 SP RETURNS TO TRAILER CLEAN
EQUIPMENT UNLOAD TRUCK
2030 KS, SN & SP DEPART SITE/BASE
TO HOTEL

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— DAILY SUMMARY —

ON SITE TETRA TECH NUS
KEITH S. SCOTT N. & SETH P.
3 WELLS SAMPLED + WELL 03C4
STARTED

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SATURDAY 9.11.99 **BOOK** 2397

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0700 SCOTT, SETH & KEITH @ TRAILER
SN & SP CAL. EQUIPMENT LOAD SUV'S
0735 DEPART TO ABG FOR GW SAMPLING
KS @ TRAILER PAPERWORK, KS TO
BLD. 1 TO MAKE PHOTO COPIES OF FIELD
0905 FORMS. RETURN TO TRAILER.
1110 TO ABG RAN NA PARAMETERS @
WELL 3C03, SN SAMPLING.
1220 TO WELL 03C07 RAN NA PARAMETERS
FOR SETH.
1238 KS TO TRAILER PICK-UP CYL. OF NIT.
FOR SCOTT.
1312 KS RUNNING NA PARAMETERS FOR
MW03C03
1525 KS TO ABG SAMPLING 03C4
1850 RETURN TO TRAILER CLEAN EQUIPMENT
PAPER WORK DEPART TRAILER/SITE
1925 FOR HOTEL

HUGH PRENTICE (LAUCKS) LEFT A MESSAGE
THAT THE TOX BOTTLE FOR AB023A99
BROKE, I GAVE HUGH THE OK TO RUN
TOX FROM T. AHOS BOTTLE. I'LL CALL
DANEEN ON MONDAY AND CHECK WITH
IF THAT'S OK.

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SUNDAY 9.12.99 **BOOK** 2397

Work continued from Page WEATHER: OVERCAST 60-78°F

0630 KS, SN & SP DEPART HOTEL FOR SITE
0705 @ TRAILER CAL. EQUIPMENT LOAD
0730 SUV'S. SCOTT & SETH TO ABG
GW SAMPLING.
KS PAPERWORK & PREP FOR SAMPLE
SHIPMENT ON MONDAY.
0840 KS TO ABG THE BATTERIES WERE
LOW ON SP CONTROLL BOX, KS
TO TRAILER PICK-UP 8 AA BATTERIES
0930 RETURN TO ABG.
0945 TO OJT KS CHECKING FLOWS @
SURFACE POINTS FOR MONDAY SAMPLING
ALSO, CLEANING DEBRIS OUT OF
SAMPLE AREA.

LOCATION	FLOW	COMMENTS
SPRING C	≈4GPM OK	CLEANED
SPRING A	≈4GPM OK	CLEANED
CR A	NO FLOW	CLEANED
CR B	≈20 GPM	

1035 RETURN TO ABG CHECK ON SCOTT &
SETH SAMPLING WELL.
1105 RETURN TO TRAILER CONTINUE
PREP FOR SAMPLE SHIPMENT.
1345 KS DEPARTS TRAILER FOR ABG

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COMPLETE SAMPLING @ BC08P2 FOR SCOTT.

1505 TO 03C4 TO COMPLETE SAMPLING THIS WELL IS A POOR PRODUCER & IT TOOK 3 DAY TO SAMPLE

1635 COMPLETE 03C4 TO TRAILER PREP (W/SCOTT) FOR SW SAMPLING ON MONDAY

1750 SP, KS & SN DEPART SITE TO HOTEL

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MONDAY 9-13-99 BOOK 2397

Work continued from Page WEATHER: OVERCAST 55-75°F SOME RAIN OVERNITE

0705 KS, SP & SN @ BW 41 CHECKED WITH TOM BRENT HE WILL MEET SCOTT & SETH AT THE CR B LOCATION AROUND 0915 TO OBSERVE SURFACE SAMPLING.

0735 SN & SP TO ABG SW SAMPLING KS PACKING COOLERS FOR FED EX SHIPPMENT.

1155 LUNCH & GAS STATION FOR ICE

1220 RETURN TO TRAILER SCOTT & SETH ARE AT TRAILER THEY COMPLETED SAMPLING CR B & SPC KS CONTINUE PACKING SAMPLES, SN RUNNING NA PARAMETERS. SETH FILTERED SURFACE WATERS FOR DIS. METALS & PHOS. SETH RETURNED TO ABG TO SAMPLE SPA

1545 SN TO ABG TO HELP SETH WITH SAMPLING AND RUN FIELD NA PARAMETERS

— SAMPLE BROKEN IN SHIPPMENT —

HUGH PRENTICE, LAUCKS TESTING CALLED ON SATURDAY (9-11-99) AND INFORMED ME THAT SAMPLE AB023A99 FOR TOX WAS BROKEN IN SHIPPMENT I ASK HUGH TO RUN THE TOX FROM THE T. PHOS. BOTTLE SAME PRES. BUT PE

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CONTAINER. ALSO, I CALLED DANEEN R. IN PGH. AND ASK HER TO CHECK IF THIS WOULD BE OK. DANEEN WILL FOLLOW-UP WITH HUGH @ LAUCKS
NO SAMPLE WAS TAKEN @ SURFACE POINT ACRA (CREEK @ SEEP A)
THIS HAS BEEN A DRY SUMMER AND THE CREEK AT THIS POINT IS NOT FLOWING. TOM BRENT WAS AT LOCATION. I INFORMED RALPH B AND DANEEN R. WE WILL TRY TO SAMPLE CRA NEXT SHIFT IF IT RAINS. I ALSO CALLED LAUCKS TESTING AND INFORMED THEM OF THIS.

1650 SN & SP RETURN TO TRAILER AFTER COMPLETEING SAMPLING SP A
SN RUNNING NA PARAMETERS
SP UNLOAD TRUCKS/CLEAN EQUIPMENT

1835 DEPART SITE/BASE TO HOTEL

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DAILY SUMMARY

3 SURFACE POINTS SAMPLED
1 MS/MSD & 1 DUP
TOM BRENT AT SAMPLE LOCATIONS
CRB & SPC DURING SAMPLING
SHIPPED 9 COOLERS OF SAMPLE TO LAUCKS
SHIPPED 1 COOLER TO MICROSEEPS

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TUESDAY 9.14.99 BOOK 2397

Work continued from Page WEATHER: SUNNY 56-75°F

0655 SP, KS & SN @ RT 45 GATE
KS & SN PICK UP NEW PASS GOOD
UNTIL DEC 2009.
0715 AT TRAILER SETH LOADS EQUIPMENT
AND DEPARTS TO ABG TO SAMPLE
WELL C20 LAST WELL.
SN RUNNING NA STANDARDS
KS PACKING SAMPLES
1122 SN & KS TO ABG HELP/CHECK ON SETH
1150 KS TO LUNCH SN & SP REMAIN @
ABG TO COMPLETE GW SAMPLING @
1200 C20. KS PICK UP 10 BAGS OF ICE
AND RETURNED TO TRAILER
1230 JENNIFER & STEVE FROM IU @ TRAILER
TO ABG PULLED PUMP @ 03C2P2
AND REPLACED THE IU TRANSDUCER
THEN REPLACED PUMP (FOLLOWING
FSP SOP FOR PUMP REMOVEL)
1335 KS TO TRAILER TO COMPLETE
SAMPLE PACKING
SCOTT RAN NA STANDARDS FOR
"NEW" CHEMICALS.
SETH CAL/CLEANING EQUIPMENT
FOR START OF NEXT SHIFT. CTO 48
1500 CLEAN TRAILER.

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1600 SCOTT TO SETH FOR A TOUR OF
SITE GAS STATION, BOQ, BLD 1 ETC.
SO WHEN HE ARRIVES SUNDAY PM
HE WILL KNOW HIS WAY AROUND
1650 FED EX AT TRAILER FOR PICK-UP
4 COOLERS SHIPPED TO LAUCKS
1735 DEPART TRAILER/BASE FOR HOTEL

DAILY SUMMARY

ON SITE TETRA TECH; SCOTT N.,
SETH P. & KEITH S.
I U. JENNIFER O. & STEVE
AT ABG WELL 03C02P2
SAMPLED LAST WELL @ ABG FOR
3 QTR.
SHIPPED 4 COOLERS TO LAUCKS LABS
CAL. & CLEANED ALL EQUIPMENT
INVENTORIED TRAILER SUPPLIES

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BOOK 2397

WED. 9.15.99

Work continued from Page WEATHER SUNNY 55-76°F

0715 KS & SN @ TRAILER, SETH PELEPKU DEPARTED HOTEL FOR AIRPORT AND PHIL. OFFICE.

0750 KS TO BLD. 3260 COPY FIELD NOTES & CHECK ON BOTTLE SHIPMENT

SN TO BLD 41 CHECK ON BOTTLE SHIPMENT.

0845 KS & SN RETURN TO TRAILER FILE COPIES OF NOTES CLEAN TRAILER.

0955 DEPART TRAILER/BASE TO AIRPORT THEN OFFICE

END OF EVENT 4

ABG SAMPLING

3 QTR 1999

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WED, 09-08-99

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0845 Seth Pelopko (SP), TENUS, and Keith Simpson (KS), TENUS, arrive at monitoring well C-27 (ABG).

Weather: mild and partly cloudy, temperature in upper 60s (°F). Forecast high: mid 80s (°F).
SP and KS set up to conduct low flow purge/sample at C-27.

0907 Begin purging C-27. Refer to Groundwater Sample Log Form AC273A99 and attached Low Flow Purge Data Sheet(s) for details.

Note: light rain falling between 1030 and 1050.

1010 Tom Breed (TB), NAVY site contact, arrives at C-27. Discusses site activities with KS and SP. TB leaves C-27 at 1045.

1100 End Purge. Begin collecting samples at C-27.

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BOOK 2456

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1305 SP and KS finish sampling C-27. Demob, secure area, and break for lunch.

1340 SP and KS return to field trailer. Drop off C-27 samples at refrigerator. Load additional supplies/bottleware, return to ABG.

1350 ~~1400~~ SP and KS discuss progress with Scott Neil (SN), TENUS.

SP 09-08-99

1355 ~~1410~~ KS returns to field trailer to begin NA analyses. SP and SN set up to purge/sample C-10 and C-15 respectively.

1410 Begin purging C-10. Refer to Groundwater Sample Log Form AC103A99 and attached Low Flow Purge Data Sheet(s) for details.

1601 End purge. Begin collecting samples at C-10.

1645 KS returns to ABG. Begins conducting field

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natural attenuation analyses at C-10.

1720 SN arrives at C-10. Assists KS with natural attenuation analyses.

1730 Complete sample collection, natural attenuation analyses. SP, KS, and SN demob, secure area, and return to field trailer.

1745 SP, KS, and SN at field trailer. Will transfer samples to refrigerators and conduct trailer natural attenuation analyses. Refer to KS's Logbook 2397 for remainder of the day's activities.

note: approx. 100 mL of formational ~~purge~~ water flushed through filters at C-27 and C-10 before collection of filtered analytical parameters (~~Phosphate~~ phosphorus, Metals) through 0.45 micron filter. SP 09-08-99

SP 09-08-99

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THURS, 09-09-99 BOOK 2456

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0750 Seth Pelepka (SP), TENUS, and Scott Neil (SN), TENUS, arrive at ABG security office. Check in and proceed to "B" monitoring well.

Weather: cool and clear, temperature in low 60s (°F). Forecast high for low 80s (°F).

0755 SP and SN set up to purge/sample ABG-03B02 and ABG-03B04 respectively.

0802 Begin purging ABG-03B02. Refer to Groundwater Sample Log Form ABG23B99 and attached low flow Purge Data Sheet(s) for details.

0820 Tom Brent (TB), NAVY site contact, arrives at ABG-03B04. Discusses site activities with SN.

0914 End Purge. Begin collecting samples at ABG-03B02.

1057 Flush approximately 100 mL of formational

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water through Geotech 0.45 micron High Capacity Disposable Filter before collection of Dissolved Phosphorus and Metals samples.

1125 ~~1025~~ SP completes sample collection at ABG-03B02. Proceeds to ABG-03B04 to discuss progress with SN. SN completing demob activities at ABG-03B04 → will proceed to ABG-03B02 shortly to assist SP with field natural attenuation analyses.

SP 09-09-99

1130 SP returns to ABG-03B02; switches bladder pump to 'manual sample' mode.

TB leaves work area.

1135 SN arrives at ABG-03B02; begins conducting field natural attenuation analyses.

1155 Complete natural attenuation analysis at well head. Demob., secure well head, and break for lunch.

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THURS, 09-09-99

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1240 SP, SN, and Keith Simpson (KS), TENUS, at field trailer. SP drops off sampler and collects additional supplies.

1300 SP proceeds to ABG-03C17

1310 SP arrives at ABG-03C17. Sets up to purge/sample monitoring well.

1333 Begin purging ABG-03C17. Refer to Groundwater Sample Log Form ~~AB~~ SP 09-09-99 AG173099 and attached Low Flow Purge Data Sheet(s) for details.

1403 ~~1300~~ YSI meter malfunctioning (locked). SP returns to field trailer to consult KS and SN. Continue purging monitoring well during absence.

1425 KS unlocks YSI meter. SP returns to ABG-03C17

1925 Continue purging ABG-03C17

1455 End purge. Begin collecting samples at ABG-03C17

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~~09-09~~ SP drawn

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THURS, 09-09-99

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1530 K.S arrives at ABG-03C17. Assists SP with sample acquisition.

1548 Flush approximately 100 mL of Deionized water through Geotech 0.45 micron High Capacity disposable filter before collection of Dissolved Phosphorus and Metals samples.

1600 SP and K.S complete sample collection at ABG-03C17. Demob., secure well head, and return to field trailer. Refer to K.S's Logbook 2397 for remainder of today's activities.

Bonnie

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FRI, 09-10-99

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1410 Seth Pelepko (SP), TENUS, arrives at ABG. Meets with ABG foreman. ABG foreman reports scheduled 5-minute burn for 1430. SP decides to set up to purge/sample ABG-03C11. Will wait until completion of burn before initializing bladder pump.

Weather: hot and clear, temperature in low 80's (°F)

1430 Set up activities at ABG-03C11. Complete SP returns to ABG office to wait for completion of burn.

1445 Burn complete. SP proceeds to ABG-03C11 to begin purge activities.

1452 Begin purging ABG-03C11. Refer to Groundwater Sample Log Form AC113999 and attached Low Flow Purge Data Sheet(s) for details.

1615 Scott Neil (SN), TENUS, arrives at ABG → proceed

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to ABG-0304 to begin purging activities

1625 Keith Simpson (KS), TENUS, arrives at ABG with SP with well head natural attenuation analyses and sampling activities

1705 End purge. Begin collecting samples at ABG-0304

1835 KS returns to field trailer to conduct natural attenuation analyses.

1915 SN stops at ABG-0304. Checks pumping and returns to field trailer

note: approx. 100 ml of formational water flushed through Acrodisc 0.45 micron filter before collection of diss. phosphorus and metals samples

1755 Complete sample collection at ABG-0304. Decontaminate sampling equipment and return to field trailer. Refer to KS's logbook 2377 for remainder of today's activities

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0755 Scott Pelepko (SP), TENUS, arrives at ABG-0307. Sets up to conduct purge/sample activities.

weather: mild and clear, temperature in upper 60s (°F). Forecast high for mid 80s (°F).

0814 Begin purging ABG-0307. Refer to Groundwater Sample Log Form AC073099 and attached Low Flow Purge Data Sheet(s) for details.

1030 ~~Scott~~ Keith Simpson (KS), TENUS, arrives at ABG-0307. Discusses projects with SP briefly and proceeds to monitoring well near southeast corner of flash pans area to assist Scott Neil (SN), TENUS.

1214 End purge at ABG-0307 → purge minimum of 4 hours as specified in FSP even though purge volume is less than leasing volume. Begin collecting samples

1225 KS returns to ABG-0307. Conducts

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SAT ~~FRI~~ SP 04-11-99, 04-11-99

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will head total Alkalinity analysis. Return to field trailer to assist SN.

1440 Flush approx. 100 ml of formatted water through Geotech 0.45 micron High Capacity disposable filter before collection of Dissolved Phosphorus and Metals sample.

1520 Sample collection complete at ABG-03C07. SP decides, since well heads are placards to ABG-03C04. Set up to sample well.

1530 KS arrives at ABG. Checks progress at ABG-03C09 SP 04-11-99

1540 KS arrives at ABG-03C04 will assist SP with sample collection

1550 Begin pumping ABG-03C04. Refer to Groundwater Sample Log Form AK043099 and attached Low Flow Purge Data Sheet(s) for details

1615 SP proceed to ABG-03C09 SP 04-11-99 → collect YSI meter from SN.

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SAT ~~FRI~~ SP 04-11-99, 09-11-99

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1630 SP returns to field trailer. Calibrate YSI meters & sondes.

1800 SN returns to field trailer → begins conducting ~~orit~~ SP 09-11-99 trailer natural attenuation analyses.

1815 SP prepares bottle sets for tomorrow's sampling event.

1845 KS returns to field trailer. Refer to KS's 23-99 logbook for remainder of site activities.

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SUN, 09-12-99.

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0745 Seth Polopka (SP), TENUS, arrives at ABG → proceeds to ABG-03C26. Sets up to begin purge/sample activities.

weather: mild and partly cloudy, temp. in mid 60s (°F). Forecast high for mid 80s (°F).

0815 Control box malfunctioning - unable to use auto-sample function. SP proceeds to ABG-03C08 to consult Scott Neil (SN), TENUS.

0845 SP and SN return to ABG-03C26. Attempt to repair control box; unsuccessful. SN thinks the batteries may need to be replaced.

(KS), TENUS,

0855 Keith Simpson arrives at ABG → proceeds to ABG-03C08. SP and SN return to ABG-03C08 to consult KS.

0900 KS returns to field trailer to retrieve replacement batteries. SP returns to ABG-03C26

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to attempt well purging using the manual function option on the control box.

0910 Attempts to begin manual purging at ABG-03C26 then for unsuccessful → bladder volume appears much smaller than normal (~25 → 30 mL).

0920 KS returns to ABG-03C26. Replaces control box batteries. Increase pump refill/discharge frequency to account for unusually small bladder volume. Begin purging ABG-03C26. Refer to Groundwater Sample Log Form AC263A99 and attached Low Flow Purge Data Sheet(s) for details.

1325 End purge at ABG-03C26 → purge minimum of 4 hours as specified in FSP even though purge volume is less than one casing volume. Begin collecting samples.

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1430 SN arrives at ABE-03C26. Conducts well head natural attenuation analyses

1445 SP returns to field trailer briefly.

1520 SP back at ABE-03C26 SN leaves well head

1540 Flush approx. 100 mL of formational water through Geotech 0.45-micron High Capacity disposable filter before collection of dissolved Phosphorus and metals samples.

1615 Sample collection complete at ABE-03C26. SP demobs., secures well head, and returns to field trailer. Refer to logbook No. 2397 for remainder of today's activities.

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MON, 09-13-99 BOOK 2456

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1440 Seth Pelepko (SP), TENUS, arrives at ABG Security Office. Checks in with ABG foreman and proceeds to Spring A.

Weather: warm, humid, and mostly cloudy, temperature in upper 70s (°F)

1504 SP begins collecting samples from Spring A. Refer to Surface Water Sample Log Form ASPA3099 for details.

1600 Scott Neil (SN), TENUS, arrives at Spring A. Conducts field natural attenuation analyses.

1635 SN returns to field trailer to conduct trailer natural attenuation analyses.

1645 Sample collection / labeling complete. SP collects equipment and returns to the field trailer. Refer to Logbook No. 2397 for remainder of today's activities

SP 09-13-99

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

WITNESS

DATE 09-13-99

DATE

TITLE NWC CRANE

PROJECT NO. 7651

BOOK 2456

TUES, 09-14-99

Work continued from Page

0835 Seth Pelepko (SP), TENUS, arrives at ABG security office. Checks in with ABG foreman. ABG foreman reports schedule burn for 1100. Will notify SP when he must leave the exclusion zone.

Weather: warm and clear, temperature in low 70s (°F). Forecast high for mid 80s (°F).

0845 SP arrives at ABG-03C20. Sets up to conduct purge/sample activities.

0850 Begin purging ABG-03C20. Refer to Groundwater Sample Log Form AC203A99 and attached Low Flow Purge Data Sheet(s) for details.

1055 ABG foreman informs SP that 1100 burn is about to commence. SP returns to ABG security office. Well purging continues during SP's absence from ABG-03C20.

1110 Burn complete. SP returns to ABG-03C20.

Work continued to Page

SIGNATURE Seth Pelepko

DATE 09-14-99

WITNESS

DATE

TITLE NEWC CRANE

PROJECT NO. 76

BOOK 2456

TUES, 09-14-99

Work continued from Page

1117 Purge complete. SP begins collecting samples at ABG-03C20.

1130 Scott Neil (SN), TENUS, and Keith Simpson (KS), TENUS, arrive at ABG-03C20. SN conducts well head natural attenuation analyses. KS assists SP with sample collection/labeling activities.

1145 KS breaks for lunch. SN and SP continue collecting samples at ABG-03C20.

1150 Flush approx. 100 mL of tap/natural water through Gatech 0.45-micron disposable filter before collection of dissolved Phosphorus and metals samples.

1200 Sample collection complete at ABG-03C20. SP and SN demob., secure well head, and break for lunch.

1240 SP and SN return to field trailer. Off-loading supplies, conduct NA analysis, begin demob activities.

Work continued to Page

SIGNATURE Seth Pelepko

DATE 09-14-99

WITNESS

DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2456

TUES. 09-14-99

Work continued from Page

1345 KS returns to field trailer continues sample packaging activities. Refer to Logbook No. 2397 for remainder of today's activities.

09-14-99

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

WITNESS

DATE 09-14-99

DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2456

THUR. 9.23 99

Work continued from Page

0650 SETH PELEPILO & KEITH SIMPSON @ TRAILER PREP. FOR SAMPLING ABG BREAKROOM WELL.

THE & WED LABELS WERE WRITEN BOTTLE SETS PUT TOGETHER AND PUBLIC WORKS CALLED TO ACCESS WELL.

SETH CAL. PID & YSI

0800 KS & SP TO ABG

MET ~~WA~~ KS RON MYERS FROM THE WATER PLANT, RON DISCONECTED THE CHLORINATOR, THEN RAN ≈ 20 GAL OF WATER THRU THE SYSTEM AFTER THIS RON CHECKED THE CHLORINE LEVEL IN THE OUTLET TO CONFURM IT WAS OFF, NO CHLORINE WAS DETECTED.

KS & SP RAN FIELD PARAMETERS THEN STARTED SAMPLING.

SAMPLE WAS COLLECTED FROM A TAP IN THE SW CORNER OF THE ROOM (SEE DRAWING) TAP WAS CLEAND ON THE OUT SIDE WITH DI WATER AND PAPER TOWELS THEN ≈ 1 GAL WAS RUN THRU TAP PRIOR TO SAMPLE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

WITNESS

DATE 9.23.99

DATE

TITLE NSWC CRANE
9.23.99

PROJECT NO. 765

BOOK 2456

Work continued from Page

COLLECTION.
SAMPLE COLLECTION START @ 0835
AND ENDED @ 1100
— SAMPLES COLLECTED —
ABR3A99 SAMPLE + MS/MSD
FD09239901 DUP
SAMPLES WERE SHIPPED THAT DAY
(9.23.99) FEDEX 5 COOLERS TO
LAUCKS LABS & 1 TO TRIANGLE LAB.

FOR MORE SEE: COC's,
FIELD NOTES DRAWING WORK
RELEASE # 0038-02 DATED 9.14.99
AND WELL RECORD DATED 12.4.68

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE 9.23.99

WITNESS

DATE

TITLE

PROJECT

BOOK

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

TITLE NSWC Crane PROJECT NO. 7651
BOOK 2426

Work continued from Page

E.P. Johns on site

0700 Arrive at trailer and begin prep for sampling + purging activities.
0755 Depart trailer for 03C25.
0820 Arrive at creek. Walk equipment back to well 03C25 and setup to purge/sample.
0905 Begin purging. See Low-Flow Purge Data Form for purging info.
1045 Begin sampling - sample ID AC252A99. Refer to G.W. Sample Log Form for info on sampling.
1156 End sampling, pack vehicle and depart for lunch.
1300 Arrive at trailer. Unload vehicle. SN does NA, KS packs coolers, FR packs equipment for FD90.
1530 E.P. Johns departs site. Demobilization activities continue.
1700 Depart for hotel.

WEATHER: Mostly sunny, 45-65°F.

Work continued to Page

SIGNATURE Scott W. Reid DATE

WITNESS DATE

TITLE NSWC CRANE PROJECT 7651
BOOK 2426

Work continued from Page

- Misc. prep work in AM (get sample bottles and equipment from BLDG 3260, prepare bottle sets in cooler for sampling, etc.)

1130 Lunch

1210 Return from lunch; load van for sampling.

1310 Arrive at ABG breakroom - ABG personnel informs SN that burning activities will take place at 1330. Will wait until burning is completed before proceeding into area to sample.

1340 Arrive at well 03C02P2 and set up equipment for purging and sampling.

1400 Begin sampling. Refer to Field Forms that correspond to this well ID. Sample ID AC02P23A99.

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SIGNATURE Scott W. Reid DATE 9/7/99

WITNESS DATE

TITLE NSWC CRANE **PROJECT NO.** 7651
BOOK 2426

Work continued from Page 63

1855 End sampling. Pack vehicle and return to trailer.

1930 Perform Natural Attenuation for CO_2 and Alkalinity - Dissolved Oxygen (DO) performed at well head.

2000 Depart trailer for hotel.

WEATHER: Sunny mid 60's - mid 80's.

LOIA
9/7/99
SAW

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott W. Neil DATE 9/7/99
WITNESS DATE

TITLE NSWC CRANE **PROJECT NO.** 7651
BOOK 2426

Work continued from Page

0730 Prep for purging and sampling.

0850 Arrive at well 03C12 and set up equipment for purging and sampling.

0910 Begin ~~sampling~~ purging (GW) - well 03C12 - sample ID A3C123A99. Refer to sample + purge field forms for purging + sampling data.

1330 End sampling - pack vehicle.

1345 KS brings ice and bottle set for the next well to be sampled.

1415 Arrive at well 03C15 and begin setting up equipment.

1435 Begin purging - sample ID AC153A99. Refer to purge and sample field forms for purging and sampling data.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page 66

SIGNATURE Scott W. Neil DATE 9/8/99
WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2426

Work continued from Page 65

1710 End sampling - load vehicle with samples and equipment.

1730 Arrive at well 03C10 and perform Sulfide NA parameter.

1800 Arrive at trailer - place samples in refrigerator, unload vehicle, and run Natural Attenuation.

WEATHER: Occ. rain in AM, sunny in PM; MID 60's - 90.

9/8/99

Sun

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott Neil DATE 9/8/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2426

Work continued from Page

0730 Depart trailer for ABG.

0743 Inform ABG personnel of purging / sampling activities

0755 Aid SP in setting-up on well 03B02. Await arrival of Tom Brent.

0820 Tom Brent arrives at 03B04 - SN proceeds to set-up for purging and sampling with Tom observing.

0840 Purging starts - refer to field forms for specific data on purging and sampling of sample ID # ABO43AG9.

1125 End of sampling for NA parameters load equipment and samples in cooler. Tom Brent leaves site.

1145 Perform NA parameters on well 03B02.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott Neil DATE 9/9/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651
BOOK 2426

Work continued from Page 67

1205 Depart ABG for lunch.

1245 Arrive at trailer. Call Tom Brent ~~so he may observe~~ to observe Natural Attenuation.

1300 Tom Brent arrives at trailer to observe NA.

1312 NA analyses begin. Sample # AB043A99.

1435 NA analyses on AB043A99 ends — Tom Brent departs trailer.

1441 Begin NA analyses of AB023A99.

1553 NA analyses ~~of~~ of AB 023A99 is finished.

1600 Fed Ex arrives and takes 7 coolers for delivery to ~~Microseeps~~ Lancies and one cooler for Microseeps. Proceed to prepare bottle sets and clean NA glassware.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott W. Reid DATE 9/9/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651
BOOK 2426

Work continued from Page 68

1630 KS + SP arrive from sampling — SW performs NA analysis on well 03017, sample ID AE013A99.

1650 SW continues making bottle sets and cleaning glassware.

WEATHER: Mostly sunny, mid 50's + low 80's.

VOID
9/9/99
SW

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott W. Reid DATE 9/9/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2426

Work continued from Page NA

- Prep vehicle for purging and sampling

0730 Depart trailer for well 03C30.

0744 Arrive at well 03C30. Setup equipment for purging and sampling - well cap is difficult to remove. Had to pound it off.

0815 Begin purging of well 03C30 - sample ID AC303A99. Refer to field log forms for purge and sample data. Well purged for a maximum of 4 hrs (per FSP) before sampling.

1523 End sampling. Pack vehicle with samples and equipment and return to trailer.

1550 Arrive at trailer - unload samples and obtain a new (full) nitrogen cylinder

1606 Depart trailer for ~~AB~~ well 03C04.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott W. Reid DATE 9/10/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2426

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1622 Arrive at well 03C04 and set up equipment.

1640 Begin purging - refer to field forms for purging and sampling data for sample # AC043A99.

1645 Well water level is dropping greater than 0.3 feet - this expected from previous rounds. Will purge dry (to pump inlet) and sample in the subsequent days until all necessary samples are collected. Will sample for analyses with the greatest hold times first.

1732 Stop purging - well producing only ≈ 20ml per bladder.

1802 Well recovered 0.22 feet in 30 minutes.

1805 Begin filling sample bottles (as many as possible - yield permitting)

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott W. Reid DATE 9/10/99

WITNESS DATE

TITLE NSNC CRANE **PROJECT NO.** 7651
BOOK 2426

Work continued from Page 71

1805 Begin filling sample bottles - fill TOX, TOC, and Metals; (metals filled ≈ 600mL).

1900 End sampling - pack ~~vehicle~~ van vehicle and depart ABG.

1932 Arrive at trailer - put samples in refrigerator.

WEATHER: Sunny, low 50's - mid 70's

9/10/99 VOIO Sun

Work continued to Page

SIGNATURE [signature] DATE 9/10/99
WITNESS DATE

TITLE NSNC CRANE **PROJECT NO.** 7651
BOOK 2426

Work continued from Page

0740 Depart trailer for ABG to begin sampling and purging of wells.

0753 Arrive at well 03C03 and begin to set up equipment for purging and sampling.

0806 Begin purging and sampling activities - Sample ID AC033A99. Refer to field forms for data on sampling and purging of well 03C03.

1215 Sampling ends - load vehicle and depart for trailer.

1235 Arrive at trailer - place samples in refrigerator - Lunch.

1300 Load van with new cylinder and sample bottles. Prep for next well.

1323 Depart trailer for ABG.

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SIGNATURE [signature] DATE 9/11/99
WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651
BOOK 2426

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1342 Arrive at well 03C09P2 and begin to set up equipment for purging and sampling.

1358 Begin purging well # 03C09P2 - one casing volume = 4.7 gallons Begin flow rate @ 168 ml/min Refer to Low Flow Purge Form for data on purging 03C09P2.

1705 End sampling - load samples and equipment in vehicle and depart ABG for trailer.

1730 Arrive at trailer - unload van and begin Natural Attenuation analyses.

WEATHER: Partly sunny, low 90's - mid 80's.

VOID
9/11/99

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

Work continued to Page

SIGNATURE [signature] DATE 9/11/99
WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651
BOOK 2426

Work continued from Page

0700 SN, SP, KS arrive at trailer. Begin prep for purging and sampling of wells at ABG.

0732 SN departs trailer for ABG.

0744 SN arrives at well 03C08P2.

0802 Begin purging well 03C08P2 - very low flow rate - anticipate purging for the maximum limit of 4 hours - one casing volume = 4.7 gallons. Refer to Low Flow Purge Data Form for specific information on purging pertaining to this well.

1202 End purging after 4 hour limit (per FSP). 3.8 gallons purged - one casing volume = 4.7 gallons.

1205 Begin sampling - refer to the Ground Water Sample Log Form for sample data on A03P2 3A 99.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605

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SIGNATURE [signature] DATE 9/12/99
WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 7651

BOOK 2426

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1225 Perform field test for Alkalinity with CHEMETS reagents => 250 ppm.

1357 KS relieves SN at well 03C08PZ
SN departs ABG for trailer.

1435 Arrive back at ABG - relieve SP @ well 03C06

1514 SP arrives back at 03C06 - SN departs for 03C08PZ - KS done w/ 03C08PZ - SN proceeds to 03C04. Begin sampling 03C04.

1534 SN departs ABG for trailer to prep for surface points on 9/13/99.

WEATHER: LOW 50'S - LOW 80'S

VOID
9/12/99 SWN

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott W. Neal DATE 9/12/99

WITNESS DATE

TITLE NSWC CRANE

PROJECT NO. 1651

BOOK 2426

Work continued from Page

0715 Arrive at trailer - prep for surface water sampling.

0751 Depart for ABG.

0809 Arrive at creek and set up for sampling. Await Tom Brent for surface observation

0837 Begin sampling - Tom Brent arrives @ 0850.

0922 Depart creek boundary for upstream sample points.

0925 Arrive @ creek below spring A sample point - no flow from creek, just flow from Spring A - Tom Brent agreed water in creek bed is being supplied by Spring A only.

0940 Arrive at Spring A - prepare to sample - including MS/MSD and duplicate.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott W. Neal DATE 9/13/99

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651 BOOK 2426

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0951 Tom Brent departs site.

1208 Finish sampling and labeling Spring C (including Dup + MS/MSD)

1221 Arrive at trailer - place samples in refrigerator. Go to lunch (SN + SP).

1300 Return to trailer - SN starts NA analyses; SP returns to ABG to sample Spring A.

1547 SN departs trailer for NA analyses at Spring A.

1600 SN arrives at Spring A for NA analyses

1633 NA field analyses completed - SN departs for trailer to finish NA analyses

1647 Arrive at trailer - begin NA on Spring A sample.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Neu DATE 9/13/99

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651 BOOK 2426

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1810 Complete Natural Attenuation analyses on Spring A sample. Clean glassware.

WEATHER: MID 80's - UPPER 70's.

VOID 9/13/99 SN

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Neu DATE 9/13/99

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651
BOOK 2426

Work continued from Page

0700 Arrive at trailer. Prep for last well and Natural Attenuation Standard Solutions analyses.

0830 Begin NA Standard Solutions / Standard Additions analyses for CO_2, Alkalinity, Nitrate, Nitrite.

1130 Depart for ABB to do CHEMets Alkalinity test on SP's well 03C20.

1150 Arrive at 03C20 and perform Alkalinity CHEMets. Stay to help SP finish sampling 03C20.

1220 LUNCH

1250 Arrive at trailer and prepare to finish NA Standard Solutions.

1430 Finish NA Standard Solutions.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE [signature] DATE 9/14/99
WITNESS DATE

TITLE NSWC CRANE PROJECT NO. 7651
BOOK 2426

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Clean up, inventory NA reagents, start Demos for this shift.

WEATHER: Low 50's - Mid 70's.

Hold 9/14/99 [signature]

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE [signature] DATE 9/14/99
WITNESS DATE

Work continued from Page

DATE: 9/7/99 SAMPLE TIME: 1540

SAMPLE LOCATION / ID: ABG / ACO2P23A99

Analyses performed and results for ACO2P23A99:

1855: DO = 9.0mg/L; Duplicate = 9.0mg/L

1935: Alkalinity = 235mg/L; Duplicate = 214mg/L

1949: CO_2 = 113.8mg/L; Duplicate = 106.6mg/L

NOTE: Duplicate and MS/MSD ~~and Duplicate~~ SMW performed on samples.

9/7/99 VOID

SMW

Work continued from Page

DATE: 9.8.99 SAMPLE TIME: 1100

SAMPLE LOCATION 03C27 ABG SAMPLE ID AC273A99

TOTAL ALKALINITY @ WELL @ 1145 = 85 PPM

ALKALINITY HACH TITRATOR AL-DT @ 1420 = 116.4 MG/L

SAMPLE LOCATION 03C12 ABG SAMPLE ID AC123A99.

TIME 1045

TIME	PARAMETER	RESULTS	
1230	SULFIDE	0.01 MG/L	AT WELL
1158	DO	8 MG/L	"
1430	ALKALINITY	158.8 MG/L	
1440	CARBON DIOXIDE	63.6 MG/L	13.5 MG/L @ WELL
1455	FERROUS IRON	0 MG/L	
1500	NITRITE	0.001 MG/L	
1600	NITRATE	2.43 MG/L	

Sample location 03C15 - Sample ID AC153A99. ~~SA~~ SW

Alkalinity = 255 mg/L @ 1816; @ well head = 250 mg/L.

Sample location 03C10 ABG Sample ID AC103A99.

TIME SW	PARAMETER	RESULT	
~~1705~~ 1723	Sulfide	0.03 mg/L	(at wellhead)
1706	DO	2.5 mg/L	(at wellhead)
1800	Alkalinity	170 mg/L	
1828	CO_2	101 mg/L	
1840	Ferrous Iron	0.02 mg/L	
1845	Nitrite	0.000 mg/L	
1904	Nitrate	2.43 LIMIT	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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SIGNATURE Scott A. [illegible] DATE 9/8/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Work continued from Page

SAMPLE ID / LOCATION: AB043A99 / 03B04-ABG

DATE: 9/9/99 TIME: 0945

DATE	TIME	PARAMETER	RESULT
9/9/99	1110	DISSOLVED OXYGEN	1.5 mg/L (Performed In Field)
9/9/99	1312	ALKALINITY	80.8 mg/L (83 mg/L @ well)
9/9/99	1320	CARBON DIOXIDE	60 mg/L (12 mg/L @ well)
9/9/99	1109	SULFIDE	0.01 mg/L (Performed at well)
9/9/99	1334	FERROUS IRON	3.30 mg/L - LIMIT
9/9/99	1343	NITRITE	0.000 mg/L
9/9/99	1403	NITRATE	0.00 mg/L

NOTE: TOM BRENT PRESENT TO OBSERVE NA ANALYSES

SAMPLE ID / LOCATION: AB023A99 / 03B02 - ABG

DATE: 9/9/99 TIME: 0914

DATE	TIME	PARAMETER	RESULT
9/9/99	1155	DISSOLVED O2	0.20 (performed @ well)
	1441	ALKALINITY	129 mg/L
	1447	CARBON DIOXIDE	120 mg/L
	1450	SULFIDE	0.04 mg/L (performed @ well)
	1452	FERROUS IRON	3.30 mg/L - LIMIT
	1457	NITRITE	0.000 mg/L
	1520	NITRATE	0.00 mg/L

Well 03C17, sample # AC173A99 for Alkalinity -
Alkalinity = 353 mg/L

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Scott W. Reid DATE 9/9/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

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SAMPLE ID/LOCATION: AC253A99 WELL 03C25

9.10.99 SAMPLE TIME

DATE	TIME	PARAMETER	RESULT	
9.10.99	1040	DISSOLVED OXYGEN	0.28 mg/L	PREFORMED @ WELL
	1420	ALKALINITY	328 mg/L	280 PPM @ WELL
	1425	CARBON DIOXIDE	93 mg/L	16 PPM @ WELL
	1038	SULFIDE	0.13 mg/L	PREFORMED @ WELL
	1433	FERROUS IRON	0.15 mg/L	—
	1500	NITRITE	0.002 mg/L	—
	1520	NITRATE	0.03 mg/L	—

SAMPLE ID/LOCATION AC113A99 WELL 03C11

SAMPLED AT:

9.10.99	1752	DISSOLVED OXYGEN	5 PPM	PREFORMED @ WELL
	1853	ALKALINITY	244 mg/L	235 PPM @ WELL
	1858	CARBON DIOXIDE	131 mg/L	
	1728	SULFIDE	0.03 mg/L	PREFORMED @ WELL
	1908	FERROUS IRON	0.04 mg/L	—
	1925	NITRITE	0.006 mg/L	—
	1935	NITRATE	>2.43 mg/L	@ METER LIMIT

SAMPLE ID/LOCATION: AC303A99 WELL 03C30 ABC

ALKALINITY @ 1605 = 229 mg/L
HACH TITRATOR

SIGNATURE [signature] DATE 9.10.99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

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SAMPLE ID/LOCATION A C03 3A99 03C03 ABG
SAMPLED 9.11.99

TIME	PARAMETER	RESULT	DUP	
1116	DIS. OXYGEN	0.15 PPM	0.15 PPM	CHEMETS IN FIELD
1322	ALKALINITY	338 mg/L	347 mg/L	190 PPM @ 1105
1332	CARBON DIOXIDE	33.0 mg/L	34.1 mg/L	—
1135	SULFIDE	0.01 mg/L	0 mg/L	PREFORMED @ WELL
1355	FERROUS IRON	0 mg/L	0 mg/L	—
1406	NITRITE	0 mg/L	0.005 mg/L	—
1443	NITRATE	0.05 mg/L	0.05 mg/L	—

SAMPLE ID/LOCATION A C073A99 03C07 ABG
SAMPLED 9.11.99
ALKALINITY = 295 mg/L

Sample ID/Location: AC09P23A99 / 03C09P2 (ABG)
DATE SAMPLED: 9/11/99 TIME SAMPLED: 1552

Alkalinity = 149 mg/L

SAMPLE ID/LOCATION: AC043A99/03C04 (ABG
DATE SAMPLED: 9/10-12/99 TIME SAMPLED:
1743 ALKALINITY = 343 mg/L
1748 CARBON DIOXIDE = 106 mg/L
1800 FERROUS IRON = 0.03 mg/L
1805 NITRITE = 0.000 mg/L
1827 NITRATE = 0.02 mg/L
1645 Dis. Oxygen = 2 mg/L } at well head.
1625 Sulfide = 0.00 mg/L }

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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SIGNATURE / Scott W. Neil DATE 9/11/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Work continued from Page

SAMPLE LOCATION/ID AC263A99 WELL 03C26
SAMPLED 9.12.99
ALKALINITY = 301 MG/L

SAMPLE ID/LOCATION AC
SAMPLED 9.12.99
ALKALINITY = 290 MG/L

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE DATE

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P ©

Work continued from Page

DATE: 9/13/99 TIME: 0837 ID/LOCATION: ACRB3A99/ CREEK AT BOUNDARY

TIME	PARAMETER	RESULT
0853	DISSOLVED O_2	6mg/L - Performed in the field.
1326	ALKALINITY	167mg/L (FIELD CHEMETS = 78ppm)
1333	CARBON DIOXIDE	38.3mg/L (FIELD CHEMETS = NA)
0905	SULFIDE	0.01mg/L - Performed in the field.
1348	FERROUS IRON	0.01mg/L
1354	NITRITE	0.001mg/L
1410	NITRATE	

DATE: 9/13/99 TIME: 0956 LOCATION/ID: SPRINGC / ASPC3A99

TIME	PARAMETER	RESULT
1052	DISSOLVED O_2	11mg/L - Performed in the field.
1100	SULFIDE	0.02mg/L - Performed in the field.
1400	Alkalinity	165mg/L (CHEMETS at the spring = 65ppm)
1430	CARBON DIOXIDE	39.8mg/L (CHEMETS at the Spring = <10ppm)
1446	FERROUS IRON	0.01mg/L
1453	NITRITE	0.001mg/L
1512	NITRATE	1.82mg/L

DATE: 9/13/99 TIME: 0956 LOCATION/ID: SPRINGC/ FD09139901
THIS IS A DUPLICATE OF ASPC3A99

TIME	PARAMETER	RESULT
1052	DISSOLVED O_2	11mg/L - Performed in the field.
1114	Sulfide	0.01mg/L - Performed in the field.
1403	Alkalinity	136mg/L (CHEMETS at the Spring = 65ppm)
1431	Carbon Dioxide	40.7mg/L (CHEMETS at the Spring = <10 ppm)
1446	FERROUS IRON	0.00mg/L
1453	NITRITE	0.000mg/L
1512	NITRATE	1.71mg/L

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SIGNATURE [signature] DATE 9/13/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

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DATE: 9/13/99 TIME: 1504 LOCATION/ID: SPRINGA/ASPA3A99

TIME	PARAMETER	RESULT
1610	DISSOLVED O_2	12 mg/L - Performed at the source.
1620	Sulfide	0.00 mg/L - Performed " " "
1651	ALKALINITY	158 mg/L (CHEMETS = 112 mg/L)
1658	CARBON DIOXIDE	37.9 mg/L (CHEMETS = < 10 mg/L).
1705	FERROUS IRON	0.01 mg/L
1714	NITRITE	0.001 mg/L
1733	NITRATE	> 2.43 mg/L (OVER LIMIT).

NOTE: Low flow at all surface points sampled due to lack of rainfall over past month.

VOID
9/13/99
SWN

SIGNATURE [signature] DATE 9/13/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Work continued from Page

0830: Run lab blank for Alkalinity ($CaCO_3$). (SN)
- Reagent grade Deionized water used (RICCA CAT# 9159150-5; LOT # 190SP059, S&P. DATE APR 2000).
- Sulfuric ~~Iter~~ titration cartridge 1.600 N (HACH). (SN)
- No color change when adding phenolphthalein indicator; total alkalinity = ~~0~~ Bicarbonate. (SN)
- Addition of bromocresol indicator causes green color change - when immersing tip of titration cartridge into flask, immediate color change occurs. Alkalinity = 0 mg/L.

0844: Run std. additions for Alkalinity:
Deionized water used with 0.50 N Alkalinity Std, and 1.60N titrant. Each titration of 25 digits of 1.60N should cause a color change to end point.

READING #	Std Added	# of Digits	Std. Added	Total Param	Expected (mg/L)
1 ~~0~~	0	0	0	0	0
2 ~~1~~ (SN)	0.1 mL	25	25	25	25
3 ~~2~~	0.2 mL	24	50	49	50
4 ~~3~~	0.3 mL	26	75	75	75

Addition Recovery Percentage = AR %:

$$100 \times \frac{\text{Reading 2} - \text{Reading 1}}{\text{Expecteded Increase}} = 100 \times \frac{25-0}{25} = 100\%$$

$$100 \times \frac{49-25}{25} = 96\%$$

$$100 \times \frac{75-49}{25} = 104\%$$

AVG AR% = 100

SIGNATURE Scott [illegible] DATE 9/14/99

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Work continued from Page 71

0920: Run Lab Blank for Carbon Dioxide (CO_2)
- Reagent Grade Deionized water used (RICCA CAT# 9150-5; LOT # 190509; EXP DATE APR 2000).
- NaOH titration cartridge = 0.3636 N (Atach)
- Titration = ~~7~~ SW 4.4mg/L (44 digits x 0.1 multiplier).

0933: Run Standard Additions on CO_2 Lab Blank.
- Use 0.1mL of CO_2 Std Solution Volumetric Ampule, 10,000mg/L CO_2.
- Each addition should require 50 digits of titrant (0.3636N NaOH).

READING #	Total Std Added	Total Digits	Total Std Add.	Total Param.
1	0mL	37	0mg/L	
2	0.1mL	49+37 = ~~86~~ 86 SW	5	
3	0.2mL	48+37 = ~~86~~ 85	10	
4	0.3mL	48+37 = 85	15	

SWR 9/14/99

Digits = Lab Blank - 44 (of .3636 N NaOH)
1st addition - 49
2nd addition - 48
3rd addition - 48

AR% (Addition Recovery Percentage):

$$100 \times \frac{\text{Reading 2} - \text{Reading 1}}{\text{expected increase}} = 100 \times \frac{(49+37)-37}{50} = 98\%$$

$$100 \times \frac{(48+37)-37}{50} = 96\%$$

$$100 \times \frac{(48+37)-37}{50} = 96\%$$

AVERAGE AR% = 97%

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page 75

SIGNATURE Scott W. Reid DATE 9/14/99

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Work continued from Page 73

1040: Run Nitrate Standard Solution:
- Prepare a 0.20 mg/L NO_3-N standard by diluting 2.00mL of a 10.0 mg/L NO_3-N Std Solution to 100.0mL w/ deionized H_2O.
- The above Std Solution will be used as a sample following the procedures for analyzing a sample.

STD SOLUTION RESULT = 0.19 mg/L - Expected result = 0.20mg/L
This result, therefore is acceptable

1330: Run Nitrite Standard Solution:
- Prepare Std. by diluting 5.00 ~~mg~~ STD mL of 250 µg/mL of Nitrite Std Solution to 250.0mL of DI H_2O. From this solution, dilute 10.0mL to 500mL of DI H_2O. This is a 0.100 mg/L NITRITE STD SOLUTION.

RESULT OF STD SOLUTION = 0.097 mg/L - Range is 0.110 - 0.90 mg/L => STD SOLUTION CHECKS.

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9/14/99
SWN

Work continued to Page

SIGNATURE Scott W. [illegible] DATE 9/14/99

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03B02
Sample Date: 9/9/99
Sample ID: AB023A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A10
Monitoring Well Inspection Form Number: A53
Water Level Measurement Form Number: A7
Ground Water Sample Log Form Number: A37
Low Flow Purge Data Form Number(s): A62
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A60
Chain-of-Custody Number(s): 0068, 69, 70, 67
Laboratory Sample ID Number:

Sample Location: 03B04
Sample Date: 9/9/99
Sample ID: AB043A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9
Monitoring Well Inspection Form Number: A54
Water Level Measurement Form Number: A7
Ground Water Sample Log Form Number: A17
Low Flow Purge Data Form Number(s): A48
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A59
Chain-of-Custody Number(s): 69, 70, 67
Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 765

Sample Location: 03C02P2

Sample Date: 9-7-99

Sample ID: A C02P23A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: A40

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A41

Low Flow Purge Data Form Number(s): A58

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A53

Chain-of-Custody Number(s): 62, 63, 65, 66, 70

Laboratory Sample ID Number:

Sample Location: 03C03

Sample Date: 9.11.99

Sample ID: A C03 3A 99

Associated Documentation

Equipment Calibration Log Number(s): A8; A10

Monitoring Well Inspection Form Number: A45

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A3

Low Flow Purge Data Form Number(s): A73

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A66 DUP & A65

Chain-of-Custody Number(s): 74, 81, 77

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C04
Sample Date: 9/10-11-12/99
Sample ID: AC043A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A10
Monitoring Well Inspection Form Number: A50
Water Level Measurement Form Number: A7
Ground Water Sample Log Form Number: A20
Low Flow Purge Data Form Number(s): A50
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A68
Chain-of-Custody Number(s): 79, 80, 81, 77
Laboratory Sample ID Number:

Sample Location: 03C07
Sample Date: 9/11/99
Sample ID: AC073A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9
Monitoring Well Inspection Form Number: A51
Water Level Measurement Form Number: A7
Ground Water Sample Log Form Number: A51
Low Flow Purge Data Form Number(s): A66
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A69
Chain-of-Custody Number(s): 78, 81
Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C08P2

Sample Date: 9.12.99

Sample ID: AC08P23A99

Associated Documentation

Equipment Calibration Log Number(s): A9, A8

Monitoring Well Inspection Form Number: A49

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A47

Low Flow Purge Data Form Number(s): A75

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A71

Chain-of-Custody Number(s): 75, 81

Laboratory Sample ID Number:

Sample Location: 03C09P2

Sample Date: 9.11.99

Sample ID: AC09P23A99

Associated Documentation

Equipment Calibration Log Number(s): A9, A8

Monitoring Well Inspection Form Number: A44

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A46

Low Flow Purge Data Form Number(s): A74

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A67

Chain-of-Custody Number(s): 79, 78, 81

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7657

Sample Location: 03 C10
Sample Date: 9/8/99
Sample ID: AC103A99

Associated Documentation

Equipment Calibration Log Number(s): A 9, A8
Monitoring Well Inspection Form Number: A 46
Water Level Measurement Form Number: A7
Ground Water Sample Log Form Number: A 36
Low Flow Purge Data Form Number(s): A 60
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A 57
Chain-of-Custody Number(s): 64, 65, 70, 67
Laboratory Sample ID Number:

Sample Location: 03 C11
Sample Date: 9/10/99
Sample ID: AC113A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9
Monitoring Well Inspection Form Number: A 43
Water Level Measurement Form Number: A 7
Ground Water Sample Log Form Number: A39
Low Flow Purge Data Form Number(s): A 65
Surface Water Sample Log Form Number: NA
Field Chemical Analysis Log Form Number(s): A 64
Chain-of-Custody Number(s): 72, 81, 77
Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C12

Sample Date: 9/8/99

Sample ID: AC123A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A10

Monitoring Well Inspection Form Number: A 42

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A16

Low Flow Purge Data Form Number(s): A59

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A55

Chain-of-Custody Number(s): 63, 64, 65, 70, 67

Laboratory Sample ID Number:

Sample Location: 03C15

Sample Date: 9/8/99

Sample ID: AC153A99

Associated Documentation

Equipment Calibration Log Number(s): A10, A8

Monitoring Well Inspection Form Number: A 47

Water Level Measurement Form Number: A7

Ground Water Sample Log Form Number: A44

Low Flow Purge Data Form Number(s): A 200

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A58

Chain-of-Custody Number(s): 65, 70

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C17

Sample Date: 9.9.99

Sample ID: AC173A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A10

Monitoring Well Inspection Form Number: A39

Water Level Measurement Form Number: A8

Ground Water Sample Log Form Number: A50

Low Flow Purge Data Form Number(s): A63

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A61

Chain-of-Custody Number(s): 71, 81

Laboratory Sample ID Number:

Sample Location: 03C20

Sample Date: 9/14/99

Sample ID: AC203A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: A40

Water Level Measurement Form Number: A8

Ground Water Sample Log Form Number: A54

Low Flow Purge Data Form Number(s): A68

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A77

Chain-of-Custody Number(s): 85

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C25

Sample Date: 9/10/99

Sample ID: AC253A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: A55

Water Level Measurement Form Number: A8

Ground Water Sample Log Form Number: A38

Low Flow Purge Data Form Number(s): A64

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A62

Chain-of-Custody Number(s): 71, 72, 81, 77

Laboratory Sample ID Number:

Sample Location: 03C26

Sample Date: 9.12.99

Sample ID: AC263A99

Associated Documentation

Equipment Calibration Log Number(s): A8 A10

Monitoring Well Inspection Form Number: A52

Water Level Measurement Form Number: A8

Ground Water Sample Log Form Number: A53

Low Flow Purge Data Form Number(s): A67

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A70

Chain-of-Custody Number(s): 76, 75, 78, 81

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: 03C27

Sample Date: 9/8/99

Sample ID: AC273A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: A 41

Water Level Measurement Form Number: A 8

Ground Water Sample Log Form Number: A49

Low Flow Purge Data Form Number(s): A61

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A54

Chain-of-Custody Number(s): 65, 66, 70

Laboratory Sample ID Number:

Sample Location: 03C30

Sample Date: 9.10.99

Sample ID: AC303A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A10

Monitoring Well Inspection Form Number: A 38

Water Level Measurement Form Number: A 8

Ground Water Sample Log Form Number: A45

Low Flow Purge Data Form Number(s): A49

Surface Water Sample Log Form Number: NA

Field Chemical Analysis Log Form Number(s): A63

Chain-of-Custody Number(s): 75, 74, 81

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 7651

Sample Location: CREEK A

Sample Date:

Sample ID:

Associated Documentation

Equipment Calibration Log Number(s):

Monitoring Well Inspection Form Number: NA

Water Level Measurement Form Number: NA

Ground Water Sample Log Form Number: NA

Low Flow Purge Data Form Number(s): NA

Surface Water Sample Log Form Number:

Field Chemical Analysis Log Form Number(s):

Chain-of-Custody Number(s):

Laboratory Sample ID Number:

Sample Location: CREEK B

Sample Date: 9/13/99

Sample ID: ACRB3A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: NA

Water Level Measurement Form Number: NA

Ground Water Sample Log Form Number: NA

Low Flow Purge Data Form Number(s): NA

Surface Water Sample Log Form Number: A12

Field Chemical Analysis Log Form Number(s): A12

Chain-of-Custody Number(s): 84, 85, 77

Laboratory Sample ID Number:

NSWC CRANE
DOCUMENT TRACKING
PROJECT NO. 765

Sample Location: SPRING A

Sample Date: 9/13/99

Sample ID: ASPA3A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: NA

Water Level Measurement Form Number: NA

Ground Water Sample Log Form Number: NA

Low Flow Purge Data Form Number(s): NA

Surface Water Sample Log Form Number: A14

Field Chemical Analysis Log Form Number(s): A75

Chain-of-Custody Number(s): 77, 82, 85

Laboratory Sample ID Number:

Sample Location: SPRING ~~B~~ C

Sample Date: 9/13/99

Sample ID: ASPC3A99

Associated Documentation

Equipment Calibration Log Number(s): A8, A9

Monitoring Well Inspection Form Number: NA

Water Level Measurement Form Number: NA

Ground Water Sample Log Form Number: NA

Low Flow Purge Data Form Number(s): NA

Surface Water Sample Log Form Number: A13

Field Chemical Analysis Log Form Number(s): A73

Chain-of-Custody Number(s): 77, 83, 90

Laboratory Sample ID Number:

ATTACHMENT 10

TABULAR LISTING OF
GROUND WATER/SURFACE WATER DATA
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03B02	03B04	03C02P2	03C02P2	03C03	03C03	03C04	03C07	03C08P2	03C09P2	03C10	03C11	03C12	03C15	03C17
Aquifer	ALLUVIUM	ALLUVIUM	BEECH CREEK	BEECH CREEK	BEAVER BEND	BEAVER BEND	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK
Matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Nsample	AB023A99	AB043A99	AC02P23A99	AC02P23A99-D	AC033A99	AC033A99-D	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
Sample	AB023A99	AB043A99	AC02P23A99	FD09079901	AC033A99	FD09119901	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
SA Code	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Sample Date	9/9/99	9/9/99	9/7/99	9/7/99	9/11/99	9/11/99	9/11/99	9/11/99	9/12/99	9/11/99	9/8/99	9/10/99	9/8/99	9/8/99	9/9/99
Duplicate				AC02P23A99		AC033A99									
Volatile Organics (ug/L)															
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
1,1-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				25	0.5 U	0.5 U		
BENZENE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
CARBON TETRACHLORIDE	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.4	0.3 U	0.3 U		
CHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
CHLOROFORM	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.9	2.1	0.3 U		
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	14	0.5 U	0.5 U	8.9	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
METHYLENE CHLORIDE	1 U	1 U			1 UJ	1 UJ	1 UJ				1 U	1 UJ	1 U		
TETRACHLOROETHENE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
TOLUENE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				0.5 U	0.5 U	0.5 U		
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.5 U	0.5 U	10	10	0.5 U	0.5 U	0.5 U	4.3	63	170	61	2300	21	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES, TOTAL	1 U	1 U			0.5 U	0.5 U	0.5 U				1 U	1 U	1 U		
Dissolved Gases (ug/L)															
ETHANE	0.091	0.048			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U		
ETHENE	0.028	0.005 U			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U		
METHANE	7.4	7.2			0.37	0.31	1.8				0.095	0.051	0.08		
Energetics (ug/L)															
1,3,5-TRINITROBENZENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
1,3-DINITROBENZENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
2,4,6-TRINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
2,4-DIAMINO-6-NITROTOLUENE	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U		
2,4-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
2,6-DIAMINO-4-NITROTOLUENE	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U		
2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.94	0.58 J	0.51 U	0.75 U	1.4 U	1.4 U
2-AMINO-4,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	2.1 J	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
2-NITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
3,5-DINITROANILINE	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U		
3-NITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
4,4'-TN-AZOXY	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U		
4-AMINO-2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.4 J	3.9 J	0.31 U	1.3 J	0.56 J	0.75 U	1.4 U	1.4 U
4-NITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
HMX	0.3 U	0.64 U	29	27	0.70 U	0.48 U	1.5 U	5.3 J	31	2.9	6.8	5.4	38	1.4 U	1.4 U
MNX	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				3	0.51 U	0.75 U		
NITROBENZENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
NITROCELLULOSE	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
NITROGLYCERIN	3 U	6.4 U	9.5 U	4.8 U	7 U	4.8 U	15 U	2.3 U	7.9 U	3.1 U	4.9 U	5.1 U	7.5 U	14 U	14 U
PETN	1.5 U	3.1 U	4.7 U	2.4 U	3.5 U	2.4 U	7.4 U	1.2 U	3.9 U	1.5 U	2.4 U	2.5 U	3.7 U	6.7 U	6.7 U
PICRIC ACID	1 U	1 U			1 U	1 U	1.1 U				1 U	1 U	1 U		
RDX	0.3 U	0.64 U	17	16	0.70 U	0.48 U	1.5 U	21	86	130	100	25	28	1.4 U	1.4 U
TETRYL	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U
TNX	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U		

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03B02	03B04	03C02P2	03C02P2	03C03	03C03	03C04	03C07	03C08P2	03C09P2	03C10	03C11	03C12	03C15	03C17
Aquifer	ALLUVIUM	ALLUVIUM	BEECH CREEK	BEECH CREEK	BEAVER BEND	BEAVER BEND	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK
Matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Nsample	AB023A99	AB043A99	AC02P23A99	AC02P23A99-D	AC033A99	AC033A99-D	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
Sample	AB023A99	AB043A99	AC02P23A99	FD09079901	AC033A99	FD09119901	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
SA Code	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Sample Date	9/9/99	9/9/99	9/7/99	9/7/99	9/11/99	9/11/99	9/11/99	9/11/99	9/12/99	9/11/99	9/8/99	9/10/99	9/8/99	9/8/99	9/9/99
Duplicate				AC02P23A99		AC033A99									
Total Metals (ug/L)															
ANTIMONY	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
ARSENIC	10.3	6.3	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1	2.2
BARIUM	88.0	95.0	105	105	42.3	43.7	30.6	31.9	81.8	15.2	46.6	23.1	96.9	25.1	13.2
BERYLLIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CADMIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CHROMIUM	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.9	2.2 U	30.1	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
IRON	12100	6790			111 U	111 U	190				111 U	111 U	111 U		
LEAD	1.1 UJ	1.1 UJ	4.0 J	1.1 UJ	1.1 U	1.1 U	1.1 U	8.3	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 UJ	1.1 UJ	1.1 U
MANGANESE	1210	1760	16.7 U	16.7 U	16.7 U	16.7 U	908	16.7 U	16.7 U	30.9	16.7 U	16.7 U	16.7 U	36.2	140
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.20 U	0.2 U	0.20 U	0.20 U	0.2 U
NICKEL	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
SELENIUM	1.1 U	1.1 U	3.1	2.0	1.1 U	1.1 U	2.3	1.8	2.6	2	3.0	4.4	1.2	2.0	1.3
SILVER	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
THALLIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
TIN	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
VANADIUM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
ZINC	11.1 UJ	13.4 J	193 J	11.1 UJ	11.1 U	11.1 U	11.1 U	33.9	11.1 U	11.1 U	11.1 UJ	11.1 U	11.1 UJ	11.1 UJ	11.1 U
Dissolved Metals (ug/L)															
ANTIMONY, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
ARSENIC, FILTERED	10.9	6.4	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2	2
BARIUM, FILTERED	91.3	107	105	105	49.7	45	31.7	32.9	89.6	15.3	44.0	27	99.6	24.9	13.8
BERYLLIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CADMIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CALCIUM, FILTERED	47300	29500	119000	122000	1430	1470	147000	97100	119000	76800	99300	237000	106000	105000	204000
CHROMIUM, FILTERED	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	7.6	5.6 U	5.6 U	5.6 U	7.3	5.6 U	5.6 U	5.6 U
COBALT, FILTERED	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.2 J	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
LEAD, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
MAGNESIUM, FILTERED	5920	4150	17600	17700	1110 U	1110 U	193000	46000	41300	14900	12300	121000	7510	43800	196000
MANGANESE, FILTERED	1250	1730	16.7 U	16.7 U	16.7 U	16.7 U	102	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	35.7	130
MERCURY, FILTERED	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	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, FILTERED	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	24	13.1	15.6	11.1 U	11.1 U	33.4	11.1 U	11.1 U	30.7
POTASSIUM, FILTERED	1350	1110 U	2930	2950	1190	1300	3220	3500	26800	1450	1130	4770	2160	2110	3300
SELENIUM, FILTERED	1.1 U	1.1 U	3.3	2.8	1.1 U	1.1 U	2.6	2	1.8	1.6	4.2	3.4	1.3	2.2	1.3
SILVER, FILTERED	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
SODIUM, FILTERED	9560	5790	33800	32800	221000	235000	51100	22400	19000	4810	7660	88400	12900	25400	119000
THALLIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
TIN, FILTERED	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
VANADIUM, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
ZINC, FILTERED	11.1 U	11.1 U	32.2	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	81 J	11.1 U	11.1 U	11.1 U
Miscellaneous															
ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353
BICARBONATE ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353
CARBON DIOXIDE (MG/L)	120	60	113.8		33.0	34.1	106				101	131	63.6		

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03B02	03B04	03C02P2	03C02P2	03C03	03C03	03C04	03C07	03C08P2	03C09P2	03C10	03C11	03C12	03C15	03C17
Aquifer	ALLUVIUM	ALLUVIUM	BEECH CREEK	BEECH CREEK	BEAVER BEND	BEAVER BEND	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK
Matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Nsample	AB023A99	AB043A99	AC02P23A99	AC02P23A99-D	AC033A99	AC033A99-D	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
Sample	AB023A99	AB043A99	AC02P23A99	FD09079901	AC033A99	FD09119901	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99
SA Code	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Sample Date	9/9/99	9/9/99	9/7/99	9/7/99	9/11/99	9/11/99	9/11/99	9/11/99	9/12/99	9/11/99	9/8/99	9/10/99	9/8/99	9/8/99	9/9/99
Duplicate				AC02P23A99		AC033A99									
CARBONATE ALKALINITY (MG/L)	0	0	0		0	0	0	0	0	0	0	0	0	0	0
CHLORIDE (MG/L)	4	1	77	73	1	1	6	8	13	5	8	46	34	4	3
CYANIDE (MG/L)	0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
DISSOLVED OXYGEN-HACH (MG/L)	0.2	1.5	9.0		0.15	0.15	2				2.5	5	8		
DISSOLVED OXYGEN-METER (MG/L)	1.10	3.11	9.4		3.15	3.15	6.57	3.82	7.01	8.04	3.71	8.45	7.48	3.3	2.14
FERROUS IRON (MG/L)	3.3 >	3.3 >			0	0	0.03				0.02	0.04	0		
HYDROXIDE ALKALINITY (MG/L)	0	0	0		0	0	0	0	0	0	0	0	0	0	0
NITRATE (MG/L)	0	0			0.05	0.05	0.02				2.43 >	2.43 >	2.43		
NITRITE (MG/L)	0	0			0	0.005	0				0	0.006	0.001		
OXIDATION REDUCTION POTENTIAL (MV)	-141.5	-98	146		2		-3	107.5	93	96	182.9	-5.8	167	-50	-71.0
PH ()	7.26	6.88	6.73		9.21		7.18	7.24	7.22	6.77	6.57	7.19	7.11	7.02	7.02
SPECIFIC CONDUCTIVITY (MS/CM)	0.373	0.215	0.843		0.903		1.884	0.87	0.829	0.488	0.561	1.92	0.782	0.856	2.26
SULFATE (MG/L)	28	17	62	60	83	86	810	92	130	51	58	820	61	160	1000
SULFIDE (MG/L)	1 UJ	1 UJ			1 UJ	1 UJ	1 UJ				1 J	1 UJ	2 J		
SULFIDE (MG/L)	0.04	0.01			0.01	0	0				0.03	0.03	0.01		
TEMPERATURE (C)	16.5	16.05	15.8		15.5		18.9	23.33	21.5	17.1	18.33	19.41	17.37	14.99	17.21
TOTAL ORGANIC CARBON (MG/L)	5.1 J	7.3 J	10 J	9.9	7.7 J	8.9 J	7.8 J	8 J	7.4 J	11 J	7 J	7.2 J	8.6 J	7.4 J	8.8 J
TOTAL ORGANIC HALOGENS (MG/L)	0.02 U	0.02 U	0.02 U	0.02 U	0.04	0.02 U	0.02 U	0.02	0.05	0.13	0.06	1.4	0.04	0.02 U	0.02 U
TOTAL PHOSPHORUS (MG/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TOTAL PHOSPHORUS, FILTERED (MG/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TURBIDITY (NTU)	3.3	1	2		1		2	0	2	6	1.8	3.8	0	0	0
WATER LEVEL (FT)	6.51	8.03	37.6		88.0		76.13	78.76	74.7	45.32	49.97	44.15	41.85	64.54	138.07

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03C20	03C25	03C26	03C27	03C30	CRB	SPRING A	SPRING C	SPRING C
Aquifer	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK				
Matrix	GW	GW	GW	GW	GW	SW	SW	SW	SW
Nsample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	ASPC3A99-D
Sample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	FD09139901
SA Code	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP
Sample Date	9/14/99	9/10/99	9/12/99	9/8/99	9/10/99	9/13/99	9/13/99	9/13/99	9/13/99
Duplicate									ASPC3A99
Volatile Organics (ug/L)									
1,1,1-TRICHLOROETHANE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
BENZENE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE		0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CHLOROETHANE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM		0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	77	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE		1 U				1 UJ	1 UJ	1 UJ	1 UJ
TETRACHLOROETHENE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE		0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	3400	0.5 U	8.9	4.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES, TOTAL		1 U				0.5 U	0.5 U	0.5 U	0.5 U
Dissolved Gases (ug/L)									
ETHANE		0.044				0.006	0.005 U	0.005 U	0.005 U
ETHENE		0.005 U				0.005 U	0.005 U	0.005 U	0.005 U
METHANE		43.8				9	0.048	0.059	0.07
Energetics (ug/L)									
1,3,5-TRINITROBENZENE	6.7 J	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
1,3-DINITROBENZENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2,4,6-TRINITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	1.8	0.31 U	0.4 U
2,4-DIAMINO-6-NITROTOLUENE		0.79 U				0.52 U	0.87 U	0.31 U	0.4 U
2,4-DINITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2,6-DIAMINO-4-NITROTOLUENE		0.79 U				0.52 U	0.87 U	0.31 U	0.4 U
2,6-DINITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2-AMINO-4,6-DINITROTOLUENE	12	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	2.1	0.31 U	0.4 U
2-NITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
3,5-DINITROANILINE		0.79 U				0.52 U	0.94	0.31 U	0.4 U
3-NITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
4,4'-TN-AZOXY		0.79 U				0.52 U	0.87 U	0.31 U	0.4 U
4-AMINO-2,6-DINITROTOLUENE	19	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	4.9	0.31 U	0.4 U
4-NITROTOLUENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
HMX	26	0.79 U	0.61 U	0.86 U	0.25 U	3.4	31	0.51	0.54
MNX		0.79 U				0.52 U	2.4 J	0.31 U	0.4 U
NITROBENZENE	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
NITROCELLULOSE	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 UR	1000 U
NITROGLYCERIN	11 U	7.9 U	6.1 U	8.6 U	2.5 U	5.2 U	8.7 U	3.1 U	4 U
PETN	5.2 U	3.9 U	3 U	4.2 U	1.2 U	2.6 U	4.3 U	1.5 U	2 U
PICRIC ACID		1 U				1 U	1 U	1 U	1 U
RDX	170	0.79 U	0.8	0.86 U	0.25 U	3.8	120	0.72	0.77
TETRYL	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
TNX		0.79 U				0.52 U	0.87 U	0.31 U	0.4 U

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03C20	03C25	03C26	03C27	03C30	CRB	SPRING A	SPRING C	SPRING C
Aquifer	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK				
Matrix	GW	GW	GW	GW	GW	SW	SW	SW	SW
Nsample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	ASPC3A99-D
Sample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	FD09139901
SA Code	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP
Sample Date	9/14/99	9/10/99	9/12/99	9/8/99	9/10/99	9/13/99	9/13/99	9/13/99	9/13/99
Duplicate									ASPC3A99
Total Metals (ug/L)									
ANTIMONY	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
ARSENIC	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM	30.4	16.8	41.6	33.0	17.2	158	142	70.2	68.9
BERYLLIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CADMIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CHROMIUM	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
IRON		201				517	111 U	118	111 U
LEAD	1.1 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
MANGANESE	16.7 U	29.7	20.1	16.7 U	26.7	362	16.7 U	16.7 U	16.7 U
MERCURY	0.2 U	0.2 U	0.2 U	0.20 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
SELENIUM	1.3	1.1 U	1.3	1.1 U	1.1 U	1.1 U	1.6	1.1 U	1.2
SILVER	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
THALLIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
TIN	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
VANADIUM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
ZINC	11.1 U	11.1 U	11.1 U	20.6 J	11.1 U	11.9	11.1 U	11.1 U	11.1 U
Dissolved Metals (ug/L)									
ANTIMONY, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
ARSENIC, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM, FILTERED	34.4	18.1	47.3	33.2	73	158	154	71.8	72.2
BERYLLIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CADMIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
CALCIUM, FILTERED	92200	104000	106000	57100	52800	48100	71800	58800	57700
CHROMIUM, FILTERED	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
COBALT, FILTERED	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
LEAD, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
MAGNESIUM, FILTERED	31100	59600	55700	3030	33300	9090	15800	12200	12100
MANGANESE, FILTERED	16.7 U	23.8	20.7	16.7 U	16.7 U	356	16.7 U	16.7 U	16.7 U
MERCURY, FILTERED	0.2 U	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, FILTERED	11.1	15.7	12.9	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
POTASSIUM, FILTERED	2130	2640	3110	1400	3630	2320	2780	1240	1180
SELENIUM, FILTERED	1.1 U	1.1 U	1.2	1.2	1.1 U	1.1 U	1.1	1.1 U	1.1 U
SILVER, FILTERED	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
SODIUM, FILTERED	12700	66100	18500	5720	80700	6370	11400	6710	6590
THALLIUM, FILTERED	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
TIN, FILTERED	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
VANADIUM, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
ZINC, FILTERED	14 J	14.6 J	11.1 U	11.1 U	11.1 U	11.1 U	32.8 J	11.1 U	11.1 U
Miscellaneous									
ALKALINITY (MG/L)	198	328	301	116.4	229	167	158	165	136
BICARBONATE ALKALINITY (MG/L)	198	328	301	116.4	229	167	158	165	136
CARBON DIOXIDE (MG/L)		93				38.3	37.9	39.8	40.7

NSWC CRANE
SUMMARY OF ALL GROUNDWATER AND SURFACE WATER RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03C20	03C25	03C26	03C27	03C30	CRB	SPRING A	SPRING C	SPRING C
Aquifer	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK				
Matrix	GW	GW	GW	GW	GW	SW	SW	SW	SW
Nsample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	ASPC3A99-D
Sample	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	FD09139901
SA Code	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP
Sample Date	9/14/99	9/10/99	9/12/99	9/8/99	9/10/99	9/13/99	9/13/99	9/13/99	9/13/99
Duplicate									ASPC3A99
CARBONATE ALKALINITY (MG/L)	0	0	0	0	0	0	0	0	0
CHLORIDE (MG/L)	5	2	3	3	2	6	11	4	4
CYANIDE (MG/L)	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
DISSOLVED OXYGEN-HACH (MG/L)		0.28				6	12	11	11
DISSOLVED OXYGEN-METER (MG/L)	4.66	1.4	5.50	10.46	3.04	6.34	11.12	11.06	11.06
FERROUS IRON (MG/L)		0.15				0.01	0.01	0.01	0
HYDROXIDE ALKALINITY (MG/L)	0	0	0	0	0	0	0	0	0
NITRATE (MG/L)		0.03				1.70	2.43	1.82	1.71
NITRITE (MG/L)		0.002				0.001	0.001	0.001	0.001
OXIDATION REDUCTION POTENTIAL (MV)	125.0	-70.3	125.9	210.5	-61	19	132.6	147	
PH ()	7.25	7.16	7.22	7.62	9.44	7.41	7.60	7.55	
SPECIFIC CONDUCTIVITY (MS/CM)	0.577	1.09	0.744	0.314	0.675	0.307	0.434	0.620	
SULFATE (MG/L)	99	270	94	12	120	31	59	49	48
SULFIDE (MG/L)		1 UJ				1 UJ	1 UJ	1 UJ	1 UJ
SULFIDE (MG/L)		0.13				0.01	0	0.02	0.01
TEMPERATURE (C)	16.16	13.6	27.08	14.7	16.0	19.3	11.74	11.9	
TOTAL ORGANIC CARBON (MG/L)	11 J	8.6 J	8.7 J	7	7.8 J	7 J	7.5 J	8 J	5 J
TOTAL ORGANIC HALOGENS (MG/L)	2.3	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
TOTAL PHOSPHORUS (MG/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TOTAL PHOSPHORUS, FILTERED (MG/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TURBIDITY (NTU)	0	1.5	0	1.4	0	5	4.2	1	
WATER LEVEL (FT)	89.4	46.76	82.58	60.88	223.39				

ATTACHMENT 11

POSITIVE DETECTIONS
FOR
GROUND WATER/SURFACE WATER
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

SUMMARY OF PARAMETERS DETECTED AT LEAST ONCE
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	03B02	03B04	03C02P2	03C02P2	03C03	03C03	03C04	03C07	03C08P2	03C09P2	03C10	03C11	03C12	03C15	03C17	03C20	03C25	03C26	03C27	03C30	CRB	SPRING A	SPRING C	SPRING C
Aquifer	ALLUVIUM	ALLUVIUM	BEECH CREEK	BEECH CREEK	BEAVER BEND	BEAVER BEND	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK	BEECH CREEK				
Matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	SW	SW	SW	SW
Nsample	AB023A99	AB043A99	AC02P23A99	AC02P23A99-D	AC033A99	AC033A99-D	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	ASPC3A99-D
Sample	AB023A99	AB043A99	AC02P23A99	FD09079901	AC033A99	FD09119901	AC043A99	AC073A99	AC08P23A99	AC09P23A99	AC103A99	AC113A99	AC123A99	AC153A99	AC173A99	AC203A99	AC253A99	AC263A99	AC273A99	AC303A99	ACRB3A99	ASPA3A99	ASPC3A99	FD09139901
SA Code	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP
Sample Date	9/9/99	9/9/99	9/7/99	9/7/99	9/11/99	9/11/99	9/11/99	9/11/99	9/12/99	9/11/99	9/8/99	9/10/99	9/8/99	9/8/99	9/9/99	9/14/99	9/10/99	9/12/99	9/8/99	9/10/99	9/13/99	9/13/99	9/13/99	9/13/99
Duplicate				AC02P23A99		AC033A99																		ASPC3A99
Volatile Organics (ug/L)																								
1,2-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U				25	0.5 U	0.5 U				0.5 U				0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.4	0.3 U	0.3 U				0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CHLOROFORM	0.3 U	0.3 U			0.3 U	0.3 U	0.3 U				1.9	2.1	0.3 U				0.3 U				0.3 U	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	14	0.5 U	0.5 U	8.9	0.5 U	0.5 U	0.5 U	77	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.5 U	0.5 U	10	10	0.5 U	0.5 U	0.5 U	4.3	63	170	61	2300	21	0.5 U	0.5 U	3400	0.5 U	8.9	4.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dissolved Gases (ug/L)																								
ETHANE	0.091	0.048			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U				0.044				0.006	0.005 U	0.005 U	0.005 U
ETHENE	0.028	0.005 U			0.005 U	0.005 U	0.005 U				0.005 U	0.005 U	0.005 U				0.005 U				0.005 U	0.005 U	0.005 U	0.005 U
METHANE	7.4	7.2			0.37	0.31	1.8				0.095	0.051	0.08				43.8				9	0.048	0.059	0.07
Energetics (ug/L)																								
1,3,5-TRINITROBENZENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	6.7 J	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2,4,6-TRINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	1.8	0.31 U	0.4 U
2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	0.79 U	0.94	0.53 J	0.51 U	0.75 U	1.4 U	1.4 U	1.1 U	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	0.87 U	0.31 U	0.4 U
2-AMINO-4,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.23 U	2.1 J	0.31 U	0.49 U	0.51 U	0.75 U	1.4 U	1.4 U	12	0.79 U	0.61 U	0.86 U	0.25 U	0.52 U	2.1	0.31 U	0.4 U
3,5-DINITROANILINE	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				0.49 U	0.51 U	0.75 U				0.79 U				0.52 U	0.94	0.31 U	0.4 U
4-AMINO-2,6-DINITROTOLUENE	0.3 U	0.64 U	0.95 U	0.48 U	0.70 U	0.48 U	1.5 U	0.4 J	3.9 J	0.31 U	1.3 J	0.56 J	0.75 U	1.4 U	1.4 U	19	0.79 U	0.51 U	0.86 U	0.25 U	0.52 U	4.9	0.31 U	0.4 U
HMX	0.3 U	0.64 U	29	27	0.70 U	0.48 U	1.5 U	5.3 J	31	2.9	6.8	5.4	38	1.4 U	1.4 U	26	0.79 U	0.61 U	0.86 U	0.25 U	3.4	31	0.51	0.54
MNX	0.3 U	0.64 U			0.70 U	0.48 U	1.5 U				2	0.51 U	0.75 U				0.79 U				0.52 U	2.4 J	0.31 U	0.4 U
RDX	0.3 U	0.64 U	17	16	0.70 U	0.48 U	1.5 U	21	86	130	180	25	28	1.4 U	1.4 U	170	0.79 U	0.8	0.86 U	0.25 U	3.8	120	0.72	0.77
Total Metals (ug/L)																								
ARSENIC	10.3	6.3	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1	2.2	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM	88.0	95.0	105	105	42.3	43.7	30.6	31.9	81.8	15.2	46.6	23.1	96.9	25.1	13.2	30.4	16.8	41.6	33.0	17.2	158	142	70.2	68.9
COPPER	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.9	2.2 U	30.1	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
IRON	12100	6790			111 U	111 U	190				111 U	111 U	111 U				201				517	111 U	118	111 U
LEAD	1.1 UJ	1.1 UJ	4.0 J	1.1 UJ	1.1 U	1.1 U	1.1 U	8.3	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 UJ	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
MANGANESE	1210	1760	16.7 U	16.7 U	16.7 U	16.7 U	908	16.7 U	16.7 U	30.9	16.7 U	16.7 U	16.7 U	36.2	140	16.7 U	29.7	20.1	16.7 U	26.7	362	16.7 U	16.7 U	16.7 U
SELENIUM	1.1 U	1.1 U	3.1	2.0	1.1 U	1.1 U	2.3	1.8	2.6	2	3.0	4.4	1.2	2.0	1.3	1.3	1.1 U	1.3	1.1 U	1.1 U	1.1 U	1.6	1.1 U	1.2
ZINC	11.1 UJ	13.4 J	193 J	11.1 UJ	11.1 U	11.1 U	11.1 U	33.9	11.1 U	11.1 U	11.1 UJ	11.1 U	11.1 UJ	11.1 UJ	11.1 U	11.1 U	11.1 U	11.1 U	20.6 J	11.1 U	11.9	11.1 U	11.1 U	11.1 U
Dissolved Metals (ug/L)																								
ARSENIC, FILTERED	10.9	6.4	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2	2	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
BARIUM, FILTERED	91.3	107	105	105	49.7	45	31.7	32.9	89.6	15.3	44.0	27	99.6	24.9	13.8	34.4	18.1	47.3	33.2	73	158	154	71.8	72.2
CALCIUM, FILTERED	47300	29500	119000	122000	1430	1470	147000	97100	119000	76800	99300	237000	106000	105000	204000	92200	104000	105000	57100	52800	48100	71800	58800	57700
CHROMIUM, FILTERED	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	7.6	5.6 U	5.6 U	5.6 U	7.3	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
COPPER, FILTERED	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.2 J	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
MAGNESIUM, FILTERED	5920	4150	17600	17700	1110 U	1110 U	193000	46000	41300	14900	12300	121000	7510	43800	196000	31100	59600	55700	3030	33300	9090	15800	12200	12100
MANGANESE, FILTERED	1250	1730	16.7 U	16.7 U	16.7 U	16.7 U	102	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	16.7 U	35.7	130	16.7 U	23.8	20.7	16.7 U	16.7 U	356	16.7 U	16.7 U	16.7 U
NICKEL, FILTERED	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	24	13.1	15.6	11.1 U	11.1 U	33.4	11.1 U	11.1 U	30.7	11.1	15.7	12.9	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
POTASSIUM, FILTERED	1350	1110 U	2930	2950	1190	1300	3220	3500	26800	1450	1130	4770	2160	2110	3300	2130	2640	3110	1400	3630	2320	2780	1240	1180
SELENIUM, FILTERED	1.1 U	1.1 U	3.3	2.8	1.1 U	1.1 U	2.6	2	1.8	1.6	4.2	3.4	1.3	2.2	1.3	1.1 U	1.1 U	1.2	1.2	1.1 U	1.1 U	1.1	1.1 U	1.1 U
SODIUM, FILTERED	9560	5790	33800	32800	221000	235000	51100	22400	19000	4810	7660	88400	12900	25400	119000	12700	66100	18500	5720	80700	6370	11400	6710	6590
ZINC, FILTERED	11.1 U	11.1 U	32.2	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	81 J	11.1 U	11.1 U	11.1 U	14 J	14.6 J	11.1 U	11.1 U	11.1 U	11.1 U	32.8 J	11.1 U	11.1 U
Miscellaneous																								
ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353	198	328	301	116.4	229	167	158	165	136
BICARBONATE ALKALINITY (MG/L)	129	80.8	235		338	347	343	295	290	149	170	244	158.8	255	353	198	328	301	116.4	229	167	158	165	136
CARBON DIOXIDE (MG/L)	120	60	113.8		33.0	34.1	106				101	131	63.6				93				38.3	37.9	39.8	40.7
CHLORIDE (MG/L)	4	1	77	73	1	1	6	8	13	5	6	46	34	4	3	5	2	3	3	2	6	11	4	4
CYANIDE (MG/L)	0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
DISSOLVED OXYGEN-HACH (MG/L)	0.2	1.5	9.0		0.15	0.15	2				2.5	5	8				0.28				6	12	11	11
DISSOLVED OXYGEN-METER (MG/L)	1.10	3.11	9.4		3.15	3.15	6.57	3.82	7.01	8.04	3.73	8.45	7.48	3.3	2.14	4.66	1.4	5.50	10.46	3.04	6.34	11.12	11.06	11.06
FERROUS IRON (MG/L)	3.3 >	3.3 >			0	0	0.03				0.02	0.04	0				0.15				0.01	0.01	0.01	0
NITRATE (MG/L)	0	0			0.05	0.05	0.02				2.43 >	2.43 >	2.43				0.03				1.70	2.43	1.82	1.71
NITRITE (MG/L)	0	0			0	0.005	0				0	0.006	0.001				0.002				0.001	0.001	0.001	0.001
OXIDATION REDUCTION POTENTIAL (MV)	-141.5	-98	146		2		-3	107.5	93	96	182.9	-5.8	167	-50	-71.0	125.0	-70.3	125.9	210.5	-61	19	132.6	147	
PH ()	7.26	6.88	6.73		9.21		7.18	7.24	7.22	6.77	6.57	7.19	7.11	7.02	7.02	7.25	7.16	7.22	7.62	9.44	7.41	7.60	7.55	
SPECIFIC CONDUCTIVITY (MS/CM)	0.373	0.215	0.843		0.903		1.884	0.87	0.829	0.488	0.561	1.92	0.782	0.856	2.26	0.577	1.09	0.744	0.314	0.675	0.307	0.434	0.620	
SULFATE (MG/L)	28	17	62	60	83	86	810	92	130	51	58	820	61	160	1000	99	270	94	12	120	31	59	49	48
SULFIDE (MG/L)	1 UJ	1 UJ			1 UJ	1 UJ	1 UJ				1 J	1 UJ	2 J				1 UJ				1 UJ	1 UJ	1 UJ	1 UJ
SULFIDE (MG/L)	0.04	0.01			0.01	0	0				0.03	0.03	0.01				0.13				0.01	0	0.02	0.01
TEMPERATURE (C)	16.5	16.05	15.8		15.5		18.9	23.33	21.5	17.1	18.33	19.41	17.37	14.99	17.21	16.16	13.6	27.08	14.7	16.0	19.3	11.74	11.9	
TOTAL ORGANIC CARBON (MG/L)	5.1 J	7.3 J	10 J	9.9	7.7 J	8.9 J	7.8 J	8 J	7.4 J	11 J	7 J	7.2 J	8.6 J	7.4 J	8.8 J	11 J	8.6 J	8.7 J	7	7.8 J	7 J	7.5 J	8 J	5 J
TOTAL ORGANIC HALOGENS (MG/L)	0.02 U	0.02 U	0.02 U	0.02 U	0.04	0.02 U	0.02 U	0.02	0.05	0.13	0.05	1.4	0.04	0.02 U	0.02 U	2.3	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
TURBIDITY (NTU)	3.3	1	2		1		2	0	2	6	1.8	3.8	0	0	0	0	1.5	0	1.4	0	5	4.2	1	
WATER LEVEL (FT)	6.51	8.03	37.6		88.0		76.13	78.76	74.7	45.32	49.97	44.15	41.85	64.54	138.07	89.4	46.76	82.58	60.88	223.39				

ATTACHMENT 12

SUMMARY OF TRIP BLANK RESULTS
MONITORING EVENT NO. 4
(SEPTEMBER 6-15, 1999)

NSWC CRANE
SUMMARY OF TRIP BLANK RESULTS
MONITORING EVENT NO. 4
AMMUNITION BURNING GROUNDS

Location	BLANK	BLANK	BLANK
Matrix	GW	GW	GW
Nsample	TB09079901	TB09099901	TB09139901
Sample	TB09079901	TB09099901	TB09139901
SA Code	NORMAL	NORMAL	NORMAL
Quality Control Type	TB	TB	TB
Sample Date	9/7/99	9/9/99	9/13/99
Volatile Organics (ug/L)			
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U
BENZENE	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.3 U	0.3 U	0.3 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.3 U	0.3 U	0.3 U
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	1 U	1 U	1 UJ
TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U
XYLENES, TOTAL	1 U	1 U	0.5 U

VOLUME II OF II

Consists of the following attachments:

Attachment 13	Laucks Testing Laboratories, Inc., Data Package and Electronic Data Deliverable; TtNUS Electronic Database File Monitoring Event No. 4 (September 6-15, 1999)
Attachment 14	TtNUS Data Validation Letters for Laucks Testing Laboratories, Inc., Analytical Data Monitoring Event No. 4 (September 6-15, 1999)
Attachment 15	Microseeps, Inc., Data Packages and Electronic Deliverable; TtNUS Data Validation Letters for Microseeps, Inc., Analytical Data Monitoring Event No. 4 (September 6-15, 1999)

Volume II of II
is provided only in the record copy of this report, which is maintained in the NSWC Crane Ground Water Monitoring Information Repository.