DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

5090/S4.7.5
Ser PRCR4/6273
25 AUG 2006

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Corrective Action Section
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center submits the responses to the May 16, 2006 U.S. EPA comments on the RCRA Corrective Measures Study (CMS) for Solid Waste Management Unit (SWMU) 10 (Rockeye) as enclosure (1). All U.S. EPA comments have been addressed and the final version of the SWMU 10 CMS is provided as enclosure (2). The permit required Certification Statement is presented as enclosure (3).

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code PRCR4-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,

Thomas J. Brent, acting

for J. M. HUNSICKER
Environmental Site Manager
By direction of the Commanding Officer

Enclosures: 1. Responses to U. S. EPA Comments
2. Final SWMU 10 CMS
3. Certification Statement

Copy to:
ADMINISTRATIVE RECORD
NAVFAC SE (Code OPGEVR) (w/o encl)
IDEM (Doug Griffin)
TTNUS (Ralph Basinski) (w/o encl)
NAVFAC MW (Howard Hickey)

Responses to the U. S. EPA Comments
for the
Rockeye Corrective Measure Study

Enclosure (1)

-----Original Message-----
From: Ramanauskas.Peter@epamail.epa.gov
[mailto:Ramanauskas.Peter@epamail.epa.gov]
Sent: Tuesday, May 16, 2006 16:53
To: Gates, William H CIV EFDSOUTH; Brent, Thomas CIV NAVSURFWARCENDIV Crane, Code RP3-TB
Subject: RKI Mn

Bill/Tom,

Could you have TetraTech flesh out their argument for naturally occurring Manganese at RKI a bit more? On page 3-19 of the CMS, they mention groundwater manganese levels can be naturally elevated, especially if acidic conditions exist (pH $\not<$ 6.0) and/or groundwater is under moderately to strong reducing condition. Do you have any site data to support this which can be added to the text (and emailed to me in the meantime)?

High concentrations of manganese are present in many of the monitoring wells at SWMU 10. The highest manganese concentration encountered to date has been 35,300 ug/L in well 10C31P3 in June 1991.

In the draft CMS report, low pH values in groundwater were identified as the likely cause of the elevated manganese concentrations. To substantiate this, all groundwater analytical data in the TtNUS database (1991 [U.S. ACE WES, 1998), 1992 (U.S. ACE WES, 1998), and 2001 (TtNUS, 2005)] have been evaluated. The manganese and pH data were sorted into groups of ascending pH values (i.e., 2-3, 3-4, 4-5, etc.). The lowest pH encountered in any well was 3.24, which was measured in well 10C25P3 on 1/09/92. The average manganese concentration for each pH group is plotted vs. pH in Figure 1. As shown in Figure 1, there is an inverse correlation between pH and manganese concentrations. As pH goes down, concentrations of manganese in groundwater increase. Note: there is significant variation around this general relationship, but the relationship is still very discernable. As stated in the CMS, the low pH values are strongly suggested as the cause of the elevated manganese concentrations in groundwater. The source of manganese is attributed to Pennsylvanian-age sandstones, siltstones, and shales. The low pH is attributed to the oxidation of iron pyrite found naturally in the bedrock. As the pyrite in the bedrock is oxidized over time, the oxidation reactions release acidity and lowers the pH in the rock and groundwater. The lower pH subsequently increases the solubility of manganese.

Attachment 2 shows a map with the locations of the 10 wells with the highest historical manganese concentrations (10C31P3, 10C41, 10-04, 10C30P2, 10C39P2, 10C38, 10C36P2, 10C29P2, 10C25P3, and 10-22). These wells are scattered around the SWMU 10 facility, but are somewhat more concentrated on the western side of the facility. According to the potentiometric map (Figures 7-7) in the RFI Report (TtNUS, 2005), the western wells are generally upgradient or sidegradient of most buildings and activities at the SWMU. Hence, there is no known SWMU-related source that is known that could have caused the elevated manganese concentrations. In addition, there is no known material used at SMWU 10 that was acidic or would generate acid conditions if spilled.

Therefore, the hypothesis that lower pH values have caused the higher manganese concentrations is the most plausible explanation for elevated manganese concentrations in groundwater. Pyrite (naturally-occurring mineral) oxidation in Pennsylvanian bedrock could easily account for the low pH values that have been measured in groundwater. Drill logs of monitoring wells are contained in historical documents for the site (Dunbar, 1984; US ACE WES, 1998; and TtNUS, 2005) Very fine-grained pyrite is difficult to visually observe in rock materials, so it is not surprising to find that pyrite is not mentioned in most of the boring logs. However, compared to other sites at NSWC Crane, the uppermost bedrock (e.g., uppermost 20-30 feet of strata) appears to be soft, highly weathered, friable, and iron-stained. This would be expected if pyrite was oxidizing and the weathering rate of the rock was accelerated due to acidic conditions.

References
U.S Army Corps of Engineers Waterways Experimental Station (U.S. ACE WES) 1998. RCRA Facility Investigation, Phase III Groundwater Release Characterization, SWMU 10/15, Rockeye Facility, Naval Surface Warfare Center Crane, Tech. report GL-98-18, Final report. Prepared by US Army Corps of Engineers, Waterways Experiment Station, August.

Tetra Tech NUS 2005, Resource Conservation and Recovery Act Facility Investigation Report for SWMUs 4 (McComish gorge), 5 (Old Burn Pit), 9 (Pesticide Control/R-150 Tank Area), and 10 Rockeye), Naval Surface Warfare Center Crane Division, July.

Dunbar, Joseph B, 1984, Hydrogeologic Investigation and Definition of Contaminated Ground-Water Plumes at Rockeye Munitions Facility, Naval Weapons Support Center, Crane, Indiana. Geotechnical Laboratory US Army Engineer Waterways Experiment Station, Vicksburg, MS..

This information has been incorporated into the discussion in Section 3.4.1 on Manganese in Section 3.4 of the CMS. This discussion now reads as follows.

A groundwater concentration MCC of 770 ug/L was established to reduce human health risks from manganese associated with the future residents to acceptable levels. High concentrations of manganese are present in many of the monitoring wells at SWMU 10. The highest manganese concentration encountered to date has been 35,300 ug/L in well 10C31P3 in June 1991.

Groundwater analytical data [1991 (U.S. ACE WES, 1998), 1992 (U.S. ACE WES, 1998), and 2001 (TtNUS, 2005)] have been evaluated. The manganese and pH data were sorted into groups of ascending pH values (i.e., 3-4, 4-5, etc.). The lowest pH encountered in any well was 3.24, which was measured in well 10C25P3 on 1/09/92. The average manganese concentration for each pH group is plotted vs. pH in Figure 3-2. As shown in Figure 3-2, there is an inverse correlation between pH and manganese concentrations. As pH goes down, concentrations of manganese in groundwater increase. Note: there is significant variation around this general relationship, but the relationship is still very discemable. As stated in the CMS, the low pH values are strongly suggested as the cause of the elevated manganese concentrations in groundwater. The source of manganese is attributed to Pennsylvanian-age sandstones, siltstones, and shales. The low pH is attributed to the oxidation of iron pyrite found naturally in the bedrock. As the pyrite in the bedrock is oxidized over time, the oxidation reactions release acidity and lowers the pH in the rock and groundwater. The lower pH subsequently increases the solubility of manganese.

The 10 wells with the highest historical manganese concentrations are 10C31P3, 10C41, 10-04, 10C30P2, 10C39P2, 10C38, 10C36P2, 10C29P2, 10C25P3, and 10-22. These wells are scattered around the SWMU 10 facility, but are somewhat more concentrated on the western side of the facility. According to the potentiometric map (Figures 7-7) in the RFI report, the western wells are generally upgradient or sidegradient of most buildings and activities at the SWMU. Hence, there is no known SWMU-related source that is known that could have caused the elevated manganese concentrations. In addition, there is no known material used at SMWU 10 that was acidic or would generate acid conditions if spilled.

Therefore, the hypothesis that lower pH values have caused the higher manganese concentrations is the most plausible explanation fore elevated manganese concentrations in groundwater. Pyrite (naturally-occurring mineral) oxidation in Pennsylvanian bedrock could easily account for the low pH values that have been measured in groundwater. Drill logs of monitoring wells are contained in historical documents for the site (Dunbar 1984; US ACE WES, 1998; and TtNUS, 2005). Very fine-grained pyrite is difficult to visually observe in rock materials, so it is not surprising to find that pyrite is not mentioned in most of the boring logs. However, compared to other sites at NSWC Crane, the uppermost bedrock (e.g., uppermost 20-30 feet of strata) appears to be soft, highly weathered, friable, and iron-stained. This would be expected if pyrite was oxidizing and weathering rate of the rock was accelerated due to acidic conditions.

Thus, the Navy believes that the elevated manganese concentrations in groundwater are derived from the Pennsylvanian bedrock and are not related to any industrial or waste activities. Therefore, manganese will not be carried forward in this CMS report.

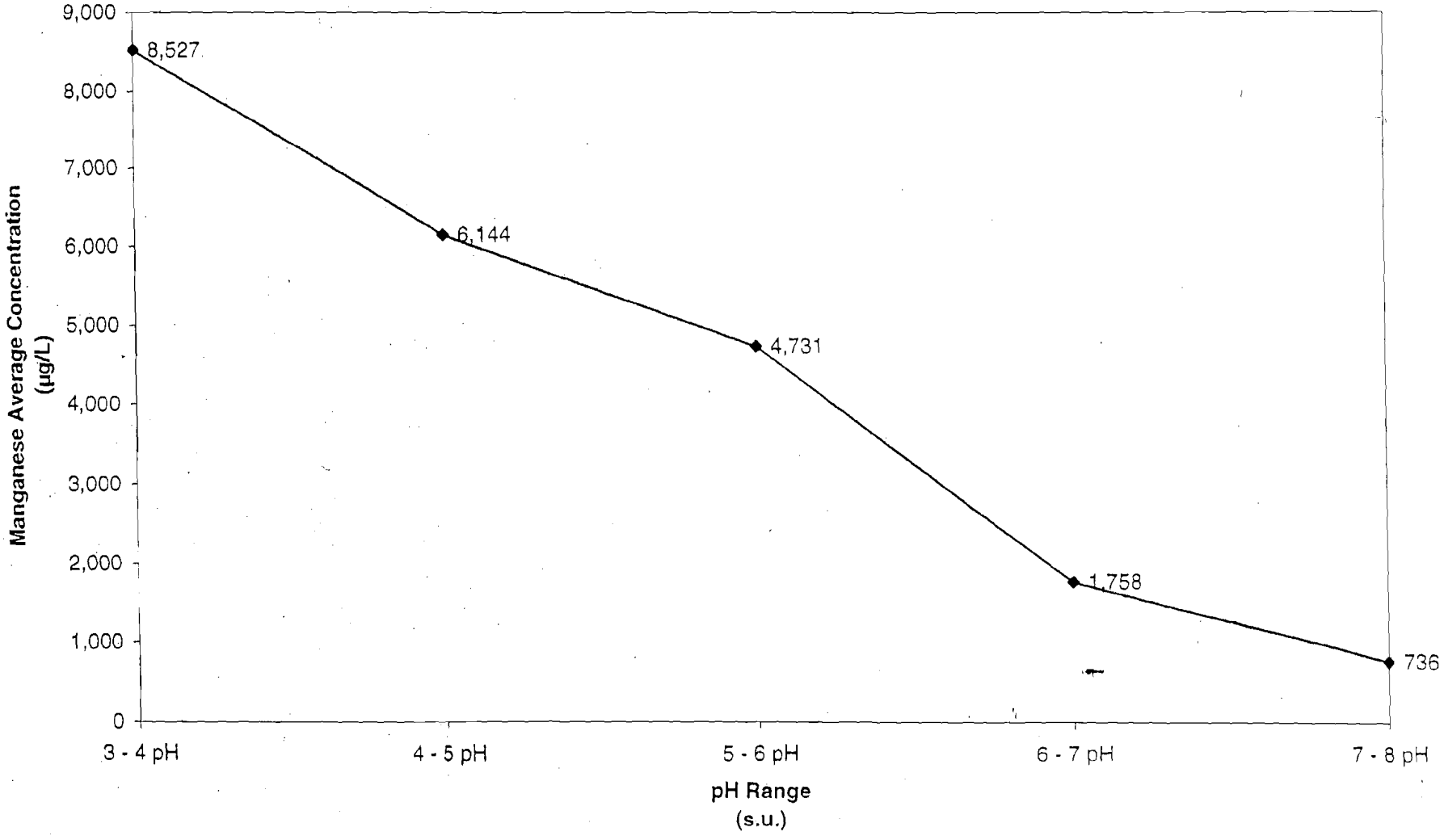
References

U.S Army Corps of Engineers Waterways Experimental Station (U.S. ACE WES) 1998. RCRA Facility Investigation, Phase III Groundwater Release Characterization, SWMU 10/15, Rockeye Facility, Naval Surface Warfare Center Crane, Tech. report GL-98-18, Final report. Prepared by US Army Corps of Engineers, Waterways Experiment Station, August

Tetra Tech NUS 2005, Resource Conservation and Recovery Act Facility Investigation Report for SWMUs 4 (McComish gorge), 5 (Old Burn Pit), 9 (Pesticide Control/R-150 Tank Area), and 10 Rockeye), Naval Surface Warfare Center Crane Division, July

Dunbar, Joseph B, 1984, Hydrogeologic Investigation and Definition of Contaminated Ground-Water Plumes at Rockeye Munitions Facility, Naval Weapons Support Center, Crane, Indiana. Geotechnical Laboratory US Army Engineer Waterways Experiment Station, Vicksburg, MS.

pH RANGE VERSES AVERAGE MANGANESE CONCENTRATION



pH Range	Manganese (µg/L)	Range ID
3 - 4 pH	8,527	1
4 - 5 pH	6,144	2
5 - 6 pH	4,731	3
6 - 7 pH	1,758	4
7 - 8 pH	736	5

location	sample_date	IRON	MANGANESE	PH
10C25P3	01/09/92	109000	10600	3.24
10-16	03/16/91	22800	8760	3.27
10C25P3	05/14/92	38100	7080	3.35
10C39P2	05/14/92	22100	17500	3.38
10C40P2	06/01/91	73000	4620	3.46
10C25P3	06/01/91	8740	4890	3.53
10C25P3	03/16/91	118000	11300	3.55
10C46P3	05/14/92	56200	5220	3.55
10C30P2	03/16/91	7060	10600	3.63
10C30P2	06/01/91	54	8100	3.68
10C40P4	03/16/91	3790	2810	3.69
10C39P2	03/16/91	24600	17300	3.72
10C29P2	06/01/91	65100	6420	3.74
10C46P2	03/16/91	95500	8080	3.81
10C30P2	01/09/92	43800	17700	3.82
10C29P2	05/14/92	48900	4940	3.82
[illegible]	[illegible]	[illegible]	[illegible]	3.82
10C47	06/01/91	10200	2990	3.84
10C39P2	06/01/91	19600	14300	3.89
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10-16	01/21/91	23700	5380	3.92
10C47	01/09/92	35600	3720	3.95
10C40P4	05/14/92	768	2390	3.96
			8,527	3 - 4 pH

3 - 4 pH 8,527 µg/L

location	sample_date	IRON	MANGANESE	PH
10-01	01/09/92	20	5	6.76
10-18	03/16/91	48	998	6.78
10C55P2	05/14/92	40	16	6.8
10-15	01/09/92	4350	1010	6.81
10C26	06/01/91	8800	651	6.83
10-17	01/23/01	286	299	6.84
10-13	01/09/92	11	42	6.84
10-21	06/01/91	4140	555	6.85
10C49	01/09/92	2430	1280	6.86
10-10	06/01/91	6760	554	6.86
10C33	01/09/92	1350	278	6.86
10C40	03/16/91	384	41	6.86
10-10	01/09/92	19700	652	6.88
10-09	05/14/92	7690	489	6.88
10C27P2	05/14/92	40	23	6.88
10-01	05/14/92	40	5	6.89
10-07	03/16/91	64	1020	6.92
10-10	05/14/92	7810	581	6.92
10C52	05/14/92	25600	944	6.93
10-09	06/01/91	8460	485	6.94
10C33	01/20/01	955	176	6.95
10C60	05/14/92	40	27	6.95
10-06	05/14/92	40	5	6.98
10-01	02/03/84	10	25	7
10-01	08/02/83			7
10C60	03/16/91	29	65	7.01
10-02	05/14/92	40	5	7.01
10C60	06/01/91	10	73	7.04
10C43	01/09/92	15800	791	7.06
10-13	05/14/92	40	17	7.07
10C28P2	01/09/92	740	81	7.08
10-14B	06/01/91	29	9	7.11
10-02	01/09/92	170	327	7.16
10C36P3	01/09/92	55	193	7.17
10C61	05/14/92	424	51	7.17
10C33P2	06/01/91	23400	8160	7.19
10C23	06/01/91	94	365	7.19
10-13	06/01/91	43	19	7.19
10-08	01/09/92	25	98	7.2
10-01	03/02/83			7.2
10-02	06/14/84			7.2
10C23	01/09/92	888	717	7.21
10C61	03/16/91	348	60	7.22
10C37P2	01/09/92	10000	732	7.24
10-18	05/14/92	77	442	7.25
10C23	05/14/92	123	48	7.25
10C60	01/09/92	274	73	7.26
10-14B	03/16/91	13	22	7.27
10-15	05/14/92	4040	910	7.28
10-01	03/16/91	18900	10400	7.35
10-14B	01/09/92	39	111	7.38
10C35P3	05/14/92	40	15	7.43
10-14B	05/14/92	40	5	7.43
10-01	06/14/84			7.6
10C61	01/09/92	250	60	7.7
10C61	06/01/91	226	54	7.71
10-02	03/16/91	10	5	7.75
10-02	06/01/91	10	7	7.77
10-02	01/06/01	468	58.9	7.78
10C23	03/16/91	10	305	7.91

location	sample_date	IRON	MANGANESE	PH
10C37	03/16/91	16400	830	5.98
10C35P3	06/01/91	10	27	5.98
10C36	03/16/91	39200	2400	5.99
10C43	03/16/91	15400	647	6
10C52	03/16/91	24400	1030	6.01
10C52	01/18/01	22200	897	6.01
10C26	05/14/92	10100	576	6.01
10C41	06/01/91	39200	25500	6.02
10C26	03/16/91	12000	556	6.03
10C24	06/01/91	17200	1330	6.04
10C45	05/14/92	14600	1280	6.04
10C24P3	01/09/92	16000	3310	6.05
10C36P3	06/01/91	449	271	6.05
10-04	03/16/91	193000	24600	6.06
10C42	01/09/92	68700	5100	6.06
10C32P2	03/16/91	25900	2430	6.06
10-11	06/01/91	66500	3710	6.07
10C32P2	01/09/92	29600	2350	6.07
10C38	01/09/92	99800	14000	6.08
10C30	03/16/91	27500	1460	6.08
10C43	06/01/91	15900	686	6.08
10C46	03/16/91	102000	9840	6.1
10C37P2	06/01/91	6620	685	6.1
10C26P3	01/09/92	4040	388	6.13
10C32	01/09/92	94500	5850	6.14
10C37P2	03/16/91	5200	605	6.14
10C26P2	05/14/92	3080	545	6.14
10C31	01/09/92	18900	871	6.15
10C31	03/16/91	15900	870	6.15
10-05	06/01/91	1580	386	6.15
10-04	01/09/92	214000	27900	6.16
10C37	05/14/92	12800	791	6.16
10-21	01/09/92	190	450	6.17
10C27	01/09/92	46700	3170	6.18
10-20	06/01/91	607	1290	6.19
10-02	03/02/83			6.2
10C43P3	01/09/92	365	665	6.21
10C51	03/16/91	896	2780	6.22
10C34P3	05/14/92	40	1220	6.22
10C55	01/09/92	641	241	6.22
10C44P2	05/14/92	40	211	6.22
10-08	03/16/91	10	46	6.22
10C27P2	06/01/91	17	27	6.22
10-11	05/14/92	75200	4330	6.23
10C53	01/09/92	4870	504	6.23
10-17	01/09/92	45	67	6.23
10-06	03/16/91	10	21	6.23
10C34P3	01/09/92	37	1200	6.24
10C37	06/01/91	17000	840	6.24
10-05	05/14/92	1140	304	6.24
10-21	05/14/92	10100	468	6.26
10C35P3	03/16/91	95	307	6.26
10C44P2	01/09/92	20	441	6.27
10C27P2	03/16/91	10	15	6.27
10C55P2	01/22/91	100	15	6.27
10C55P2	01/09/92	10	8	6.28
10-19	05/14/92	350	4630	6.29
10C44P2	03/16/91	15400	1280	6.29
10C45P2	01/09/92	59	645	6.3
10C53	03/16/91	9160	507	6.3
10C24P2	05/14/92	8510	408	6.3
10C32P3	05/14/92	43	349	6.3
10C55P2	06/01/91	49	257	6.3
10C28P2	03/16/91	51	29	6.3
10C34P2	01/09/92	56	2980	6.33
10-05	03/16/91	1150	341	6.33
10-11	03/16/91	33500	4180	6.34

location	sample_date	IRON	MANGANESE	PH
10-10	03/16/91	13300	623	6.34
10C43P2	05/14/92	21300	1230	6.35
10C36P3	03/16/91	97	604	6.36
10C28P2	06/01/91	10	43	6.38
10C42P2	05/14/92	140	1120	6.39
10C49	05/14/92	2190	1390	6.41
10C24P2	06/01/91	3810	511	6.41
10C51	05/14/92	9310	5200	6.42
10C53P2	05/14/92	40	35	6.42
10C28	01/09/92	33700	1760	6.43
10C45	01/09/92	18200	1720	6.43
10C30	06/01/91	13400	762	6.44
10C53	05/14/92	3120	408	6.45
10C32	05/14/92	89600	5370	6.46
10C54	05/14/92	2320	843	6.46
10-20	01/09/92	988	1370	6.49
10-18	01/09/92	61	623	6.49
10-08	05/14/92	308	296	6.49
10C24	05/14/92	20900	1320	6.5
10-15	06/01/91	3480	998	6.5
10-07	01/09/92	20	370	6.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10-02	[illegible]			[illegible]
10-04	05/14/92	85700	22600	6.51
10C57	01/24/01	20810	7270	6.51
10C36	05/14/92	52700	2720	6.51
10-22	03/16/91	18100	10400	[illegible]
10C32P2	05/14/92	30000	2520	6.52
10-03	06/01/91	6790	881	6.52
10-07	06/01/91	1320	594	6.52
10-01	06/01/91	10	19	6.52
10C33P2	05/14/92	22000	7730	6.54
10C42P2	06/01/91	1030	2890	6.54
10C24P2	03/16/91	754	571	6.54
10C42P2	01/09/92	229	2040	6.55
10-17	06/01/91	10	49	6.55
10-03	05/14/92	5100	692	6.56
10C53P2	06/01/91	10	43	6.58
10-02	02/03/84		5	6.6
10-11	01/09/92	55400	3860	6.61
10C28	05/14/92	39100	1790	6.61
10C43P2	01/09/92	22500	1390	6.61
10C25	05/14/92	8530	526	6.62
10-07	05/14/92	448	471	6.62
10-03	01/09/92	8320	928	6.63
10-05	01/09/92	826	318	6.63
10-22	05/14/92	39100	8360	6.64
10C52	01/09/92	25100	998	6.64
10-08	06/01/91	299	325	6.64
10C30	05/14/92	1970	145	6.64
10-17	03/16/91	62	82	6.64
10-13	03/16/91	10	5	6.64
10C42P2	03/16/91	6390	6010	6.65
10C26	01/09/92	10500	847	6.65
10C35P3	01/09/92	57	19	6.65
10C51	01/09/92	10500	3720	6.66
10-03	03/16/91	1170	582	6.67
10-03	01/18/01	2400	643	6.68
10-09	03/16/91	9290	518	6.68
10C33	05/14/92	666	235	6.71
10-06	01/09/92	10	5	6.71
10C27P2	01/09/92	20	5	6.71
10-18	06/01/91	305	876	6.74
10C43	05/14/92	17600	669	6.75
10C33P2	01/09/92	26700	9500	6.76
10-06	06/01/91	10	6080	6.76
10-09	01/09/92	18100	610	6.76
10-17	05/14/92	40	51	6.76

location	sample date	IRON	MANGANESE	pH
10C31P3	03/16/91	903	30200	5
10-15	03/16/91	3550	1300	5
10C44	05/14/92	20700	1120	5
10C47P2	05/14/92	273	867	5.04
10C43P3	03/16/91	392	694	5.04
10C34P2	05/14/92	40	3780	5.06
10C37P3	03/16/91	58900	8540	5.07
10C30P2	05/14/92	2200	12000	5.09
10C44	03/16/91	20700	1220	5.1
10C46	05/14/92	99500	9530	5.12
10C46P3	06/01/91	54900	4180	5.13
10C47P2	03/16/91	197	1140	5.13
10C34	01/09/92	29600	6020	5.16
10C25P2	03/16/91	17800	635	5.16
10C55	03/16/91	1100	314	5.16
10C39	05/14/92	96900	6530	5.17
10C35	06/01/91	112000	9040	5.18
10C34P2	03/16/91	198	4220	5.19
10C56	01/09/92	10700	3100	5.19
10C53P2	03/16/91	50	38	5.19
10C35P2	05/14/92	3400	3240	5.2
10C40P2	05/14/92	81900	4230	5.22
10C41P3	01/09/01	497	8050	5.23
10C54	01/09/92	80	710	5.25
10C26P3	03/16/91	5530	368	5.27
10C41	01/09/01	39700	20900	5.28
10C48	05/14/92	86900	6050	5.29
10C31P3	01/22/01	1450	21800	5.3
10C25P2	06/01/91	6970	602	5.3
10C40P2	03/16/91	75100	4220	5.32
10C35	01/21/01	93700	6780	5.33
10C48	01/09/92	97500	6900	5.34
10C41	05/14/92	28200	25300	5.35
10C41	03/16/91	40300	29600	5.39
10C32P3	03/16/91	5660	559	5.39
10C31P3	05/14/92	385	31700	5.4
10C37P3	06/01/91	66800	8950	5.4
10C39	06/01/91	68000	5220	5.41
10C39	01/09/92	82100	6220	5.42
10C26P2	06/01/91	12400	499	5.43
10C35	05/14/92	118000	9190	5.44
10C24P3	03/16/91	3680	2780	5.44
10C26P3	06/01/91	4140	353	5.44
10C40P2	01/09/92	86900	4200	5.45
10C29	01/09/92	51000	4540	5.47
10C38	05/14/92	92600	11400	5.49
10C34P3	06/01/91	929	1220	5.49
10C25P2	05/14/92	14300	776	5.49
10C41P3	05/14/92	196	9510	5.5
10C24	03/16/91	20500	1360	5.5
10C35	01/09/92	131000	8990	5.51
10C56	05/14/92	40	1840	5.51
10C53P2	01/09/92	20	41	5.51
10C46	06/01/91	86700	8130	5.53
10C48	03/16/91	69300	5550	5.53
10C57	05/14/92	14500	3620	5.54
10C25P2	01/09/92	20400	792	5.55
10C45	03/16/91	447	354	5.55
10C41P3	03/16/91	112	9750	5.56
10C49P2	05/14/92	40	91	5.56
10C25	06/01/91	3420	498	5.58
10C25	01/09/92	14500	629	5.59
10C42	03/16/91	70100	5490	5.6
10C45	06/01/91	13200	1340	5.61
10C33P2	03/16/91	17000	7060	5.62
10C48	06/01/91	76300	5920	5.62
10C49P2	06/01/91	10	76	5.62
10C50	05/14/92	20900	8890	5.63

location	sample date	IRON	MANGANESE	PH
10C28	03/16/91	32700	1760	5.63
10C43P3	05/14/92	885	787	5.64
10C48P2	06/01/91	10	381	5.64
10C45P2	05/14/92	120	162	5.64
10C39	03/16/91	82000	6350	5.65
10C31P3	01/09/92	9320	28800	5.66
10C37P3	01/09/92	59800	9890	5.66
10C55	05/14/92	2970	534	5.67
10C49P2	01/09/92	251	148	5.68
10-19	03/16/91	41	6080	5.69
10C32	03/16/91	87400	5590	5.69
10C45P2	06/01/91	208	340	5.69
10C55	06/01/91	234	141	5.7
10C24	01/09/92	22600	1430	5.71
10C29	03/16/91	44000	4490	5.72
10C27	06/01/91	43000	2950	5.72
10C27	03/16/91	44600	2930	5.72
10C27	05/14/92	30000	2520	5.72
10C30	01/09/92	28000	1460	5.72
10C33P2	01/20/01	20200	5390	5.73
10C54	06/01/91	89	749	5.73
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C34P3	03/16/91	161	1210	5.74
10C57	06/01/91	20200	3450	5.75
10C37	01/19/01	16300	698	5.75
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C37P2	05/14/92	5510	657	5.79
10-21	03/16/91	4630	524	5.75
10C32P3	06/01/91	807	381	5.79
10C44P2	06/01/91	6070	970	5.8
10C31	06/01/91	19100	836	5.8
10C31	05/14/92	17500	819	5.81
10C41P3	01/09/92	36	9790	5.82
10C46	01/09/92	75100	7070	5.82
10C42	05/14/92	69300	5790	5.83
10C36	01/09/92	49200	2730	5.83
10C28	06/01/91	32000	1800	5.83
10C49	03/16/91	1300	922	5.84
10C43P3	06/01/91	473	735	5.84
10C50	01/09/92	23800	9420	5.85
10C43P2	06/01/91	21400	1280	5.85
10C52	06/01/91	24000	930	5.85
10C32P2	06/01/91	29100	2470	5.86
10C48P2	01/09/92	65	222	5.86
10C29	06/01/91	48700	4220	5.87
10C43P2	03/16/91	24200	1180	5.87
10C36P3	05/14/92	40	65	5.87
10C45P2	03/16/91	13600	1370	5.89
10C26P2	03/16/91	12900	502	5.89
10C32P3	01/09/92	1840	449	5.89
10C25	03/16/91	13400	566	5.9
10C37	01/09/92	17800	945	5.91
10C32	06/01/91	83100	5380	5.93
10C42	06/01/91	66200	5210	5.93
10C24P3	05/14/92	218	2340	5.93
10-20	05/14/92	289	1370	5.93
10C49	06/01/91	1760	1040	5.93
10C48P2	05/14/92	61	152	5.93
10-04	06/01/91	99300	21300	5.94
10C29	05/14/92	55800	5000	5.94
10C26P3	05/14/92	2400	351	5.94
10-19	06/01/91	69	14	5.94
10C41	01/09/92	45300	32600	5.95
10C31	01/08/01	17100	686	5.96
10C55P2	03/16/91	18	87	5.96
10C41P3	06/01/91	388	9150	5.98
10C36	06/01/91	46200	2630	5.98
10C54	03/16/91	1660	889	5.98

location	sample_date	IRON	MANGANESE	PH
10-01	02/03/84	10	25	7
10-01	08/02/83			7
10C60	03/16/91	29	65	7.01
10-02	05/14/92	40	5	7.01
10C60	06/01/91	10	73	7.04
10C43	01/09/92	15800	791	7.06
10-13	05/14/92	40	17	7.07
10C28P2	01/09/92	740	81	7.08
10-14B	06/01/91	29	9	7.11
10-02	01/09/92	170	327	7.16
10C36P3	01/09/92	55	193	7.17
10C61	05/14/92	424	51	7.17
10C33P2	06/01/91	23400	8160	7.19
10C23	06/01/91	94	365	7.19
10-13	06/01/91	43	19	7.19
10-08	01/09/92	25	98	7.2
10-01	03/02/83			7.2
10-02	06/14/84			7.2
10C23	01/09/92	838	717	7.21
10C61	03/16/91	348	60	7.22
10C37P2	01/09/92	10000	732	7.24
10-18	05/14/92	77	442	7.25
10C23	05/14/92	123	48	7.25
10C60	01/09/92	274	73	7.26
10-14B	03/16/91	13	22	7.27
10-15	05/14/92	4040	910	7.28
10-01	03/16/91	18900	10400	7.35
10-14B	01/09/92	39	111	7.38
10C35P3	05/14/92	40	15	7.43
10-14B	05/14/92	40	5	7.43
10-01	06/14/84			7.6
10C61	01/09/92	250	60	7.7
10C61	06/01/91	226	54	7.71
10-02	03/16/91	10	5	7.75
10-02	06/01/91	10	7	7.77
10-02	01/06/01	468	58.9	7.78
10C23	03/16/91	10	305	7.91

7 - 8 736 µg/l

736.4818182

location	sample date	IRON	MANGANESE	PH
10C25P3	01/09/92	109000	10600	3.24
10-16	03/16/91	22800	8760	3.27
10C25P3	05/14/92	38100	7080	3.35
10C39P2	05/14/92	22100	17500	3.38
10C40P2	06/01/91	73000	4620	3.46
10C25P3	06/01/91	8740	4890	3.53
10C25P3	03/16/91	118000	11300	3.55
10C46P3	05/14/92	56200	5220	3.55
10C30P2	03/16/91	7060	10600	3.63
10C30P2	06/01/91	54	8100	3.68
10C40P4	03/16/91	3790	2810	3.69
10C39P2	03/16/91	24600	17300	3.72
10C29P2	06/01/91	65100	6420	3.74
10C46P2	03/16/91	95500	8080	3.81
10C30P2	01/09/92	43800	17700	3.82
10C29P2	05/14/92	48900	4940	3.82
10C46P2	05/14/92	31700	3710	3.82
10C47	06/01/91	10200	2990	3.84
10C39P2	06/01/91	19600	14300	3.89
10C39P2	01/09/92	35100	17700	3.91
10-16	01/21/01	23700	5380	3.92
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C40P4	06/01/91	1020	2500	4.07
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C36P2	06/01/91	105000	11400	4.15
10C36P2	05/14/92	130000	11600	4.16
10C35P2	01/21/01	8050	2230	4.19
10C46P2	06/01/91	36100	3700	4.2
10C35P2	03/16/91	8330	2940	4.23
10C34	06/01/91	25100	5010	4.26
10C29P2	01/09/92	160000	12000	4.31
10C47	03/16/91	32100	3770	4.31
10C47	05/14/92	31700	3480	4.33
10C40P4	01/09/92	11400	3110	4.33
10C46P2	01/09/92	35900	3510	4.37
10C34	05/14/92	30400	5320	4.4
10C56	06/01/91	96	3160	4.42
10C36P2	01/09/92	115000	11900	4.43
10C38	06/01/91	58100	12100	4.45
10C29P2	03/16/91	117000	9130	4.5
10C57	03/16/91	20800	2700	4.5
10C24P3	06/01/91	39	1240	4.59
10C47P2	01/09/92	60	1050	4.6
10C35P2	06/01/91	4730	2810	4.63
10C37P3	01/06/01	31400	9100	4.67
10C50	03/16/91	17500	9400	4.69
10C34	03/16/91	28500	5490	4.69
10-16	01/09/92	30600	8600	4.72
10C56	03/16/91	138	2090	4.72
10C46P3	03/16/91	75100	6490	4.73
10-16	06/01/91	24300	8080	4.74
10C35	03/16/91	117000	9230	4.75
10C38	03/16/91	59000	11800	4.8
10C35P2	01/09/92	10000	3050	4.8
10C55	01/21/01	1207	687	4.81
10C34P2	06/01/91	112	2810	4.84
10-16	05/14/92	25800	8140	4.85
10-20	03/16/91	287	1550	4.86
10C49P2	03/16/91	44	40	4.9
10C48P2	03/16/91	122	438	4.91
10C31P3	06/01/91	220	35300	4.92
10C37P3	05/14/92	51100	9180	4.94
10C47P2	06/01/91	40	942	4.94
10C44	06/01/91	19200	1220	4.96

3 - 4	8,527 µg/L
4 - 5	6,144
5 - 6	4,731
6 - 7	2,082
7 - 8	736

location	sample date	IRON	MANGANESE	PH
10-20	01/09/92	988	1370	6.49
10-18	01/09/92	61	623	6.49
10-08	05/14/92	300	296	6.49
10C24	05/14/92	20900	1320	6.5
10-15	06/01/91	3480	998	6.5
10-07	01/09/92	20	370	6.5
10C28P2	05/14/92	40	45	6.5
10-02	08/02/83			6.5
10-04	05/14/92	85700	22600	6.51
10C57	01/24/01	20810	7270	6.51
10C36	05/14/92	52700	2720	6.51
10C26P2	01/09/92	14100	594	6.51
10-22	03/16/91	18100	10400	6.52
10C32P2	05/14/92	30000	2520	6.52
10-03	06/01/91	6790	881	6.52
10-07	06/01/91	1320	594	6.52
10-01	06/01/91	10	19	6.52
10C33P2	05/14/92	22000	7730	6.54
10C42P2	06/01/91	1030	2890	6.54
10C24P2	03/16/91	754	571	6.54
10C42P2	01/09/92	229	2040	6.55
10-17	06/01/91	10	49	6.55
10-03	05/14/92	5100	692	6.56
10C53P2	06/01/91	10	43	6.58
10-02	02/03/84		5	6.6
10-11	01/09/92	55400	3860	6.61
10C28	05/14/92	39100	1790	6.61
10C43P2	01/09/92	22500	1300	6.61
10C25	05/14/92	8530	526	6.62
10-07	05/14/92	448	471	6.62
10-03	01/09/92	8320	928	6.63
10-05	01/09/92	826	318	6.63
10-22	05/14/92	39100	8360	6.64
10C52	01/09/92	25100	998	6.64
10-08	06/01/91	299	325	6.64
10C30	05/14/92	1970	145	6.64
10-17	03/16/91	62	82	6.64
10-13	03/16/91	10	5	6.64
10C42P2	03/16/91	6390	6010	6.65
10C26	01/09/92	10500	847	6.65
10C35P3	01/09/92	57	19	6.65
10C51	01/09/92	10500	3720	6.66
10-03	03/16/91	1170	582	6.67
10-03	01/18/01	2400	643	6.68
10-09	03/16/91	9290	518	6.68
10C33	05/14/92	666	235	6.71
10-06	01/09/92	10	5	6.71
10C27P2	01/09/92	20	5	6.71
10-18	06/01/91	305	876	6.74
10C43	05/14/92	17600	669	6.75
10C33P2	01/09/92	26700	9500	6.76
10-06	06/01/91	10	6080	6.76
10-09	01/09/92	18100	610	6.76
10-17	05/14/92	40	51	6.76
10-01	01/09/92	20	5	6.76
10-18	03/16/91	48	998	6.78
10C55P2	05/14/92	40	16	6.8
10-15	01/09/92	4350	1010	6.81
10C26	06/01/91	8800	651	6.83
10-17	01/23/01	286	299	6.84
10-13	01/09/92	11	42	6.84
10-21	06/01/91	4140	555	6.85
10C49	01/09/92	2430	1280	6.86
10-10	06/01/91	6760	554	6.86
10C33	01/09/92	1350	278	6.86
10C40	03/16/91	384	41	6.86
10-10	01/09/92	19700	652	6.88
10-09	05/14/92	7690	489	6.88
10C27P2	05/14/92	40	23	6.88
10-01	05/14/92	40	5	6.89
10-07	03/16/91	64	1020	6.92
10-10	05/14/92	7810	581	6.92
10C52	05/14/92	25600	944	6.93
10-09	06/01/91	8460	485	6.94
10C33	01/20/01	955	176	6.95
10C60	05/14/92	40	27	6.95
10-06	05/14/92	40	5	6.98

1758.289855

location	sample_date	IRON	MANGANESE	PH
10-01	02/03/84	10	25	7
10-01	08/02/83			7
10C60	03/16/91	29	65	7.01
10-02	05/14/92	40	5	7.01
10C60	06/01/91	10	73	7.04
10C43	01/09/92	15800	791	7.06
10-13	05/14/92	40	17	7.07
10C28P2	01/09/92	740	81	7.08
10-14B	06/01/91	29	9	7.11
10-02	01/09/92	170	327	7.16
10C36P3	01/09/92	55	193	7.17
10C61	05/14/92	424	51	7.17
10C33P2	06/01/91	23400	8160	7.19
10C23	06/01/91	94	365	7.19
10-13	06/01/91	43	19	7.19
10-08	01/09/92	25	98	7.2
[illegible]	[illegible]			7.2
10-02	06/14/84			7.2
10C23	01/09/92	888	717	7.21
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C37P2	01/09/92	10000	732	7.24
10-18	05/14/92	77	442	7.25
10C23	05/14/92	123	48	7.25
10C60	01/09/92	274	73	7.26
10-14B	03/16/91	13	22	7.27
10-15	05/14/92	4040	910	7.28
10-01	03/16/91	18900	10400	7.35
10-14B	01/09/92	39	111	7.38
10C35P3	05/14/92	40	15	7.43
10-14B	05/14/92	40	5	7.43
10-01	06/14/84			7.6
10C61	01/09/92	250	60	7.7
10C61	06/01/91	226	54	7.71
10-02	03/16/91	10	5	7.75
10-02	06/01/91	10	7	7.77
10-02	01/06/01	468	58.9	7.78
10C23	03/16/91	10	305	7.91

7 - 8 pH 736.48 µg/L

location	sample date	IRON	MANGANESE	PH
10C39	03/16/91	82000	6350	5.65
10C31P3	01/09/92	9320	28800	5.66
10C37P3	01/09/92	59800	9890	5.66
10C55	05/14/92	2970	534	5.67
10C49P2	01/09/92	251	148	5.68
10-19	03/16/91	41	6080	5.69
10C32	03/16/91	87400	5590	5.69
10C45P2	06/01/91	208	340	5.69
10C55	06/01/91	231	141	5.7
10C24	01/09/92	22600	1430	5.71
10C29	03/16/91	44000	4490	5.72
10C27	06/01/91	43000	2950	5.72
10C27	03/16/91	44600	2930	5.72
10C27	05/14/92	30000	2520	5.72
10C30	01/09/92	28000	1460	5.72
10C33P2	01/20/01	20200	5390	5.73
10C54	06/01/91	89	749	5.73
10C50	06/01/91	17900	8680	5.74
10C51	06/01/91	23700	5450	5.74
10C34P3	03/16/91	161	1210	5.74
10C57	06/01/91	20200	3450	5.75
10C37	01/19/01	16300	698	5.75
10C44	01/09/92	20600	1130	5.79
10C37P2	05/14/92	5510	657	5.79
10-21	03/16/91	4630	524	5.79
10C32P3	06/01/91	807	381	5.79
10C44P2	06/01/91	6070	970	5.8
10C31	06/01/91	19100	836	5.8
10C31	05/14/92	17500	819	5.81
10C41P3	01/09/92	36	9790	5.82
10C46	01/09/92	75100	7070	5.82
10C42	05/14/92	69300	5790	5.83
10C36	01/09/92	49200	2730	5.83
10C28	06/01/91	32000	1800	5.83
10C49	03/16/91	1300	922	5.84
10C43P3	06/01/91	473	735	5.84
10C50	01/09/92	23800	9420	5.85
10C43P2	06/01/91	21400	1280	5.85
10C52	06/01/91	24000	930	5.85
10C32P2	06/01/91	29100	2470	5.86
10C48P2	01/09/92	65	222	5.86
10C29	06/01/91	48700	4220	5.87
10C43P2	03/16/91	24200	1180	5.87
10C36P3	05/14/92	40	65	5.87
10C45P2	03/16/91	13600	1370	5.89
10C26P2	03/16/91	12900	502	5.89
10C32P3	01/09/92	1840	449	5.89
10C25	03/16/91	13400	566	5.9
10C37	01/09/92	17800	945	5.91
10C32	06/01/91	83100	5380	5.93
10C42	06/01/91	66200	5210	5.93
10C24P3	05/14/92	218	2340	5.93
10-20	05/14/92	289	1370	5.93
10C49	06/01/91	1760	1040	5.93
10C48P2	05/14/92	61	152	5.93
10-04	06/01/91	99300	21300	5.94
10C29	05/14/92	55800	5000	5.94
10C26P3	05/14/92	2400	351	5.94
10-19	06/01/91	69	14	5.94
10C41	01/09/92	45300	32600	5.95
10C31	01/08/01	17100	686	5.96
10C55P2	03/16/91	18	87	5.96
10C41P3	06/01/91	388	9150	5.98
10C36	06/01/91	46200	2630	5.98
10C54	03/16/91	1660	889	5.98
10C37	03/16/91	16400	830	5.98
10C35P3	06/01/91	10	27	5.98
10C36	03/16/91	39200	2400	5.99

location	sample_date	IRON	MANGANESE	pH
10C43	03/16/91	15400	647	6
10C52	03/16/91	24400	1030	6.01
10C52	01/18/01	22200	897	6.01
10C26	05/14/92	10100	576	6.01
10C41	06/01/91	39200	25500	6.02
10C26	03/16/91	12000	556	6.03
10C24	06/01/91	17200	1330	6.04
10C45	05/14/92	14600	1280	6.04
10C24P3	01/09/92	16000	3310	6.05
10C36P3	06/01/91	449	271	6.05
10-04	03/16/91	193000	24600	6.06
10C42	01/09/92	68700	5100	6.06
10C32P2	03/16/91	25900	2430	6.06
10-11	06/01/91	66500	3710	6.07
10C32P2	01/09/92	29600	2350	6.07
10C38	01/09/92	99800	14000	6.08
10C30	03/16/91	27500	1460	6.08
10C43	06/01/91	15900	686	6.08
10C46	03/16/91	102000	9840	6.1
10C37P2	06/01/91	6620	685	6.1
10C26P3	01/09/92	4040	388	6.13
10C32	01/09/92	94500	5850	6.14
10C37P2	03/16/91	5200	605	6.14
10C26P2	05/14/92	3080	545	6.14
10C31	01/09/92	18900	871	6.15
10-05	06/01/91	1580	396	6.15
10-04	01/09/92	214000	27900	6.16
10C37	05/14/92	12800	791	6.16
10-21	01/09/92	190	450	6.17
10C27	01/09/92	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	667	1290	6.19
10-02	03/02/83			6.2
10C43P3	01/09/92	365	665	6.21
10C51	03/16/91	896	2780	6.22
10C34P3	05/14/92	40	1220	6.22
10C55	01/09/92	641	241	6.22
10C44P2	05/14/92	40	211	6.22
10-08	03/16/91	10	46	6.22
10C27P2	06/01/91	17	27	6.22
10-11	05/14/92	75200	4330	6.23
10C53	01/09/92	4870	504	6.23
10-17	01/09/92	45	67	6.23
10-06	03/16/91	10	21	6.23
10C34P3	01/09/92	37	1200	6.24
10C37	06/01/91	17000	840	6.24
10-05	05/14/92	1140	304	6.24
10-21	05/14/92	10100	468	6.26
10C35P3	03/16/91	95	307	6.26
10C44P2	01/09/92	20	441	6.27
10C27P2	03/16/91	10	15	6.27
10C55P2	01/22/01	100	15	6.27
10C55P2	01/09/92	10	8	6.28
10-19	05/14/92	350	4630	6.29
10C44P2	03/16/91	15400	1280	6.29
10C45P2	01/09/92	59	645	6.3
10C53	03/16/91	9160	507	6.3
10C24P2	05/14/92	8510	408	6.3
10C32P3	05/14/92	43	349	6.3
10C55P2	06/01/91	49	257	6.3
10C28P2	03/16/91	51	29	6.3
10C34P2	01/09/92	56	2980	6.33
10-05	03/16/91	1150	341	6.33
10-11	03/16/91	33500	4180	6.34
10-10	03/16/91	13300	623	6.34
10C43P2	05/14/92	21300	1230	6.35
10C36P3	03/16/91	97	604	6.36
10C28P2	06/01/91	10	43	6.38
10C42P2	05/14/92	140	1120	6.39
10C49	05/14/92	2190	1390	6.41
10C24P2	06/01/91	3810	511	6.41
10C51	05/14/92	9310	5200	6.42
10C53P2	05/14/92	40	35	6.42
10C28	01/09/92	33700	1760	6.43
10C45	01/09/92	18200	1720	6.43
10C30	06/01/91	13400	762	6.44
10C53	05/14/92	3120	408	6.45
10C32	05/14/92	89600	5370	6.46
10C54	05/14/92	2320	843	6.46

6 - 7 pH 1,758 µg/l

location	sample_date	IRON	MANGANESE	PH
10C40P4	06/01/91	1020	2500	4.07
10C46P3	01/09/92	35300	2800	4.08
10C36P2	03/16/91	120000	13200	4.12
10C36P2	06/01/91	105000	11300	4.15
10C36P2	05/14/92	130000	11600	4.16
10C35P2	01/21/01	8050	2230	4.19
10C46P2	06/01/91	36100	3700	4.2
10C35P2	03/16/91	8330	2940	4.23
10C34	06/01/91	25100	5010	4.26
10C29P2	01/09/92	160000	12000	4.31
10C47	03/16/91	32100	3770	4.31
10C47	05/14/92	31700	3480	4.33
10C40P4	01/09/92	11400	3110	4.33
10C46P2	01/09/92	35900	3510	4.37
10C34	05/14/92	30400	5320	4.4
10C56	06/01/91	96	3160	4.42
10C36P2	01/09/92	115000	11900	4.43
10C38	06/01/91	58100	12100	4.45
10C29P2	03/16/91	117000	9130	4.5
10C57	03/16/91	20800	2700	4.5
10C24P3	06/01/91	39	1240	4.59
10C47P2	01/09/92	60	1050	4.6
10C35P2	06/01/91	4730	2810	4.63
10C37P3	01/06/01	31400	9100	4.67
10C50	03/16/91	17500	9400	4.69
10C34	03/16/91	28500	5490	4.69
10-16	01/09/92	30600	8600	4.72
10C56	03/16/91	138	2090	4.72
10C46P3	03/16/91	75100	6490	4.73
10-16	06/01/91	24300	8080	4.74
10C35	03/16/91	117000	9230	4.75
10C38	03/16/91	59000	11800	4.8
10C35P2	01/09/92	10000	3050	4.8
10C55	01/21/01	1207	687	4.81
10C34P2	06/01/91	112	2810	4.84
10-16	05/14/92	25800	8140	4.85
10-20	03/16/91	287	1550	4.86
10C49P2	03/16/91	44	40	4.9
10C48P2	03/16/91	122	438	4.91
10C31P3	06/01/91	220	35300	4.92
10C37P3	05/14/92	51100	9180	4.94
10C47P2	06/01/91	40	942	4.94
10C44	06/01/91	19200	1220	4.96
			6,144	4 - 5 pH

4 - 5 pH 6,144 µg/L

location	sample_date	IRON	MANGANESE	PH
10C31P3	03/16/91	903	30200	5
10-15	03/16/91	3550	1300	5
10C44	05/14/92	20700	1120	5
10C47P2	05/14/92	273	867	5.04
10C43P3	03/16/91	392	694	5.04
10C34P2	05/14/92	40	3780	5.06
10C37P3	03/16/91	58900	8540	5.07
10C30P2	05/14/92	2200	12000	5.09
10C44	03/16/91	20700	1220	5.1
10C46	05/14/92	99500	9530	5.12
10C46P3	06/01/91	54900	4180	5.13
10C47P2	03/16/91	197	1140	5.13
10C34	01/09/92	29600	6020	5.16
10C25P2	03/16/91	17800	635	5.16
10C55	03/16/91	1100	314	5.16
10C39	05/14/92	96900	6530	5.17
10C35	06/01/91	112000	9040	5.18
10C34P2	03/16/91	198	4220	5.19
10C56	01/09/92	10700	3100	5.19
10C53P2	03/16/91	50	38	5.19
10C35P2	05/14/92	3400	3240	5.2
10C40P2	05/14/92	81900	4230	5.22
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C26P3	03/16/91	5530	368	5.27
10C41	01/09/01	39700	20900	5.28
10C48	05/14/92	86900	6050	5.29
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10C40P2	03/16/91	75100	4220	5.32
10C35	01/21/01	93700	6780	5.33
10C48	01/09/92	97500	6900	5.34
10C41	05/14/92	28200	25300	5.35
10C41	03/16/91	40300	29600	5.39
10C32P3	03/16/91	5660	559	5.39
10C31P3	05/14/92	385	31700	5.4
10C37P3	06/01/91	66800	8950	5.4
10C39	06/01/91	68000	5220	5.41
10C39	01/09/92	82100	6220	5.42
10C26P2	06/01/91	12400	499	5.43
10C35	05/14/92	118000	9190	5.44
10C24P3	03/16/91	3680	2780	5.44
10C26P3	06/01/91	4140	353	5.44
10C40P2	01/09/92	86900	4200	5.45
10C29	01/09/92	51000	4540	5.47
10C38	05/14/92	92600	11400	5.49
10C34P3	06/01/91	929	1220	5.49
10C25P2	05/14/92	14300	776	5.49
10C41P3	05/14/92	196	9510	5.5
10C24	03/16/91	20500	1360	5.5
10C35	01/09/92	131000	8990	5.51
10C56	05/14/92	40	1840	5.51
10C53P2	01/09/92	20	41	5.51
10C46	06/01/91	86700	8130	5.53
10C48	03/16/91	69300	5550	5.53
10C57	05/14/92	14500	3620	5.54
10C25P2	01/09/92	20400	792	5.55
10C45	03/16/91	447	354	5.55
10C41P3	03/16/91	112	9750	5.56
10C49P2	05/14/92	40	91	5.56
10C25	06/01/91	3420	498	5.58
10C25	01/09/92	14500	629	5.59
10C42	03/16/91	70100	5490	5.6
10C45	06/01/91	13200	1340	5.61
10C33P2	03/16/91	17000	7060	5.62
10C48	06/01/91	76300	5920	5.62
10C49P2	06/01/91	10	76	5.62
10C50	05/14/92	20900	8890	5.63
10C28	03/16/91	32700	1760	5.63
10C43P3	05/14/92	885	787	5.64
10C48P2	06/01/91	10	381	5.64
10C45P2	05/14/92	120	162	5.64

5 - 6 pH 4,731 µg/L

P:\GIS\NSWC CRANE\CTO 10 SWMU10 TAGS R1.APR INORGANIC AND ORGANIC DETECTIONS IN SURFACE WATER 11/30/04 CF

NOTE: THIS FIGURE IS A REPRODUCTION OF FIGURE 7-15 FROM THE DRAFT RFI REPORT (TINUS, 2003).

R9TAP	U.S. EPA Region 9 Tap Water
R5DQL	U.S. EPA Region 5 Data Quality Level
MCL	Federal Maximum Contaminant Level
AWQC	Ambient Water Quality Criteria

LEGEND
- Monitoring Well
- Soil Boring
- Surface Water/Sediment Sample Location
- SWMU (Estimated Boundary)
- Building
- Tree Line
- Stream
- Road
- Railroad

CONTRACT NO. N4267

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 1 - 6

REV 0

INORGANIC AND ORGANIC DETECTIONS IN SURFACE WATER
CMS REPORT FOR SWMU 10 - ROCKEYE
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY J. LAMEY DATE 9/12/02

CHECKED BY V. PLACHY DATE 11/29/04

COST/SCHED-AREA

SCALE AS NOTED

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Thomas F. Brent, acting

SIGNATURE

Manager, Environmental Protection

TITLE

8/25/06

DATE