

**Baker**

9/20/02-03542

**Baker Environmental, Inc.**

*A Unit of Michael Baker Corporation*

Airport Office Park, Building 3  
420 Rouser Road  
Coraopolis, Pennsylvania 15108

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September 20, 2002

Commander  
Atlantic Division  
Naval Facilities Engineering Command  
1510 Gilbert Street (Bldg. N-26)  
Norfolk, VA 23511-2699

Attn: Mr. Kirk Stevens, P.E.  
Navy Technical Representative  
Code EV23-KAS

Re: Contract N62470-95-D-6007  
Navy CLEAN, District III  
Contract Task Order (CTO) 0219  
Marine Corps Base, Camp Lejeune  
Brinson Creek Surface Water and Sediment Inorganic Analytical Results

Dear Mr. Stevens:

As requested at the August 2002 Partnering meeting, attached you will find five figures related to the surface water and sediment sampling conducted in Brinson Creek. The figures provide inorganic data from the Remedial Investigation (RI) (April 1994), Long-term Monitoring (July 2001), and the focused natural attenuation evaluation (NAE) field program (February 2002). This letter and attachments are for information purposes and provide the basis for further discussion at an upcoming Partnering Meeting. Please note that a complete analytical data summary from the February 2002 sampling event was provided to you in the August 14, 2002 Summary Letter Report (Tables 6 and 7).

Figure 1 is a reprint from Baker's Site 35 RI Report (April 1994) and shows inorganic concentrations in surface water. It should be noted that these samples were collected from surface of the creek. Exceedences of screening criteria were few. Mercury exceeded both the federal (USEPA Region IV) and state (North Carolina Surface Water Quality Standards) criteria near the headwaters of Brinson Creek (35-SW01). Lead and zinc were detected above both the federal and state criteria in only one sample, located near Site 35.

Figure 2 is also a reprint from Baker's Site 35 RI Report (April 1994) and shows inorganic concentrations in sediments. Only lead exceeded screening criteria (NOAA sediment screening value). Exceedences occur over much of the length of Brinson Creek (from just upgradient of Site 35 to mouth of the creek). It should be noted that lead was detected in one sample (36-SD06-06) at 15,100 mg/kg, adjacent to Site 36. This concentration appears to have been anomalous though. Subsequent sampling in October 1995 around this location revealed lead concentrations three orders of magnitude less.

Figure 3 shows inorganic concentrations in surface water that exceed the state screening criteria. This figure shows the July 2001 (LTM) data and the February 2002 data. It should be noted that the February 2002 samples were collected approximately 6-inches above the creek bed using a peristaltic pump. The July 2001 samples were collected from the surface of the creek. Only copper and mercury exceeded

**ChallengeUs.**

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screening criteria in both events. The highest detection of mercury occurs upstream of Site 35. Copper was present in 2001 and 2002 in scattered locations in the creek. The highest detections of copper occur in the surface water samples collected near Site 35, and just downstream of the site. Because of different sampling methods, this difference may be a function of sample collection method, rather than spatial variation.

Figure 4 shows inorganic concentrations in sediment that exceed screening criteria (NOAA sediment screening values and/or USEPA Region IV screening value). Again, the July 2001 and February 2002 data are shown. Many inorganics exceed screening criteria, including cadmium, copper, lead, mercury, nickel, silver, and zinc. Lead and zinc appear to exhibit the highest and most consistent exceedences, from Site 35 to the mouth of Brinson Creek. The other inorganics are above screening criteria mainly in the downstream portion of the creek (from Site 35 to the mouth of the creek). The highest observed concentrations of seven of the eight inorganics exceeding screening criteria occurred in sample IRBC-SD01-02B. That sample was collected downstream of Site 36.

Historical and recent inorganic compound data suggest that operations and disposal activities at Site 35 have not impacted the surface water in Brinson Creek. Mercury was detected at higher concentrations upstream of the site in 2002 (and in 1994, during the RI). Copper does occur at relatively elevated concentrations in samples collected by Site 35. However, there is mitigating evidence. The differences in sampling methods could have contributed to the observed variation in sample concentrations. More importantly, copper was detected in surface and subsurface soil samples, as well as groundwater samples at Site 35 during the 1994 RI, but levels were below screening criteria. Copper was not detected in any groundwater samples collected in the wetland area during the February 2002 NAE. Additionally, the presence of copper (or any other organic compound) in Brinson Creek does not appear to be chronic. A comparison of Figures 1 and 3 show generally different analytes were detected above screening criteria in each event.

Historical and recent inorganic compound data suggests that the sediments of Brinson Creek have been impacted by anthropogenic activity, but the source of that impact is not clear. Figure 5 graphically represents the February 2002 contaminant concentrations. It is clear from this figure that there is some impact to sediments in the downstream portion of Brinson Creek (from Site 35 to the mouth of Brinson Creek). Figure 5 shows that inorganic concentrations in samples IRBC-SD01, IRBC-SD02, and IRBC-SD13 (located in the upper portion of the creek) are consistently lower than samples in the downstream portion of the creek. However, the distribution pattern of inorganics in the creek sediments appears random in the downstream portion of Brinson Creek, which could be indicative of a regional source rather than a point source. Also, the exceedences of inorganics observed in sediment samples do not correlate well to exceedences observed in surface soil, subsurface soil, and groundwater samples at Site 35. It would be expected that the wetland areas would serve as a buffer from direct sedimentation from Site 35 to the creek as well.

With respect to inorganics, the evidence collected to date suggests that operations and disposal activities at Site 35 have not impacted surface water in Brinson Creek. Sediments in the creek have been impacted by inorganics, but the source is not necessarily Site 35.

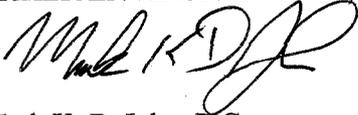
**Baker**

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Please do not hesitate to call me if you have any questions or comments on the data presented.

Sincerely,

BAKER ENVIRONMENTAL, INC.



Mark K. DeJohn, P.G.  
Project Geologist

MKD/lp  
Attachment

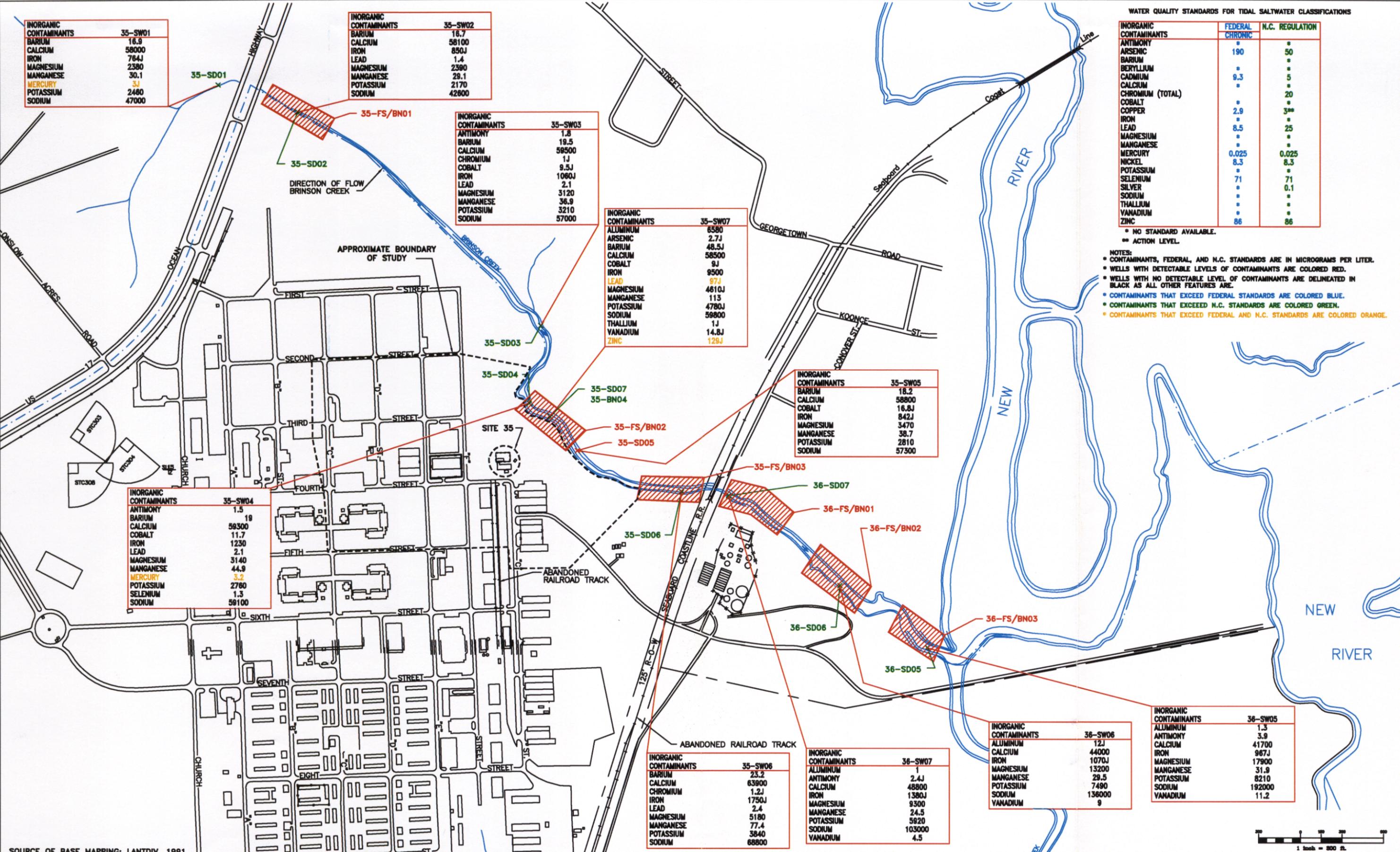
cc: Mr. Scott Bailey, CH2M Hill (w/attachment)  
Mr. Christopher Bozzini, CH2M Hill (w/attachment)  
Mr. Thomas Burton, EQB (w/attachment)  
Mr. Rick Raines, EQB (w/attachment)  
Mr. Dave Lown, NC DENR- Superfund Section (w/attachment)  
Ms. Gena Townsend, USEPA (w/attachment)  
Ms. Diane Rossi, NC DENR - WRO (letter only)  
Dr. Charlie Stehman, NC DENR - WRO (w/attachment)  
Mr. Ron Kenyon, Shaw Environmental (w/attachment)

WATER QUALITY STANDARDS FOR TIDAL SALTWATER CLASSIFICATIONS

INORGANIC CONTAMINANTS	FEDERAL CHRONIC	N.C. REGULATION
ANTIMONY	*	*
ARSENIC	190	50
BARIUM	*	*
BERYLLIUM	*	*
CADMIUM	9.3	5
CALCIUM	*	*
CHROMIUM (TOTAL)	*	20
COBALT	*	*
COPPER	2.9	3**
IRON	*	*
LEAD	8.5	25
MAGNESIUM	*	*
MANGANESE	*	*
MERCURY	0.025	0.025
NICKEL	8.3	8.3
POTASSIUM	*	*
SELENIUM	71	71
SILVER	*	0.1
SODIUM	*	*
THALLIUM	*	*
VANADIUM	*	*
ZINC	86	86

\* NO STANDARD AVAILABLE.  
 \*\* ACTION LEVEL.

NOTES:  
 • CONTAMINANTS, FEDERAL, AND N.C. STANDARDS ARE IN MICROGRAMS PER LITER.  
 • WELLS WITH DETECTABLE LEVELS OF CONTAMINANTS ARE COLORED RED.  
 • WELLS WITH NO DETECTABLE LEVEL OF CONTAMINANTS ARE DELINEATED IN BLACK AS ALL OTHER FEATURES ARE.  
 • CONTAMINANTS THAT EXCEED FEDERAL STANDARDS ARE COLORED BLUE.  
 • CONTAMINANTS THAT EXCEED N.C. STANDARDS ARE COLORED GREEN.  
 • CONTAMINANTS THAT EXCEED FEDERAL AND N.C. STANDARDS ARE COLORED ORANGE.



INORGANIC CONTAMINANTS 35-SW01

BARIUM	16.9
CALCIUM	58000
IRON	764J
MAGNESIUM	2380
MANGANESE	30.1
MERCURY	3J
POTASSIUM	2480
SODIUM	47000

INORGANIC CONTAMINANTS 35-SW02

BARIUM	16.7
CALCIUM	58100
IRON	850J
LEAD	1.4
MAGNESIUM	2390
MANGANESE	29.1
POTASSIUM	2170
SODIUM	42800

INORGANIC CONTAMINANTS 35-SW03

ANTIMONY	1.8
BARIUM	19.5
CALCIUM	59500
CHROMIUM	1J
COBALT	9.5J
IRON	1060J
LEAD	2.1
MAGNESIUM	3120
MANGANESE	36.9
POTASSIUM	3210
SODIUM	57000

INORGANIC CONTAMINANTS 35-SW07

ALUMINUM	6580
ARSENIC	2.7J
BARIUM	48.5J
CALCIUM	58500
COBALT	9J
IRON	9500
LEAD	97J
MAGNESIUM	4610J
MANGANESE	113
POTASSIUM	4780J
SODIUM	59800
THALLIUM	1J
VANADIUM	14.8J
ZINC	129J

INORGANIC CONTAMINANTS 35-SW05

BARIUM	18.2
CALCIUM	58800
COBALT	16.8J
IRON	842J
MAGNESIUM	3470
MANGANESE	38.7
POTASSIUM	2810
SODIUM	57300

INORGANIC CONTAMINANTS 35-SW04

ANTIMONY	1.5
BARIUM	19
CALCIUM	59300
COBALT	11.7
IRON	1230
LEAD	2.1
MAGNESIUM	3140
MANGANESE	44.9
MERCURY	3.2
POTASSIUM	2760
SELENIUM	1.3
SODIUM	59100

INORGANIC CONTAMINANTS 35-SW06

BARIUM	23.2
CALCIUM	63900
CHROMIUM	1.2J
IRON	1750J
LEAD	2.4
MAGNESIUM	5180
MANGANESE	77.4
POTASSIUM	3840
SODIUM	68800

INORGANIC CONTAMINANTS 36-SW07

ALUMINUM	1
ANTIMONY	2.4J
CALCIUM	48800
IRON	1380J
MAGNESIUM	9300
MANGANESE	24.5
POTASSIUM	5920
SODIUM	103000
VANADIUM	4.5

INORGANIC CONTAMINANTS 36-SW06

ALUMINUM	12J
CALCIUM	44000
IRON	1070J
MAGNESIUM	13200
MANGANESE	29.5
POTASSIUM	7490
SODIUM	136000
VANADIUM	9

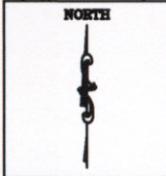
INORGANIC CONTAMINANTS 36-SW05

ALUMINUM	1.3
ANTIMONY	3.9
CALCIUM	41700
IRON	967J
MAGNESIUM	17900
MANGANESE	31.9
POTASSIUM	8210
SODIUM	192000
VANADIUM	11.2

SOURCE OF BASE MAPPING: LANTDIV, 1991

**LEGEND**  
 35-SW/SD01 - SAMPLE LOCATION FOR SURFACE WATER AND SEDIMENT  
 35-FS/BN01 - COLLECTION AREA FOR FISH AND BENTHIC SAMPLES  
 - FENCE LINE  
 - EXISTING STRUCTURE

DATE OCT. 1994  
 SCALE 1" = 300'  
 DRAWN WJH  
 REVIEWED JSC  
 S.O.# 62470-232-0000-07000  
 CADD# 22195672 FROM 232910R1



SITE 35, CAMP GEIGER AREA FUEL FARM RI/FS  
 MARINE CORPS BASE, CAMP LEJEUNE  
 NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.  
 Coraopolis, Pennsylvania



DETECTED INORGANICS  
 IN SURFACE WATER  
 CONTRACT TASK ORDER - 0232

SCALE 1" = 300' DATE OCT. 1994

SHEET NO.  
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INORGANIC CONTAMINANTS	35-SD01-06		35-SD01-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	37300	19200		
ARSENIC	2.3	ND		
BARIIUM	129	58.8		
CALCIUM	5040J	3160J		
CHROMIUM	28.4J	17J		
COBALT	8.6	3.2		
COPPER	4.1	ND		
IRON	10400J	6210J		
LEAD	21.1J	12.4J		
MAGNESIUM	685	480		
MANGANESE	29.7	13.1J		
POTASSIUM	498	ND		
SELENIUM	1.6J	ND		
THALLIUM	0.66J	0.43J		
VANADIUM	24.2	14.5J		

INORGANIC CONTAMINANTS	35-SD02-06		35-SD02-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	484	903		
ARSENIC	0.46J	0.34J		
BARIIUM	3.8	6.5		
CALCIUM	3831J	4970J		
COBALT	1.8	ND		
COPPER	ND	24.8		
IRON	1050J	1970J		
LEAD	4.7J	26.3J		
MAGNESIUM	88.1	145		
MANGANESE	3.2J	5.2J		
MERCURY	0.07J	ND		
SELENIUM	0.23J	ND		
VANADIUM	0.94J	1.9J		

INORGANIC CONTAMINANTS	35-SD04-06		35-SD04-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	1950J	4240		
ARSENIC	0.97J	1J		
BARIIUM	10	30.1		
CALCIUM	4940J	4110J		
CHROMIUM	ND	14.8J		
COPPER	4.2	8.4		
IRON	3560J	7110J		
LEAD	32J	34.4J		
MAGNESIUM	280J	405		
MANGANESE	11	15.9J		
SODIUM	518J	461		
THALLIUM	ND	0.22J		
VANADIUM	4.8J	8.8J		
ZINC	ND	101J		

INORGANIC CONTAMINANTS	35-SD06-06		35-SD06-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	16000	8430		
ARSENIC	3.7J	ND		
BARIIUM	36.7	19.2		
BERYLLIUM	0.59	0.27		
CALCIUM	4500J	4100J		
CHROMIUM	20.9	9.1		
COBALT	2.9	4		
COPPER	21.2	4.6		
IRON	10900	8350		
LEAD	82.6	ND		
MAGNESIUM	1140	715		
MANGANESE	24.3	23.4		
NICKEL	6.4	2.6		
POTASSIUM	812	ND		
SODIUM	706	712		
THALLIUM	0.47	0.35		
VANADIUM	23.9	10.9		

INORGANIC CONTAMINANTS	35-SD07-06		35-SD07-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	3960	8820		
ARSENIC	1.2J	2.3J		
BARIIUM	19.5	48.6		
CALCIUM	2530J	3800J		
CHROMIUM	7.1J	20J		
COBALT	7.8	3.2		
COPPER	9.4	10.6		
IRON	5340J	7220J		
LEAD	42J	79J		
MAGNESIUM	227	359		
MANGANESE	28.8J	37J		
SELENIUM	0.25J	0.26J		
THALLIUM	0.22J	0.38		
VANADIUM	8.7J	15.9J		
ZINC	60.4J	104J		

INORGANIC CONTAMINANTS	35-SD05-06		35-SD05-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	11300	2580		
ARSENIC	2.3J	0.91J		
BARIIUM	43.7	15.8		
BERYLLIUM	0.4	ND		
CALCIUM	6490J	5780J		
CHROMIUM	16.3	4.3		
COBALT	3.2	ND		
COPPER	18.1	5.2		
IRON	13400	3910		
LEAD	92	54.2		
MAGNESIUM	1070	446		
MANGANESE	25.2	10.9		
NICKEL	5.5	2.2		
SODIUM	729	ND		
THALLIUM	0.63	0.2		
VANADIUM	21.2	4.7		

INORGANIC CONTAMINANTS	36-SD07-06		36-SD07-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	31500	10800		
ARSENIC	2J	1.7J		
BARIIUM	60.9	19.9		
BERYLLIUM	1.1	ND		
CALCIUM	17500	8610		
CHROMIUM	28.6	10.4		
COPPER	14.4	5.1		
IRON	13100	9710		
LEAD	44.9	17		
MAGNESIUM	3830	1830		
MANGANESE	29.2	15.3		
NICKEL	10	7.3		
POTASSIUM	2610	ND		
SODIUM	4320	1180		
THALLIUM	0.96	0.54		
VANADIUM	28.6	12.4		

INORGANIC CONTAMINANTS	36-SD06-06		36-SD06-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	2150	1580		
ARSENIC	0.67J	0.7J		
BARIIUM	3.4	2.4		
CALCIUM	301J	ND		
CHROMIUM	3.1	2.4		
COBALT	1.4	ND		
COPPER	4.4	3.4		
IRON	1860	1090		
LEAD	15100	7.1		
MAGNESIUM	305	201		
MANGANESE	5.6	4.9		
NICKEL	2.1	2.6		
SODIUM	548	514		
VANADIUM	4.6	3.2		

INORGANIC CONTAMINANTS	36-SD05-06		36-SD05-12	
	0"-6"	6"-12"	0"-6"	6"-12"
ALUMINUM	11100	17200		
ARSENIC	ND	2.8J		
BARIIUM	25.7	31.6		
CALCIUM	5670J	8340J		
CHROMIUM	19.4	14.6		
COPPER	24.4	6.8		
IRON	14900	15900		
LEAD	115	ND		
MAGNESIUM	2750	2940		
MANGANESE	36.8	62.8		
NICKEL	ND	7.8		
SODIUM	4980	1890		
THALLIUM	0.89	0.59		
VANADIUM	39.3	19.6		

REGION IV WASTE MANAGEMENT DIVISION SEDIMENT SCREENING VALUES FOR HAZARDOUS WASTE SITES (1/27/92 VERSION)

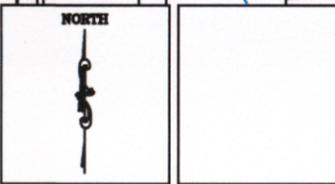
INORGANIC CONTAMINANTS	NOAA ER-L CONCENTRATION
TRACE ELEMENTS (mg)	
ANTIMONY	2
ARSENIC	33
CADMIUM	5
CHROMIUM	80
COPPER	70
LEAD	35
MERCURY	0.15
NICKEL	30
SILVER	1
ZINC	120

NOTES:  
 \* BLUE INDICATES SEDIMENT LOCATIONS THAT EXCEED NOAA STANDARDS.  
 \* STANDARDS AND INORGANICS CONCENTRATIONS ARE IN MILLIGRAMS PER KILOGRAM.

SOURCE OF BASE MAPPING: LANTDIV, 1991

**LEGEND**  
 X - SAMPLE LOCATION FOR SURFACE WATER AND SEDIMENT  
 35-FS/BN01 - SAMPLE ZONE FOR FISH AND BENTHICS

DATE: OCT. 1994  
 SCALE: 1" = 300'  
 DRAWN: WJH  
 REVIEWED: JSC  
 S.O.#: 62470-232-0000-07000  
 CADD#: 2219566Z FROM 232912RI



SITE 35, CAMP GEIGER AREA FUEL FARM RI/FS  
 MARINE CORPS BASE, CAMP LEJEUNE  
 NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.  
 Coraopolis, Pennsylvania



DETECTED INORGANICS IN SEDIMENT  
 CONTRACT TASK ORDER - 0232

SCALE: 1" = 300'  
 DATE: OCT. 1994

SHEET NO. 2  
 OF 5



- NOTE:
- BRINSON CREEK BANK WAS SURVEYED IN THE VICINITY OF SITE 35. ELSEWHERE THE BANK WAS LOCATED BASED ON AERIAL PHOTOGRAPHY
  - BRINSON CREEK SEDIMENT SAMPLE LOCATIONS WERE SURVEYED WITH THE EXCEPTION OF IRBC-SD04 (LOCATION ESTIMATED).
  - BRINSON CREEK SURFACE WATER SAMPLE LOCATIONS WERE ESTIMATED.
  - FOCUSED NAE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS, AS WELL AS LTM SURFACE WATER SAMPLE LOCATIONS WERE SURVEYED.

SAMPLE ID	IRBC-SW04-02A
SAMPLE DATE	2/16/2002
METALS (ug/L)	
Mercury	0.24

SAMPLE ID	IR36-SW01-01C
SAMPLE DATE	07/17/01
METALS (ug/L)	
Copper	7.6 J

SAMPLE ID	IR35-DS01SW-02A
SAMPLE DATE	2/16/2002
METALS (ug/L)	
Mercury	0.12 J

SAMPLE ID	IR35-DS02SW-02A
SAMPLE DATE	2/16/2002
METALS (ug/L)	
Copper	7.9 J
Mercury	0.08 J

SAMPLE ID	IR35-DS03SW-02A
SAMPLE DATE	2/16/2002
METALS (ug/L)	
Copper	7.3 J

SAMPLE ID	IR36-SW02-01C
SAMPLE DATE	07/17/01
METALS (ug/L)	
Copper	2.4 J

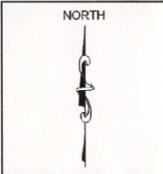
SAMPLE ID	IR36-SW05-01C
SAMPLE DATE	07/17/01
METALS (ug/L)	
Copper	2.3 J

SAMPLE ID	IR36-SW04-01C
SAMPLE DATE	07/17/01
METALS (ug/L)	
Copper	1.5 J

INGORGANIC COMPOUND DETECTED BELOW SCREENING VALUE  
EXCEEDS NORTH CAROLINA SURFACE WATER QUALITY STANDARD

- LEGEND
- IRBC-SW01A - BRINSON CREEK SURFACE WATER SAMPLE LOCATION
  - 35DS01SW/SD04 - FOCUSED NAE SURFACE WATER/SEDIMENT SAMPLE LOCATION
  - SW/SD05 - CREEK FLOW DIRECTION
  - SW/SD05 - SURFACE WATER/SEDIMENT LOCATION FROM JANUARY 2001
  - 36-SW/SD04 - LTM SURFACE WATER/SEDIMENT SAMPLE

DRAWN RRR  
REVIEWED MKD  
S.O.# 28007-219  
CADD# 2219582z  
k126007219PhaseI\Graphics\cad\zz1



MARINE CORPS BASE, CAMP LEJEUNE  
NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.  
Coraopolis, Pennsylvania



INORGANICS ABOVE SCREENING CRITERIA  
IN SURFACE WATER - BRINSON CREEK  
SITE 35, FORMER CAMP GEIGER FUEL FARM

SCALE 1 inch = 200 ft

DATE SEPTEMBER 2002

SHEET NO.  
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OF 5

- NOTE:
- BRINSON CREEK BANK WAS SURVEYED IN THE VICINITY OF SITE 35. ELSEWHERE THE BANK WAS LOCATED BASED ON AERIAL PHOTOGRAPHY
  - BRINSON CREEK SEDIMENT SAMPLE LOCATIONS WERE SURVEYED WITH THE EXCEPTION OF IRBC-SD04 (LOCATION ESTIMATED).
  - BRINSON CREEK SURFACE WATER SAMPLE LOCATIONS WERE ESTIMATED.
  - FOCUSED NAE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS, AS WELL AS LTM SURFACE WATER SAMPLE LOCATIONS WERE SURVEYED.

SAMPLE ID	IRBC-SD15-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Lead	3.6
Mercury	0.03 J
Nickel	0.49 J
Zinc	8 J

SAMPLE ID	IRBC-SD14-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	0.4 J
Cadmium	0.06 J
Copper	3.6
Nickel	1 J
Zinc	10 J

SAMPLE ID	IRBC-SD13-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	0.73 J
Cadmium	0.11 J
Copper	2.6 J
Lead	7.6
Nickel	1.5 J
Zinc	27.8 J

SAMPLE ID	IRBC-SD12-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	3.6
Cadmium	0.56 J
Copper	12.7
Lead	94.9
Mercury	0.077 J
Nickel	5.4 J
Zinc	122 J

SAMPLE ID	IRBC-SD11-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	3.4
Cadmium	0.39 J
Copper	9.6
Lead	23.3
Mercury	0.028 J
Nickel	6.2 J
Zinc	78.4 J

SAMPLE ID	IRBC-SD10-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	5.6
Cadmium	0.68 J
Copper	18.9
Lead	58.1
Mercury	0.065 J
Nickel	11.7 J
Zinc	156 J

SAMPLE ID	IRBC-SD09-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	3.5
Cadmium	0.41 J
Copper	11.7
Lead	52.4
Mercury	0.13 J
Nickel	5.9 J
Zinc	102 J

SAMPLE ID	IRBC-SD08-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	3.6
Cadmium	0.58 J
Copper	13.8
Lead	81
Mercury	0.23 J
Nickel	8.8 J
Zinc	104 J

SAMPLE ID	IRBC-SD07-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	4.4
Cadmium	0.46 J
Copper	14.8
Lead	59.9
Mercury	0.11 J
Nickel	7.3 J
Zinc	125 J

SAMPLE ID	IRBC-SD06-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	4.4
Cadmium	0.53 J
Copper	13
Lead	38.9
Mercury	0.13 J
Nickel	10.5 J
Zinc	117 J

SAMPLE ID	IRBC-SD05-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	4.8 J
Cadmium	0.42 J
Copper	13.4
Lead	80.3
Nickel	8.9 J
Zinc	98.8 J

SAMPLE ID	IRBC-SD04-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	2.1 J
Copper	5.4 J
Lead	13.2
Mercury	0.04 J
Nickel	3.2 J
Zinc	33.1 J

SAMPLE ID	IRBC-SD03-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	4.3 J
Cadmium	0.48 J
Copper	13.1
Lead	44.3
Mercury	0.21 J
Nickel	8.4 J
Zinc	101 J

SAMPLE ID	IRBC-SD02-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	2.7
Cadmium	0.16 J
Copper	10.6
Lead	20.4
Mercury	0.17 J
Nickel	8.8 J
Zinc	54 J

SAMPLE ID	IRBC-SD01-02A
SAMPLE DATE	2/15/2002
INORGANICS (ug/kg)	
Arsenic	14
Cadmium	0.89 J
Copper	26.8
Lead	101
Mercury	0.47 J
Nickel	23.3 J
Zinc	190 J

SAMPLE ID	IR35-DS01SD-02A
SAMPLE DATE	2/16/2002
INORGANICS (ug/kg)	
Arsenic	6.9
Cadmium	0.74 J
Copper	18.6
Lead	42.4
Mercury	0.13 J
Nickel	13.5
Zinc	142 J

SAMPLE ID	IR35-DS02SD-02A
SAMPLE DATE	2/16/2002
INORGANICS (ug/kg)	
Arsenic	12
Cadmium	0.19 J
Copper	4.4
Lead	12.7
Mercury	0.034 J
Nickel	3.3 J
Zinc	38 J

SAMPLE ID	IR35-DS03SD-02A
SAMPLE DATE	2/16/2002
INORGANICS (ug/kg)	
Arsenic	2.6
Cadmium	0.37 J
Copper	10
Lead	45.1
Mercury	0.098 J
Nickel	4.2 J
Zinc	87.1 J

SAMPLE ID	IR36-SD01-01C
SAMPLE DATE	07/17/01
METALS (mg/kg)	
Cadmium	0.37 J
Chromium	22.9
Copper	10.1 J
Lead	22.6
Nickel	8.5 J
Silver	1.3 J
Zinc	30.5

SAMPLE ID	IR36-SD02-01C
SAMPLE DATE	07/17/01
METALS (mg/kg)	
Cadmium	0.45 J
Chromium	36.1
Copper	27.4
Lead	89.4
Nickel	12.1 J
Zinc	140

SAMPLE ID	IR36-SD03-01C
SAMPLE DATE	07/17/01
METALS (mg/kg)	
Cadmium	2.5
Chromium	20.2
Copper	34.9 J
Lead	93.5
Nickel	45
Silver	61.5
Zinc	0.27 J
	528

SAMPLE ID	IR36-SD05-01C
SAMPLE DATE	07/17/01
METALS (mg/kg)	
Cadmium	38.4 J
Chromium	30.8
Copper	34.9 J
Lead	78.2
Nickel	38 J
Silver	3.1 J
Zinc	231

SAMPLE ID	IR36-SD04-01C
SAMPLE DATE	07/17/01
METALS (mg/kg)	
Cadmium	0.35 J
Chromium	6.2
Copper	14.1
Lead	18.6
Mercury	1.7
Silver	0.36 J
Zinc	692

INORGANIC COMPOUNDS NOT DETECTED IN A GIVEN SAMPLE ARE NOT SHOWN  
 INORGANIC COMPOUND DETECTED BELOW SCREENING VALUE  
 EXCEEDS NOAA SEDIMENT SCREENING VALUE  
 EXCEEDS REGION IV SEDIMENT SCREENING VALUE  
 EXCEEDS BOTH NOAA AND REGION IV SEDIMENT SCREENING VALUES

**LEGEND**

- IRBC-SD01-02A - BRINSON CREEK SEDIMENT SAMPLE LOCATION
- 35SD01SW/SD - FOCUSED NAE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- SW/SD05 - CREEK FLOW DIRECTION
- 36-SW/SD04 - SURFACE WATER/SEDIMENT LOCATION FROM JANUARY 2001
- 36-SW/SD04 - SURFACE WATER/SEDIMENT SAMPLE
- 35-SW01A - LTM SURFACE WATER SAMPLE LOCATIONS

**DRAWN** RRR  
**REVIEWED** MKD  
**S.O.#** 26007-219  
**CADD#** 2219561z  
 K12800/1219Phase1/Graphics/lead.zxl

**NORTH**

**MARINE CORPS BASE, CAMP LEJEUNE**  
 NORTH CAROLINA

**BAKER ENVIRONMENTAL, Inc.**  
 Coraopolis, Pennsylvania

**Baker**

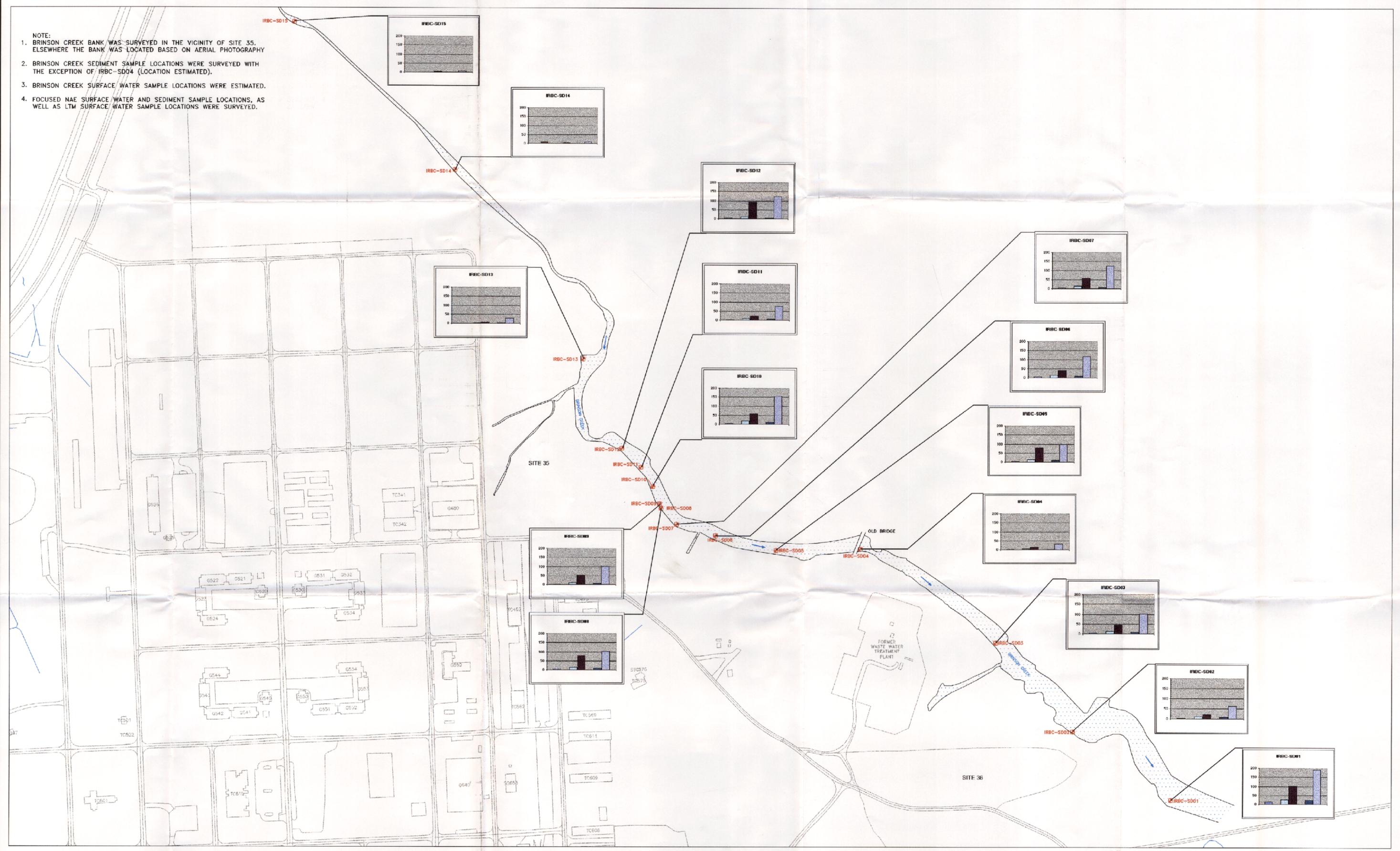
**INORGANICS ABOVE SCREENING CRITERIA**  
**IN SEDIMENT - BRINSON CREEK**  
**SITE 35, FORMER CAMP GEIGER FUEL FARM**

SCALE 0 100 200  
 1 inch = 200 ft

DATE SEPTEMBER 2002

SHEET NO.  
**4**  
 OF 5

- NOTE:
1. BRINSON CREEK BANK WAS SURVEYED IN THE VICINITY OF SITE 35. ELSEWHERE THE BANK WAS LOCATED BASED ON AERIAL PHOTOGRAPHY.
  2. BRINSON CREEK SEDIMENT SAMPLE LOCATIONS WERE SURVEYED WITH THE EXCEPTION OF IRBC-SD04 (LOCATION ESTIMATED).
  3. BRINSON CREEK SURFACE WATER SAMPLE LOCATIONS WERE ESTIMATED.
  4. FOCUSED NAE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS, AS WELL AS LTM SURFACE WATER SAMPLE LOCATIONS WERE SURVEYED.

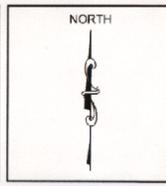


**LEGEND**

IRBC-SD01 - BRINSON CREEK SEDIMENT SAMPLE LOCATION  
 → CREEK FLOW DIRECTION

■ Arsenic
■ Cadmium
■ Copper
■ Lead
■ Mercury
■ Nickel
■ Zinc

DRAWN: RRR  
 REVIEWED: MKD  
 S.O.#: 26007-219  
 CADD#: 2219563z  
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MARINE CORPS BASE, CAMP LEJEUNE  
 NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.  
 Coraopolis, Pennsylvania



GRAPHICAL REPRESENTATION OF THE DISTRIBUTION OF INORGANICS IN SEDIMENT (mg/kg)  
 BRINSON CREEK - FEBRUARY 2002  
 SITE 35, FORMER CAMP GEIGER FUEL FARM

SCALE: 1 inch = 200 ft

DATE: SEPTEMBER 2002

SHEET NO. 5  
 OF 5