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CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN SOLID WASTE MANAGEMENT
UNIT 196 (SWMU 196) ZONE H CNC CHARLESTON SC
5/8/2008
CH2M HILL

CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN

SWMU 196, Zone H



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

CH2M-Jones

May 2008

Contract N62467-99-C-0960



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May 8, 2008

Ms. Meredith Amick
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: Corrective Measures Implementation Work Plan (Revision 2) – SWMU 196, Zone H

Dear Ms. Amick:

Enclosed please find two copies of the Corrective Measures Implementation Work Plan (Revision 2) for SWMU 196 in Zone H of the Charleston Naval Complex (CNC). Included are replacement covers, pages, and figures for insertion into the Revision 0 document. This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

Please contact me at 352/335-5877, ext. 52280, if you have any questions or comments.

Sincerely,

CH2M HILL

A handwritten signature in black ink that reads "Dean Williamson".

Dean Williamson, P.E.

cc: Dann Spariosu/USEPA, w/att
Kathryn Stewart/Navy, w/att
Gary Foster/CH2M HILL, w/att

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SWMU 196, Zone H



***Charleston Naval Complex
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PREPARED BY
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May 2008

*Revision 2
Contract N62467-99-C-0960
258814.ZH.EX.16*

Certification Page for the Corrective Measures Implementation Work Plan for SWMU 196, Zone H, Charleston Naval Complex — Revision 2

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 the 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.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.


Date

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1 **1.4 Report Organization**

2 This CMI WP consists of the following sections, including this introduction:

3 **1.0 Introduction and Purpose** – Presents the purpose of the CMI WP and general
4 background information necessary to understand the CMI WP objectives.

5 **2.0 Corrective Measures Implementation** – Presents a summary of the implementation of
6 each phase of corrective measures at SWMU 196.

7 **3.0 Project Management** – Presents a description of the tasks that were managed during
8 this project.

9 **4.0 References** – Provides the references used in preparing this report.

10 **Appendix A** presents a copy of the *Scope of Services for Fabrication and Delivery of a Package*
11 *Biosparging and Soil Vapor Extraction System for SWMU 196, Charleston Naval Complex, South*
12 *Carolina* (CH2M-Jones, 2004b).

13 **Appendix B** contains the groundwater monitoring purge logs from activities performed
14 during 2005–2006.

15 **Appendix C** presents the groundwater monitoring data from monitoring activities
16 conducted during 2005–2006.

17 **Appendix D** contains copies of correspondence related to the SCDHEC Underground
18 Injection Permits, January 2006 and February 2007.

19 **Appendix E** contains copies of the biosparge injection point installation logs.

20 **Appendix F** contains a description of the process to be followed for construction activities in
21 areas with land use controls (LUCs) at the CNC, as well as an example inspection form used
22 in the CA process.

23 **Appendix G** contains the responses to SCDHEC comments on the Revision 1 CMI WP
24 submitted by CH2M HILL in May 2007.

25 All tables and figures are found at the end of their respective sections.

1 appears to originate. The other row is located between the building and Shipyard Creek and
2 will effectively treat contamination migrating from beneath the building to prevent the
3 contamination from migrating towards Shipyard Creek. **Figure 2-11** shows the Phase II
4 biosparge point locations. UIC permits for these new sparge points were obtained from
5 SCDHEC. Correspondence regarding the UIC permitting is contained in **Appendix D**.
6 **Appendix E** presents the sparge point installation logs for the 23 injection points in
7 operation at SMWU 196.

8 The Phase II system began operation on March 15, 2007, and is generally working as
9 expected. Periodic checks of system pressures, flow rates, and temperatures are conducted
10 to ensure that the system is operating as necessary. Performance monitoring of the system
11 (discussed in **Section 2.5**) and long-term monitoring (conducted annually as part of the
12 sitewide monitoring) are performed by CH2M-Jones.

13 The system is expected to continue to operate for up to several years. Generally, operations
14 are expected to continue until groundwater at the site meets the MSCs or until the data
15 indicate that the system has provided adequate treatment and that natural attenuation or
16 another remedy should be considered. The air sparge system will continue to operate in a
17 pulsed on/off mode, with a daily run time of approximately 6 to 8 hours. The initial
18 operating configuration is to sparge into all 21 sparge points concurrently. However, this
19 configuration may be modified in the future. For example, the system may be operated to
20 deliver air only to the more upgradient row of sparge points or to the more downgradient
21 row of sparge points. Changing the configuration of a system in this manner is often
22 effective in improving the treatment achieved in a particular injection zone.

23 **2.4 Land Use Controls**

24 LUCs have been implemented to limit the future use of the site to control or eliminate
25 exposure pathways to COCs at the site and to ensure the integrity and effectiveness of the
26 remedy. With regard to real property, a LUC refers to any restriction or control that limits
27 the use of and/or exposure to a portion of the property, including water resources, arising
28 from the need to protect human health and the environment. The LUCs are primarily
29 regarded as a component of CAs that apply technologies that reduce toxicity, mobility,
30 volume, and mass of the source of contamination.

31 The term LUC encompasses “institutional controls,” which are defined as real estate
32 restrictions, deed notifications, governmental permitting, zoning laws and other “legal”

1 restrictions to protect human health and the environment. Institutional controls are non-
2 engineered mechanisms used for ensuring compliance with necessary land use limitations.

3 LUCs also include restrictions on access (access controls), whether achieved by means of
4 engineered barriers (for example, fence or concrete pad), affirmative measures to achieve the
5 desired restrictions (for example, night lighting of an area), and prohibitive directives (for
6 example, restrictions on certain types of wells for the duration of the CA).

7 Considered altogether, the LUCs for a facility will provide a tool for directing how the
8 property should be used in order to maintain the level of protectiveness that one or more
9 CAs were designed to achieve. Periodic inspections will be conducted to ensure the long-
10 term integrity of the remedy and the effectiveness of the LUCs.

11 LUCs have been implemented at the site for the following reasons:

- 12 • Restricting human contact with groundwater contaminated with organic and inorganic
13 constituents,
- 14 • Controlling soil disturbance activities (for example, construction activities) such that any
15 such activities do not cause unacceptable exposure of human or ecological receptors to
16 contaminants, and
- 17 • Prohibiting residential development of the site, until all impacted media have been
18 remediated to levels acceptable for unrestricted land use.

19 The term "control the implementation of soil disturbance activities" does not mean that all
20 intrusive drilling or other intrusive activities into the subsurface will be prohibited.
21 However, any intrusive activities will require an evaluation and the parties conducting the
22 intrusive activities will need to understand the potential consequences that contact with
23 contaminated groundwater may cause. In addition, any activities that require dewatering
24 will be need to be conducted in a manner to ensure that any extracted groundwater is
25 properly managed such that it does not cause unacceptable impacts to human health or the
26 environment. Activities that would compromise the integrity or protectiveness of the
27 remedy will not be permitted.

28 The LUCs have been developed and implemented in accordance with the Navy's RCRA
29 Hazardous Waste Management permit and current Navy and SCDHEC policies for LUCs.
30 Periodic visual inspections and reviews will be conducted for the purpose of verifying that
31 all necessary LUCs have been implemented and are being properly maintained. An annual
32 report will be prepared and forwarded to the SCDHEC, signed by the Navy, certifying the

1 continued retention of all LUCs implemented in SWMU 196. LUCs were incorporated into
2 the RCRA Part B Permit for the CNC in the March 2005 permit modification.

3 **2.4.1 Modifying LUCs**

4 In order for LUCs to be changed, the RCRA CA permit must be modified. The request for
5 permit modification must come from the Navy. The method to modify the permit is
6 outlined in the applicable South Carolina Hazardous Waste Management Regulations
7 (SCHWMR), R61-79-264 and R61-79-270.42. The LUCs cannot be modified or removed
8 without the approval of the Navy and SCDHEC.

9 Each provision of the LUCs may be modified separately or collectively by individual site or
10 as a collection of sites with applicable documentation. LUCs may be modified in accordance
11 with the Land Use Control Management Plan (LUCMP) contained within the RCRA Part B
12 permit. This allows for the evaluation of a proposed land use with respect to the exposure
13 assumptions used to estimate the risk to human health and the environment.

14 It is the responsibility of the Property Owner to ensure that LUCs are implemented and
15 maintained properly and in agreement with their Voluntary Cleanup Contract and this
16 CMIP. The Navy elected to transfer the procedural responsibilities to the Property Owners
17 by contract; however, the Navy shall retain ultimate responsibility for CA integrity.

18 In the event that a transfer of the property to a new owner is implemented, the current
19 Property Owner will follow the property conveyance process outlined in the LUCMP
20 contained within the RCRA permit. The Property Owner shall ensure that: (1) covenants
21 consistent with the Permit are included in the appropriate conveyance documentation, and
22 (2) the Navy, SCDHEC, and the EPA are provided with a copy of any proposed deed or
23 other conveyance documents prior to any conveyance in order to ensure that the documents
24 are consistent with the LUCs required as part of the final CA.

25 **2.4.2 Implementing Construction Activities in Areas Impacted by LUCs**

26 The Navy, in conjunction with SCDHEC (Bureau of Land and Waste Management) and the
27 EPA, has developed a process for use by current and subsequent landowners or operators
28 when conducting construction activities in areas where LUCs exist. The process includes
29 submitting information necessary to evaluate whether construction activities may have an
30 adverse effect on LUCs and remedies in place at the CNC.

31 The process to be followed for construction activities in areas with LUCs is described in
32 **Appendix F**. This process was previously referred to as the "Dig Permit" process. It is

1 important that this process be rigorously followed so that the construction is implemented
2 in a manner that does not change the protectiveness of the remedy. **Appendix F** also shows
3 the portions of SWMU 196 subject to LUCs.

4 **2.4.3 Monitoring of LUCs and Reporting Requirements**

5 The Navy will initiate the following specific actions:

- 6 1) Conduct inspections/review, at the frequency specified in the CMIWP or other CA
7 document approved by SCDHEC. These inspections shall be for the purposes of
8 verifying that all necessary LUCs have been implemented and are being properly
9 maintained at SWMU 196. The Navy is responsible for the following:
 - 10 a) Ensuring that all required inspections are performed.
 - 11 b) Ensuring that SCDHEC is provided with thirty (30) days advance notice of, and
12 opportunity to observe facility personnel as they conduct at least one of the quarterly
13 inspections each year.
 - 14 c) Ensuring that SCDHEC is notified in writing within thirty (30) days of any
15 deficiencies noted.
 - 16 d) Ensuring that all appropriate measures are undertaken within thirty (30) days to
17 correct any deficiencies and timely notification in writing to SCDHEC detailing
18 measures taken. If thirty (30) days is not sufficient time to correct the deficiencies, the
19 Navy will submit to SCDHEC a written request for an extension. The written
20 request will provide the rationale for the extension and a projected timeframe for
21 rectifying the deficiencies.
- 22 2) Prepare and forward an annual report to SCDHEC signed by the Navy certifying the
23 continued maintenance of all LUCs associated with SWMU 196.

24 In accordance with the LUCMP, monitoring of the LUCs will be conducted at least annually.
25 The Navy is responsible for inspecting and certifying LUCs. However, per the VCCs signed
26 by the new property owners, the property owners have assumed responsibility for
27 inspecting Land Use Controls on their property. Copies of the monitoring reports for a
28 given year will be provided to the Navy by the land owners by the end of January of the
29 following year. The Navy will submit and certify the reports to SCDHEC with copies also
30 provided to EPA by the end of March.

1 The LUC monitoring report submitted by the Property Owner or their designated party will
2 summarize the status of the LUCs and how any deficiencies or inconsistent uses have been
3 addressed. The evaluation will address whether the use restrictions and controls referenced
4 in this CMIP were communicated in deeds (if necessary); whether owners and state and
5 local agencies were notified of the use restrictions and controls affecting the property (if
6 applicable); and whether use of the property has conformed with such restrictions and
7 controls.

8 An example inspection form that can be adapted for use in conducting these inspections is
9 provided in **Appendix F**.

10 **2.4.4 Groundwater Well Notification Record Review Process**

11 The SCDHEC has promulgated the South Carolina Individual Residential Well and
12 Irrigation Well Permitting at R.61-44 and the Well Standards at R.61-71 pursuant to the
13 authority of the Pollution Control Act, Section 48-1-10 et seq., and the Safe Drinking Water
14 Act, Section 44-55-10 et seq., 1976 S.C. Code of Laws. The groundwater well regulations
15 require any property owner, agent, or the licensed well driller to submit a Notice of Intent
16 (NOI) and obtain coverage under a General Permit, in the manner prescribed by the
17 SCDHEC Bureau of Water regulations, prior to commencement of drilling water wells in
18 South Carolina. The regulations will not directly prevent installation of groundwater wells
19 within the contaminated groundwater plume(s) on the former Charleston Naval Complex.
20 However, the Navy will review Bureau of Water notification records or database(s) for
21 permitted wells and use that information, as provided below.

22 The Navy will review the SCDHEC well installation request records or database(s) at least
23 once a year to determine whether a property owner (or licensed well driller) has submitted
24 an NOI and use that information to determine the actual or proposed well location. In the
25 event that an NOI has been filed for a well or wells within any known groundwater plumes
26 at the CNC, the Navy will undertake a good faith effort to contact the property owner (or
27 licensed well driller) promptly to inform them of the potential risks associated with using
28 the groundwater. The Navy will ascertain whether the proposed use may violate existing
29 land and/or groundwater use restrictions (on the former CNC property) or otherwise
30 undermine the CA.

31 Should the Navy discover a well on the former CNC, a notice will be sent via registered
32 mail to the property owner (and/or lessee, if necessary) within 30 days. The notice will
33 provide information regarding the deed restrictions and require the owner (and/or lessee)
34 to immediately cease use of the well and remove/abandon the well within 60 days. The

1 Navy will also notify the EPA and SCDHEC as soon as practicable but no later than 10 days
2 from the discovery of the well, as well as provide the EPA and SCDHEC with a copy of the
3 notification letters sent to the property owners (or lessee). The Navy will also request that
4 SCDHEC initiate an enforcement action in accordance with R61-44(H) if the wells could
5 present an unacceptable risk to the health of the persons using the well.

6 **2.5 Performance Monitoring**

7 To monitor the effectiveness of the air sparge system for increasing the dissolved oxygen
8 (DO) content of site groundwater, periodic measurements of DO will be made in the
9 following wells:

- 10 • H196GW004
- 11 • H196GW005
- 12 • H196GW009
- 13 • H196GW011
- 14 • H196GW013
- 15 • H196GW014
- 16 • H196GW015
- 17 • H196GW022
- 18 • FGELGW015
- 19 • H009GW020
- 20 • H009GW021

21 These monitoring wells are shown in **Figure 2-12**. Monitoring well H196GW022 is a new
22 well installed specifically for evaluating the performance of the Phase II biosparge system.
23 For the first month after starting up of the system, DO will be measured at least on a
24 biweekly basis (every 2 weeks). If DO levels appear adequate (for example, greater than
25 approximately 2 to 3 mg/L in the wells), DO will be measured monthly in these wells for
26 the next 2 months. If DO levels are lower than approximately 2 mg/L, adjustments to the
27 system will be made to increase the DO levels. DO levels will then be monitored at least
28 weekly until adequate DO levels are measured in the wells. Additional system adjustments
29 will be made as required. The flow rate and pressures for sparge injectors will also be
30 monitored when system operations are modified and at least monthly during this period.

1 VOC samples will be collected from the wells listed above and analyzed for VOCs using
2 SW846 Methods 8260B. Samples for VOC analysis will be collected 3 months after the
3 Phase II system operations begin and these wells will be included in the annual sitewide
4 sampling. Based on the analytical results for these samples, additional performance
5 monitoring samples may be collected to confirm system operation.

6 **2.6 Waste Management and Disposal**

7 The investigation-derived waste (IDW) that is expected to be generated as part of this
8 investigation may include pavement debris, soil/sediment, well purge water, equipment
9 decontamination wastes, and used personal protective equipment (PPE). As it is generated,
10 the IDW will be containerized in labeled 55-gallon drums and characterized in accordance
11 with South Carolina Hazardous Waste Management Regulations (SCDHEC R.61-79.261).
12 Filled containers will be transported to the less than 90-day storage facility located at
13 Building 1824. After analytical results have been received and reviewed, the containers will
14 be transported to a permitted and licensed facility for proper treatment/disposal.

15 **2.7 Sample Handling and Chain-of-Custody**

16 Sample collection procedures and site conditions at the time of sampling will be
17 documented in a field logbook by the field team leader. Samples will be collected in
18 prepared containers supplied by the lab vendor, using preprinted chain-of-custody
19 logsheets and coolers for transport of the samples. Samples will be iced as appropriate and
20 transported by the sampling team to the lab for analysis, maintaining the chain-of-custody
21 at all times after sampling occurs and until the analysis is complete. Sample handling
22 procedures will adhere to the standard procedures described in the approved
23 Comprehensive Sampling and Analysis Plan (CSAP) portion of the *CNC RCRA Facility*
24 *Investigation (RFI) Work Plan* (EnSafe/ Allen & Hoshall, 1994).

25 **2.8 Analysis of Samples**

26 The samples will be delivered to a subcontracted laboratory for chemical analysis of COCs
27 by EPA SW-846 methods and/or standard operating procedures (SOPs) for screening
28 methods to achieve EPA Level II Data Quality Objectives (DQO). VOCs will be analyzed
29 using SW-846 Method 8260B. The subcontracted lab will meet the EPA Level II DQO criteria
30 specified in the approved CNC CSAP (EnSafe, 1996). Sample analysis will be performed in

- 1 accordance with the guidance in EPA's *Test Methods for Evaluating Solid Waste, SW-846,*
- 2 *Revision 4* (EPA, 1996), Office of Solid Waste and Emergency Response (OSWER), and in the
- 3 EPA *Environmental Services Division Laboratory Operations and Quality Control Manual*
- 4 (ESDLOQCM) (1997).

TABLE 2-1
 Dissolved Oxygen Readings at SWMU 196 Before and After 6 Hours of Air Sparging
 Phase I Corrective Measures Implementation Plan, SWMU 196, Zone H, Charleston Naval Complex

Well ID	GELGW015		009GW020		196GW013		196GW005		196GW004	
	DO in PM (after sparging)	DO in AM (next morning)	DO in PM (after sparging)	DO in AM (next morning)	DO in PM (after sparging)	DO in AM (next morning)	DO in PM (after sparging)	DO in AM (next morning)	DO in PM (after sparging)	DO in AM (next morning)
Tuesday 08/09/2005	5.20	3.24	3.84	3.21	5.27	3.86	6.48	2.70	6.85	5.55
Wednesday 08/10/2005	6.96	3.57	3.95	2.60	4.93	3.78	6.04	2.59	7.50	5.19
Thursday 08/11/2005	8.41	3.24	4.72	4.00	7.02	2.34	8.04	2.53	8.75	4.04
Friday 08/12/2005	7.91	3.71	4.26	3.60	6.77	3.51	8.16	3.35	8.45	4.89
Average	7.12	3.44	4.19	3.35	6.00	3.37	7.18	2.79	7.89	4.92

All readings in milligrams per liter (mg/L).

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color



Figure 2-1
Phase I Biosparging Locations
SWMU 196, Zone H
Charleston Naval Complex.

FIGURE 2-3
 Results of Microbiological Monitoring in Well in H196GW004

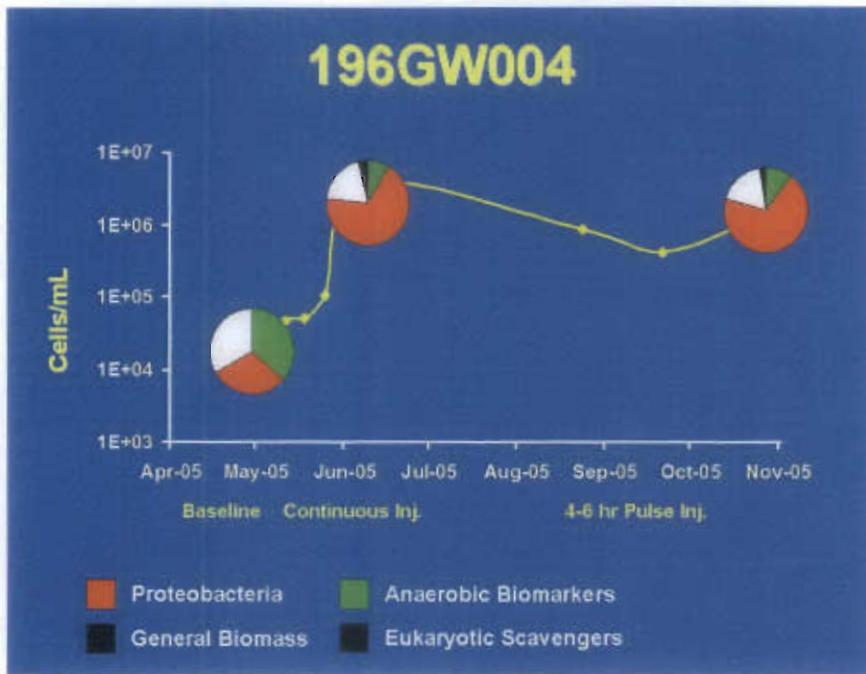


FIGURE 2-4
 Results of Microbiological Monitoring in Well in H196GW013

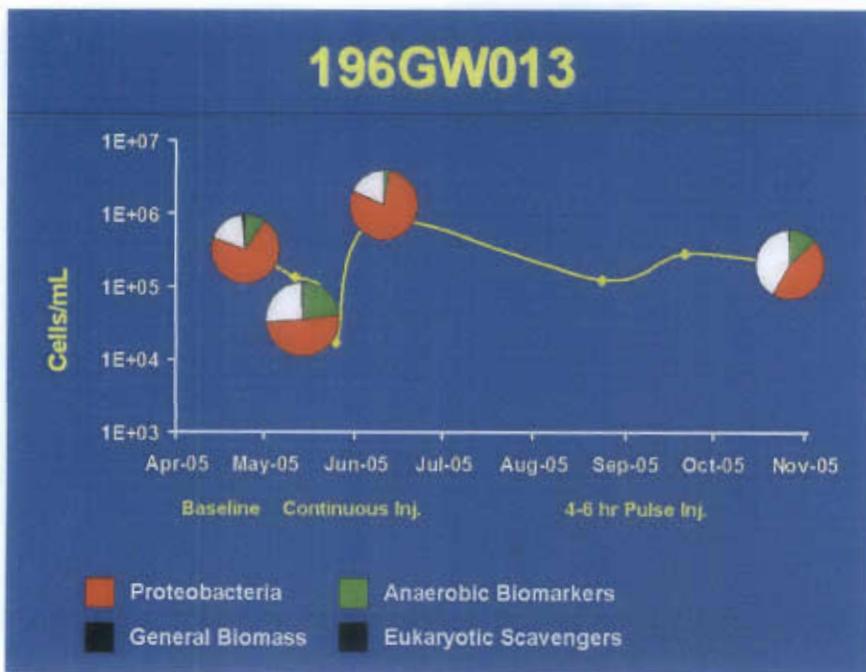


FIGURE 2-5
 Results of Carbon 13 Labeled Chlorobenzene Testing

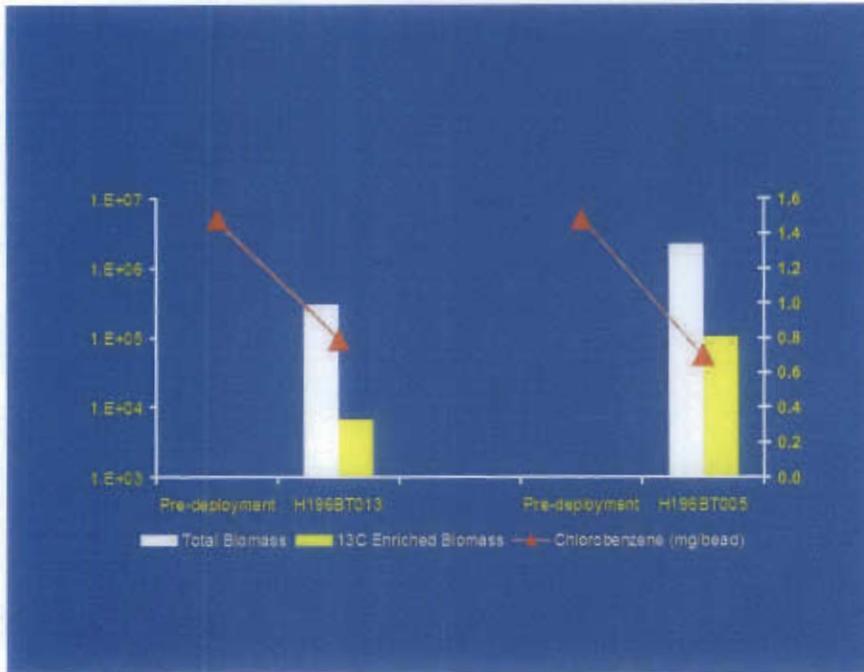


FIGURE 2-6
 Chlorobenzenes—Well H196GW004

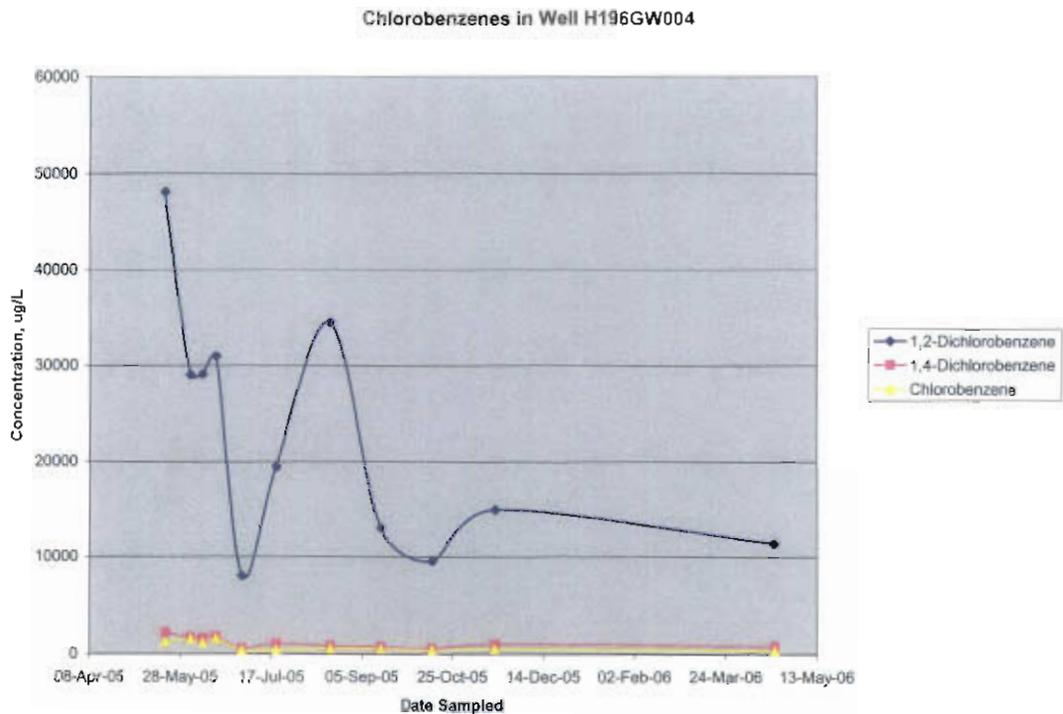


FIGURE 2-7
Chlorobenzenes—Well H196GW005

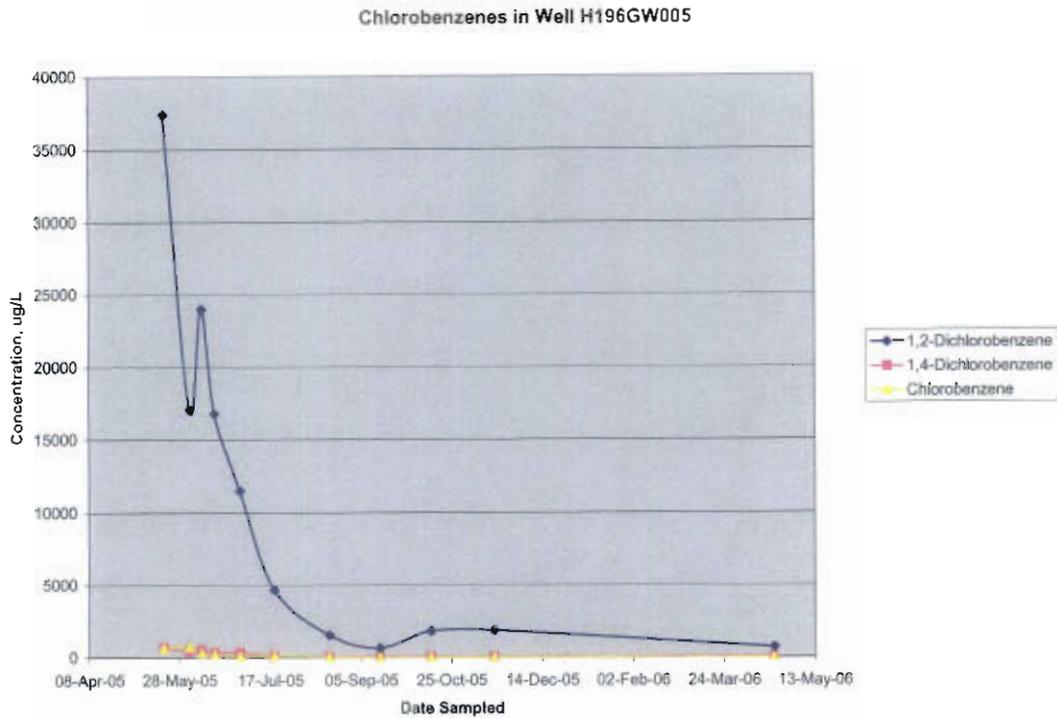


FIGURE 2-8
Chlorobenzenes—Well H196GW013

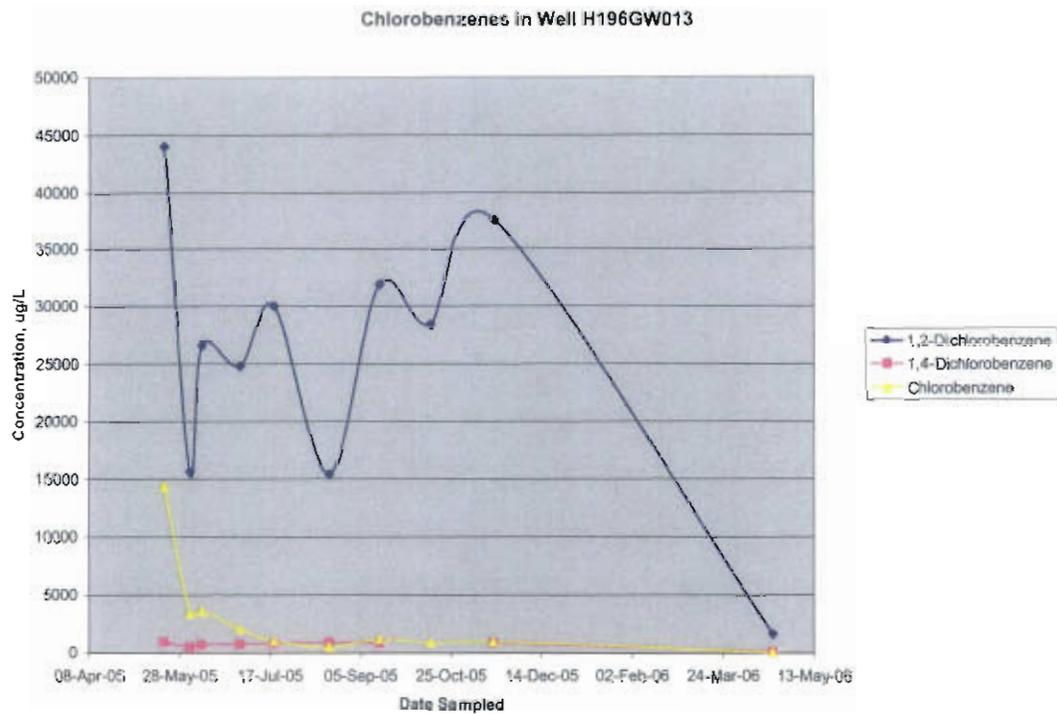


FIGURE 2-9
 Chlorobenzenes—Well FGELGW015

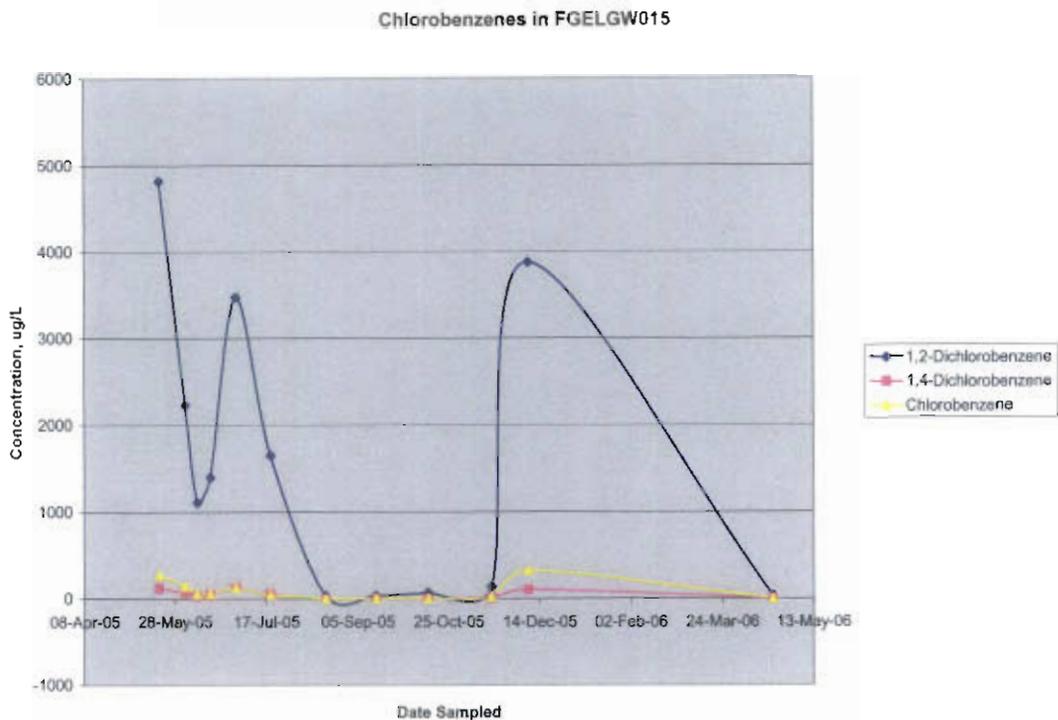
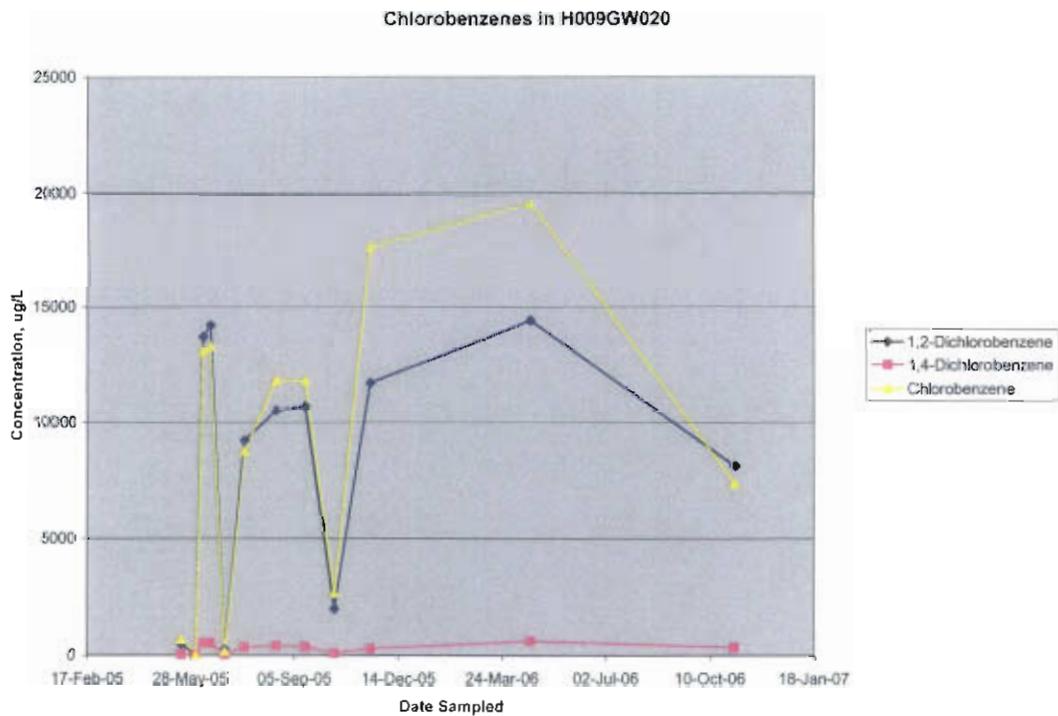


FIGURE 2-10
 Chlorobenzenes—Well H009GW020



Appendix C Data Summary_...v 2_SWMU 196 CMIWP.xls

SampleID	StationID	Matrix	SampleType	DateCollected	Method	ParamID	Paramname	AnaValue	ProjQual	MDL	RL	Units
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	HCLBZ	Hexachlorobenzene	9.8 U		1.96	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	HCLEA	Hexachloroethane	9.8 U		1.96	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	HXO2	2-Hexanone	1000 U		125	1000	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	INP123	Indeno(1,2,3-c,d)pyrene	9.8 U		0.196	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	ISOP	Isophorone	9.8 U		1.96	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	MEK	Methyl ethyl ketone (2-Butanone)	1000 U		125	1000	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	MIBK	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1000 U		125	1000	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	MTLNCL	Methylene Chloride	500 U		200	500	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	MTNPH2	2-Methylnaphthalene	9.8 U		0.294	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NAPH	Naphthalene	9.8 U		0.294	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NNSPR	N-Nitrosodi-n-propylamine	9.8 U		1.96	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NO2ANIL2	2-Nitroaniline	49 U		1.96	49	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NO2ANIL3	3-Nitroaniline	49 U		1.96	49	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NO2ANIL4	4-Nitroaniline	49 U		2.94	49	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	NO2BZ	Nitrobenzene	9.8 U		2.94	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	PCA	1,1,2,2-Tetrachloroethane	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	PCE	Tetrachloroethylene (PCE)	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	PHAN	Phenanthrene	9.8 U		0.196	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8270C	PYR	Pyrene	9.8 U		0.294	9.8	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	STY	Styrene	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TBME	Bromofom	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCA111	1,1,1-Trichloroethane	100 U		30	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCA112	1,1,2-Trichloroethane	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCB123	1,2,3-Trichlorobenzene	100 U		30	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCB124	1,2,4-Trichlorobenzene	100 U		30	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCE	Trichloroethylene (TCE)	36.2 J		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	TCLME	Chloroform	100 U		25	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	VA	Vinyl acetate	500 U		150	500	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	VC	Vinyl chloride	605 =		50	100	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	XYLENES	Xylenes, Total	300 U		25	300	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	XYLMP	m+p Xylene	200 U		25	200	ug/L
196GW015R3	H196GW015	WG	N	02-Nov-06	SW8260B	XYLO	o-Xylene	100 U		25	100	ug/L

- Notes:
- = Detected. The analyte was analyzed for and detected at the concentration shown.
 - J Estimated. The analyte was present but the reported value may not be accurate or precise.
 - U Undetected. The analyte was analyzed for but not detected above the method detection limit.
 - UJ Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.

Date of Issuance: 10 January 2007

Approval #: HW-07-005

Monitoring Well Approval

Approval is hereby granted to:

Dudley Patrick, BRAC PMO SE
4130 Faber Place Drive
Suite 202
N. Charleston, SC 29405

Facility:

North Charleston, SC 29406
Naval Base Station Charleston (CNAV)
Charleston County
SC0-170-022-560

This approval is for the installation one (1) permanent groundwater monitoring well at SWMU-196. The monitoring well is to be installed in the location as illustrated on Figure 1 (attached), using the specific construction method described in the well approval request (letter, Gates to Hargrove, dated 9 January 2007). The monitoring well is to be installed following all of the applicable requirements of R.61-71.

Please note that R.61-71 requires the following:

- 1) That a minimum of (48) hours prior to initiation of drilling activities, notice shall be provided to Christine Sanford-Coker, District Hydrogeologist, at EQC Region 7 Office (843-740-1590).
All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.
- 2) All wells shall be properly developed per R.61-71.H.2.d. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted within 30 days after well completion or abandonment unless another schedule has been approved by the Department. The form shall be submitted to Donald C. Hargrove
Bureau of Land and Waste Management
Division of Hydrogeology
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f.

- 3) All analytical data and water levels obtained from the monitoring well shall be submitted to

Donald C. Hargrove
Bureau of Land and Waste Management
Division of Hydrogeology
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

- 4) This information must be submitted within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

Conditions:

- A) All monitoring wells shall be labeled as required by R.61-71.H.2.c.
- B) If any of the information provided to the Department changes, the Author (Donald C. Hargrove) shall be notified a minimum of twenty-four hours prior to well construction as required by R.61-71.H.1.a.

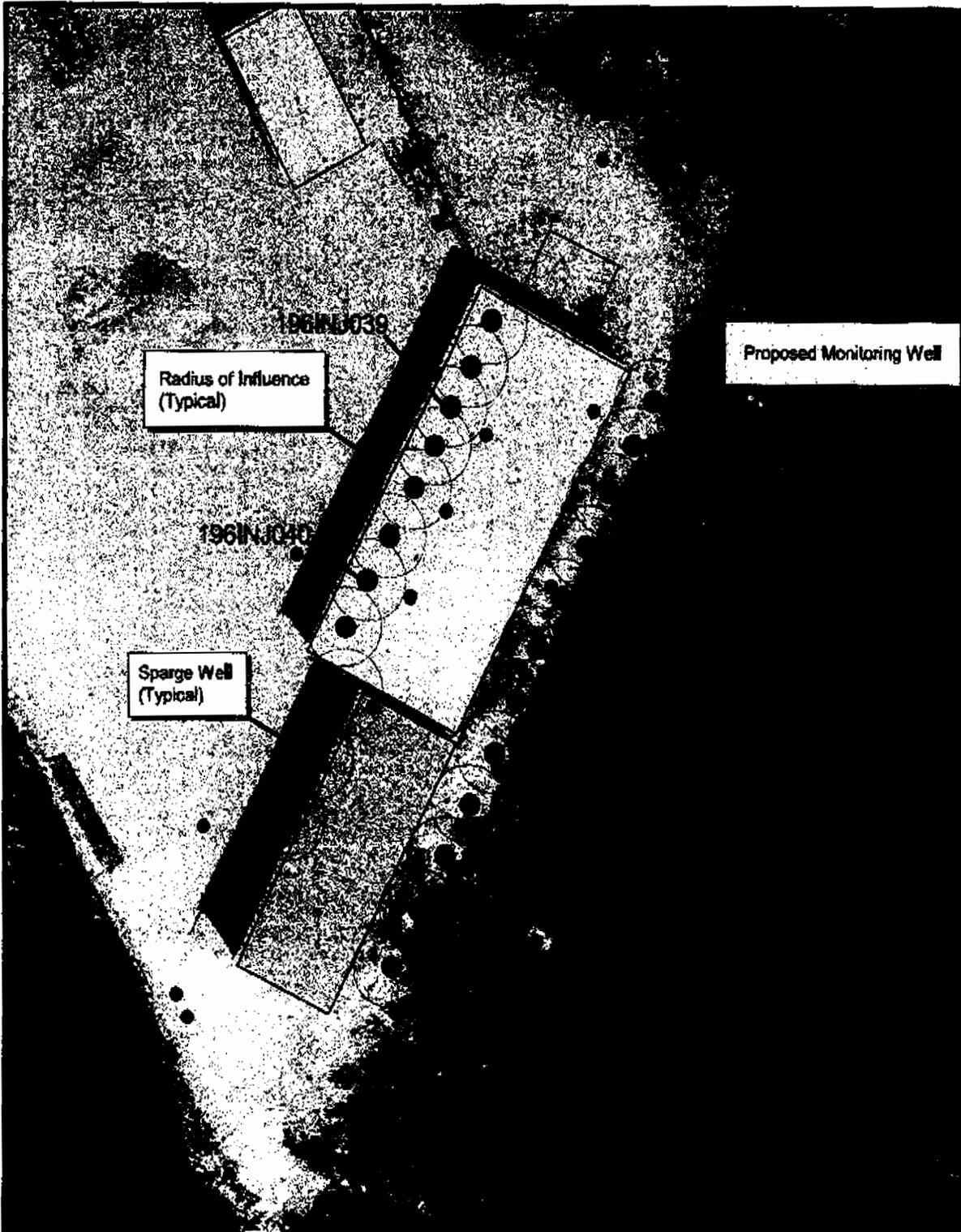
This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002.

Donald C. Hargrove, Hydrogeologist

RCRA Hydrogeology Section 1
Division of Hydrogeology
Bureau of Land and Waste Management

Attachment: Figure 1

CC: Jerry Stamps, Corrective Action Engineering
Dann Spariosu, Federal Facilities Section, USEPA
Christine Sanford-Coker, EQC Region 7, Charleston
File #50484



Radius of Influence (Typical)

Proposed Monitoring Well

Sparge Well (Typical)

- Proposed Monitoring Well
- Existing Monitoring Well
- Proposed Biosparge Well
- Existing Biosparge Well
- ∧ Shoreline
- Buildings

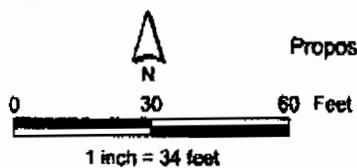


Figure 1
 Proposed Biosparge / Monitoring Well layout
 SWMU 196, Zone H
 Charleston Naval Complex

Annual Land Use Control (LUC) Compliance Certification

Charleston Naval Complex

EPA I.D. No SC0170022560

Property Owner: DEPT OF HOMELAND SECURITY (FLETC)

Property Conveyed Since Last Inspection? _____

Check months completed:

(Explain in Comments block)

 April May June (for semi-annual inspections) **AND** October November December (write in year)

Site (SWMU site numbers through 499; AOC site numbers 500 and higher)	Restricted Media		Use Restrictions Communicated in Deed	Any LUC Violations Were Reported Within 3 Business Days of Discovery	Explanation of Actions Taken or to be Taken Provided Within 10 Days of Discovery	Groundwater Not Being Used	Monitoring Wells Not Disturbed	Land Not Being Used for Residential Use	Land Not Being Used for Recreational Use	Land Not Being Used for Agricultural Use	Soils Not Disturbed or Disturbed with Authorization via LUC Area Construction Permit	Engineering Controls Maintained	Landfill Cover Not Disturbed or Disturbed with Authorization via LUC Area Construction Permit	Zone	Notes (restrictions) W = groundwater use restriction; U = use restriction; E = engineering controls; D = digging/excavation restriction			
	Groundwater	Soil																
			"Y" if Yes; "N" if No; "NA" if not applicable															
			"Y" if LUC has been maintained. "N" if LUC has not been maintained (explain in Comments section on page 2). Shading indicates particular LUC is not applicable.															
9	•	•	/	/	/	/	/	/	/	/	/	/	/	/	/	G & H	W, U, E, D Semi-annual	
19, 20, 121, 649, 650, 651	•	•	/	/	/	/	/	/	/	/	/	/	/	/	/	/	H	W, U, E, D Semi-annual
724	•	•	/	/	/			/	/	/	/		/	/	/	/	G & H	U, D
196	•	•	/	/	/			/	/	/	/	/	/	/	/	/	H	W, U, E, D
17	•	•	/	/	/	/	/	/	/	/	/	/	/	/	/	/	H	W, U, E, D Semi-annual
680	•	•	/	/	/			/	/	/		/	/	/	/	/	I	E, U
722	•	•	/	/	/	/	/	/	/	/	/	/	/	/	/	/	I	W, D, U

Diagonally split cells indicate a requirement for semi-annual inspections: April-June and October-December.

**Annual Land Use Control (LUC, Compliance Certification
Charleston Naval Complex
EPA I.D. No SC0170022560**

Property Owner: DEPT OF HOMELAND SECURITY (FLETC) **Type of Inspection:** Drive-through Walk-through

I, the undersigned, hereby certify that I am an authorized representative of DEPT OF HOMELAND SECURITY (FLETC) and that the above described land use controls have been complied with for the calendar year _____. Any known deficiencies and completed or planned actions to address such deficiencies are described in the attached explanation of deficiencies. I have also attached a map to this certification showing the sites and the LUCs in place at each site.

Signature _____ Relationship to Property Owner _____ Date _____

Printed Name _____ Phone Number (_____) _____

Address _____ City _____ Zip Code _____

Comments: (attach additional sheets as needed)

A map is attached showing the LUCs in place at each site.

Mail original completed certification to SCDHEC (WM), with copies to SC DHEC (SAR), US EPA, and the US Navy at the below addresses:

<p><u>SCDHEC (Waste Management Division)</u> South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management Attn: Director, Waste Management Division 2600 Bull Street Columbia, SC 29201</p>	<p><u>SCDHEC (Site Assessment & Remediation Division)</u> South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management Attn: Director, Site Assessment & Remediation Division 2600 Bull Street Columbia, SC 29201</p>
<p><u>US EPA</u> US Environmental Protection Agency Region 4 Federal Facilities Branch Attn: Charleston Naval Complex RPM 61 Forsyth Street SW Atlanta, GA 30303-8909</p>	<p><u>US Navy</u> BRAC Program Management Office Southeast Attn: Charleston Naval Complex RPM 4130 Faber Place Dr Ste 202 North Charleston, SC 29405</p>

Annual Land Use Control (LuC) Compliance Certification

Charleston Naval Complex

EPA I.D. No SC0170022560

Property Owner: SC STATE PORTS AUTHORITY

Property Conveyed Since Last Inspection? _____

Check months completed:

(Explain in Comments block)

___ April ___ May ___ June (for semi-annual inspections) AND ___ October ___ November ___ December (write in year) _____

Site (SWMU site numbers through 499; AOC site numbers 500 and higher)	Restricted Media		Use Restrictions Communicated in Deed	Any LUC Violations Were Reported Within 3 Business Days of Discovery	Explanation of Actions Taken or to be Taken Provided Within 10 Days of Discovery	Groundwater Not Being Used	Monitoring Wells Not Disturbed	Land Not Being Used for Residential Use	Land Not Being Used for Recreational Use	Land Not Being Used for Agricultural Use	Soils Not Disturbed or Disturbed with Authorization via LUC Area Construction Permit	Engineering Controls Maintained	Landfill Cover Not Disturbed or Disturbed with Authorization via LUC Area Construction Permit	Zone	Notes (Restrictions) W = groundwater use restrictions; U = use restrictions; E = engineering controls; D = digging/excavation restrictions
	Groundwater	Soil													
			"Y" if Yes; "N" if No; "NA" if not applicable												
			"Y" indicates LUC has been maintained; "N" if LUC has not been maintained (explain in Comments section, pg 2). Shading indicates particular LUC is not applicable.												
5/18/605/621	•	•												E	W, U, E, D
617	•	•												E	W, U, E, D
6/7/635	•													G	W
8/636	•	•	/	/	/	/	/	/	/	/	/	/	/	G	W, U, E, D Semi-annual
633	•	•												G	W, U
637/706	•	•	/	/	/	/	/	/	/	/	/	/	/	G	W, U, E, D Semi-annual
Fac 123	•	•												G	W, U, D
9	•	•	/	/	/	/	/	/	/	/	/	/	/	G & H	W, U, E, D Semi-annual
724	•	•	/	/	/	/	/	/	/	/	/	/	/	G & H	W, U, E, D Semi-annual
503		•												H	U, D

Diagonally split cells indicate a requirement for semi-annual inspections: April-June and October-December.

**Annual Land Use Control (LUC) Compliance Certification
Charleston Naval Complex
EPA I.D. No SC0170022560**

Property Owner: SC STATE PORTS AUTHORITY

Check Type of Inspection: ___ Drive-through ___ Walk-through

I, the undersigned, hereby certify that I am an authorized representative of SC STATE PORTS AUTHORITY and that the above described land use controls have been complied with for the calendar year _____. Any known deficiencies and completed or planned actions to address such deficiencies are described in the attached explanation of deficiencies. I have also attached a map to this certification showing the sites and the LUCs in place at each site.

Signature _____ Relationship to Property Owner _____ Date _____

Printed Name _____ Phone Number (_____) _____

Address _____ City _____ State _____ Zip Code _____

Comments: (attach additional sheets as needed)

A map is attached showing the LUCs in place at each site.

Mail original completed certification to SCDHEC (WM), with copies to SC DHEC (SAR), US EPA, and the US Navy at the below addresses:

SCDHEC (Waste Management Division)
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
Attn: Director, Waste Management Division
2600 Bull Street
Columbia, SC 29201

SCDHEC (Site Assessment & Remediation Division)
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
Attn: Director, Site Assessment & Remediation Division
2600 Bull Street
Columbia, SC 29201

US EPA
US Environmental Protection Agency Region 4
Federal Facilities Branch
Attn: Charleston Naval Complex RPM
61 Forsyth Street SW
Atlanta, GA 30303-8909

US Navy
BRAC Program Management Office Southeast
Attn: Charleston Naval Complex RPM
4130 Faber Place Dr Ste 202
North Charleston, SC 29405

CHARLESTON NAVAL COMPLEX LUC AREA CONSTRUCTION PERMIT

GENERAL INFORMATION:

Requestor:	Location: (Include Bldg Nos. and Streets)	Date of Request:
Contractor:	Subcontractors:	SWMUs/AOCs Impacted:

PROPOSED WORK:

Scope of Work: (Attach sketches, drawings & information outlined in Process to Conduct Construction Activities Document)

Construction Schedule (planned start date - planned completion date):

LAND USE CONTROLS:

Current Land Use Controls on Construction Area:

Frequency and Date of Next LUC Inspection for Construction Area:

Potential Effect of Proposed Construction on LUCs:

CERTIFICATIONS:

As a representative of the property owner of the subject property, I hereby certify that: (check all that apply)

1. I possess an updated copy of the CNC LUC Areas Map and Interim Measures Work Plan.

2. I acknowledge that residual contamination exists on the subject property and am aware that further information on site contaminants can be found in the Administrative Record located at Bldg 7, 1330 Truxton Ave, Suite 300.

3. Information regarding SWMUs/AOCs, and contaminants will be provided to all contractors and subcontractors. Contractor and subcontractor representatives to sign below signifying receipt of information.

Contractor	Name/Signature	Date
Sub-Contractor	Name/Signature	Date

4. The proposed construction will not change the land use (i.e., from industrial to residential)

5. Personnel hazards will be controlled where construction activities have the potential to interfere with existing remedies. Exposure controls such as PPE, exclusion zones, etc. will be utilized.

6. Dewatering will not affect migration of contaminants, and water under groundwater use restriction will be tested and properly disposed.

7. Excess soil under digging restriction will be tested and properly disposed.

8. Exposure assumptions used in deriving LUCs will not be altered.

9. Impacts to the remedy as a result of construction activities will be monitored (i.e., groundwater flow direction, vertical migration of residual contamination, and potential for migration to indoor air.)

10. Any previously unknown contamination will be reported immediately to the Navy (within 7 days of discovery).

Printed Name & Signature of Requesting Official	Property Representing & Phone Number:	Date:

NAVY REVIEW:

<input type="checkbox"/> Requestor *Authorized to Proceed <input type="checkbox"/> Further Information is Requested <input type="checkbox"/> Permit Denied <input type="checkbox"/> Comments attached	Signatures: _____ Navy RPM/BEC _____ CH2M-Hill	Serial No: _____ Date: _____
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------	---------------------------------

*Authorization to proceed does not constitute approval of methods by which environmental, safety, and other regulations are satisfied.

APPENDIX G

Responses to SCDHEC Comments

General Comments

1. It is unclear why two different inspection checklists are attached to the document. Please clarify.

Response: The first inspection checklist (LUC inspection form) was included based on previous BCT agreements. It was our understanding at the time the document was prepared that the second checklist, provided by DHEC, was also desired in the appendix. Based on subsequent BCT discussions, only the first checklist will be included. The second checklist can be removed.

Specific Comments

2. Response to Stamps Comment # 5.

The Department cannot locate within the text of the document the response to this comment. Please indicate the location of the response or respond to the comment in the text.

Response: As discussed at the April 2008 BCT meeting, a section of Appendix F – Land Use Control Management Plan from the RCRA permit will be included in Section 2.4 of the CMI WP to response to Mr. Stamps comment #5. The section of Appendix F that will be included is Section I. LUC Inspection – Review – Certification.

3. Page 2-6 Section 2.4 Line 24.

This section reads “LUCs will be implemented...”. However, it is the Department’s understanding that LUCs have already been implemented on the property. Please clarify.

Response: The Department is correct; LUCs have already been implemented. The text will be clarified to indicate that “LUCs have been implemented.”

4. Section 2.4.3.

This CMI WP and all subsequent ones should discuss that per the LUCMP, the Navy is responsible for inspecting and certifying Land Use Controls. However, per the VCCs the new property owners have assumed responsibility for inspecting Land Use Controls on their property. Once the copies of the inspection reports for the given year are provided to the Navy, the Navy must submit and certify the inspection reports.

Response: Section 2.4.3 will be modified as requested.

Response to Hydrogeology Comments on SWMU 196 CMI WP, Revision 0
Charleston Naval Complex
Comments by Sommer Barker
Comments Dated March 21, 2008

1. Figure 2-1, *Phase I Biosparge Locations*, should be updated to show an appropriate legend explaining what each symbol shown in this figure means.

Response: A legend will be provided on a revised figure.

2. Appendix C, Groundwater Monitoring Data, 2005-2006, should be updated to show an appropriate legend explaining what each symbol shown in this appendix means.

Response: A legend will be provided on the last page of this appendix.

3. CNC states that well H196GW022 was newly installed specifically to evaluate the performance of the Phase II biosparge system. The Department has no record of a request to install this well. The Navy should provide documentation indicating approval to install this monitoring well and the field forms from the installation process within 30 days after receiving this letter.

Response: Approval Number HW-07-005 to install well H196GW022 was received from Don Hargrove on January 10, 2007 (see attached letter). Copies of the well construction log are also attached.

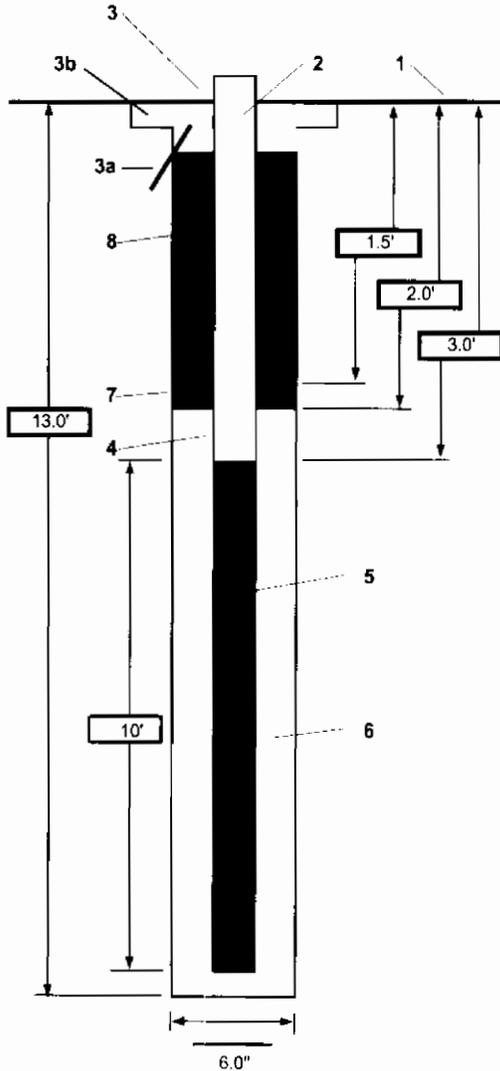
WELL DEVELOPMENT LOG

WELL NUMBER: 196GW022		SITE: SWMU 196			
FIELD CREW: Andrew O'Connor					
DEPTH TO WATER (FT):	5.5	CASING DIAMETER	GAL/FT OF CASING		
WELL DEPTH (FT):	13	2 IN.	0.1632		
WATER COLUMN (FT):	7.5	water column = well depth - depth to water			
GAL/FT OF CASING	0.1632				
CASING VOLUME (GAL)	1.22	casing volume = water column x 0.1632			
NO. OF VOLUMES min.(3)	Approx. 39				
TOTAL PURGE VOL. (GAL)	45.00	total purge volume = casing volume x total total volumes purged			
METHOD OF PURGING					
PUMP: Peristaltic		OTHER:			
TIME ON: 0815		BAILER : TEFLON, SS ,OTHER:			
FLOW RATE (gpm): variable		BAILER VOL.. (gal)			
PUMP TIME (min): 0165		REQUIRED PULLS:			
VOL. PURGED (gals): 45.00		VOL. PURGED (gals):			
		OTHER:			
FIELD PARAMETERS	FIELD MEASUREMENTS				
	1st reading	2nd reading	3rd reading	4th reading	
TIME	1047	1052	1057	1102	
pH (s.units)	6.72	6.74	6.75	6.75	
COND.(S/m)	14.3	13.9	13.5	13.4	
TURBIDITY(NTUs)	85.2	9	0	1.2	
TEMP.(C)	19.2	19.3	19.3	19.2	
DO.(mg/L)	1.51	0.91	0.9	0.91	
ORP(mV)	80	77	77	76	
OBSERVATIONS					
COLOR: clear					
ODOR: none					
COMMENTS: The well was surged using a rubber block for 10 minutes prior to initiating development.					
Approximately 45 gallons were purged using a submersible pump prior to collecting parameters using a low-flow peristaltic pump.					
DEVELOPMENT DATE / TIME : 3-26-2007					



PROJECT NUMBER 258814	WELL NUMBER H196GW022	SHEET 1	OF 1
WELL COMPLETION DIAGRAM			

PROJECT : Charleston Naval Complex LOCATION : SWMU 196 Northing: Not obtained to date
 DRILLING CONTRACTOR : S&ME, Inc. / 1723 Easting: Not obtained to date
 DRILLING METHOD AND EQUIPMENT USED : Hollow-Stem Auger / Geoprobe Rig
 WATER LEVELS : +/- 4.5 feet bls START : 12-Jan-07 END : 12-Jan-07 LOGGER : Darryl Gates



1- Ground elevation at well	Not obtained to date
2- Top of casing elevation	Not obtained to date
3- Wellhead protection cover type	Flush-mounted vault w/ bolt-down cover
a) drain tube?	No
b) concrete pad dimensions	24" X 24"
4- Dia./type of well casing	2-inch / PVC
5- Type/slot size of screen	PVC / .010-circumslot
6- Type screen filter	20/30 silica sand
7- Type of seal	Barroid bentonite chips
8- Grout	
a) Grout mix used	Type I Portland cement w/ 5% bentonite
b) Method of placement	Trimmie
Development method	Surge block / Submerge / peristaltic pump
Development time	32 minutes
Estimated purge volume	45 gallons

Comments Well surged with rubber block for 10 minutes then purged using a submersible pump until clear. Groundwater parameters were analyzed using a peristaltic pump and Horiba U-22 water meter. Final parameters: pH-6.75, Cond-13.4, Turbidity-1.2, DO-0.91, Temp-19.2, and ORP-76.