Doc. No.: CLEJ-00140-3.01-01/03/84
CL 3.01

UNITED STATES MARINE CORPS
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA 28542

IN REPLY REFER TO

FAC/REA/hf
6280
3 JAN 1984

N.C. Division of Environmental Management
Groundwater Section
Attn: Mr. Arthur Mouberry
P. O. Box 27687
Raleigh, NC 27611

Re: Request for Approval
Groundwater Monitoring Wells
Camp Lejeune, NC

Dear Mr. Mouberry:

This letter follows the telephone discussion between you and Mr. Alexander of this office on 21 December 1983. The purpose of this letter is to request approval of construction of groundwater monitoring wells. These wells are described as follows:

Number: 55
Location: See attached maps of enclosures (1) and (2)
Depth: 25 ft
Diameter: 2 inches
Materials: See construction diagram of enclosure (3)

The proposed wells are being installed as part of the Marine Corps Base study of potential contamination from past hazardous materials operations. An Initial Assessment Study has been developed under the Navy Assessment and Control of Installation Pollutants (NACIP) Program. The initial screening, which has been completed for 76 potential sites, concludes that none of the 76 sites pose an immediate threat to human health or the environment. A copy of this report is being provided to the Division of Environmental Management under a separate letter.

Doc. No.: CLE5-00140-3.01-01/03/84

FAC/REA/hf
6280
3 JAN 1984

We request that copies of forms for well completion records be provided along with your response to this proposal. For further information regarding this matter, please contact Mr. Bob Alexander, MCB Environmental Engineer at 919-451-3034 or at the above address.

Sincerely,

M. G. LILLEY
Colonel, U.S. Marine Corps
Assistant Chief of Staff, Facilities
By direction of the Commanding General

Encl:(1) Fig 2-1, Site Locations at MCB, Camp Lejeune
(2) Camp Lejeune Special Map, Scale 1:50,000
(3) Appendix A - Monitoring Well Construction & Diagram

Copy to: (w/o encl (2))
CMC (Code LFF-2)
LANTNAVFACENGCOM (Code 114)

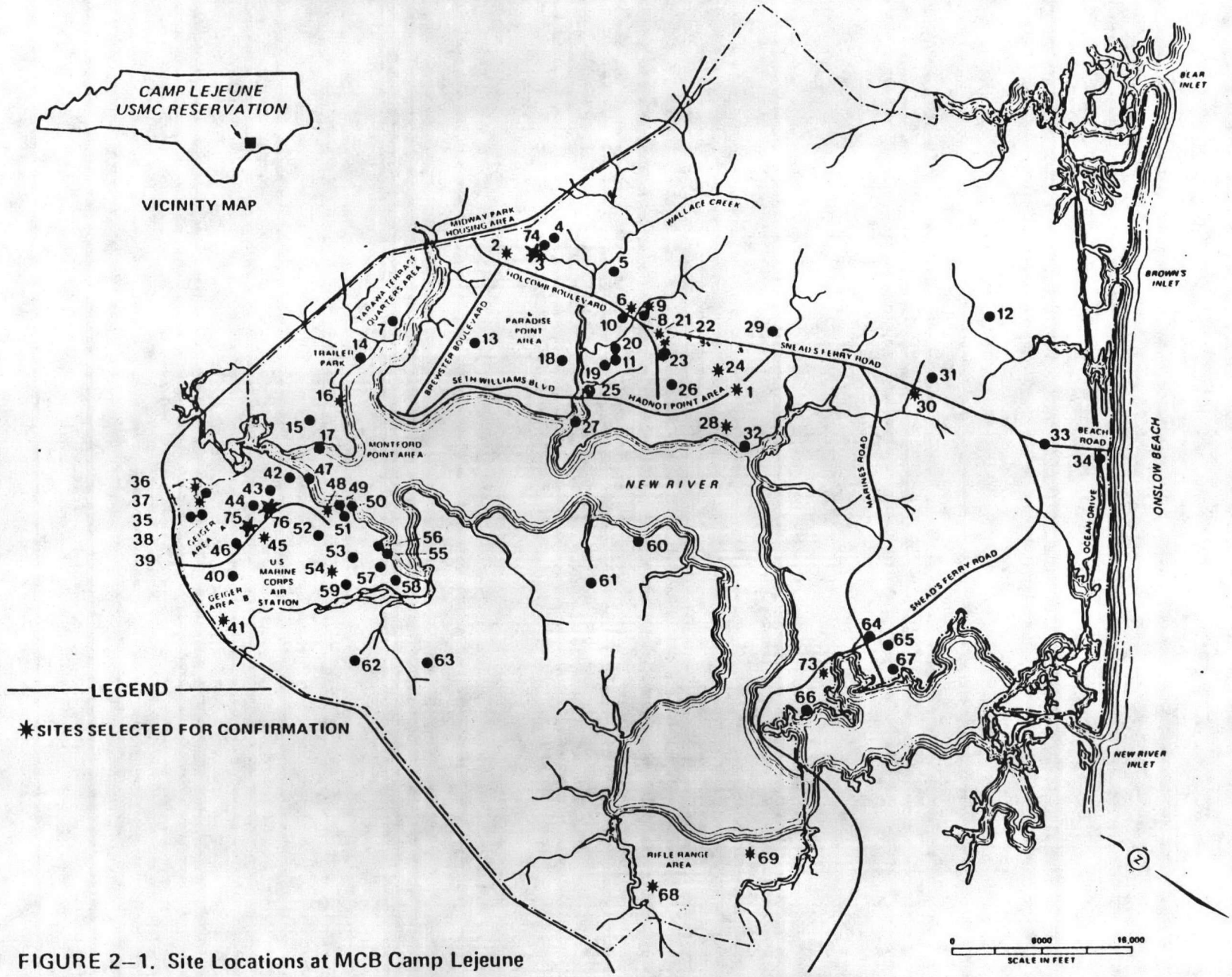

FIGURE 2–1. Site Locations at MCB Camp Lejeune

APPENDIX A--MONITORING WELL CONSTRUCTION

A-1. RECOMMENDATIONS FOR GROUNDWATER MONITORING

A-1.1 Monitoring Well Inventory. Wells that have been improperly abandoned or that have been out of service for a long period are potential conduits for contamination from the water table aquifer to those deeper. Many of the wells at Camp Lejeune have been abandoned or are no longer in service, but there is not a complete inventory of the location or abandonment procedure.

It is recommended that the status of wells at the installation be clarified by determining the location of all the wells that have ever been drilled at the base. A comparison of the complete list of wells with the wells now in use will show those that have been abandoned or that are out of service. If these wells are close to and downgradient of a confirmed hazardous waste site, a further assessment of the wells' status should be made. This assessment should include the reason for abandonment or nonuse, the date when the well was last used, how it was abandoned (if applicable), future plans for the well (if not yet abandoned), and a review of any chemical/physical data available.

A satisfactory abandonment procedure involves filling the well and gravel pack with grout so that contaminants cannot migrate between aquifers.

A-1.2 Monitoring Well Installation. Each monitoring-well should be constructed so that it has both an efficient hydraulic connection to the surrounding water table aquifer and an effective seal against the migration of surface waters into the borehole.

The following techniques and materials are recommended to accomplish these two aims (Figure A-1):

1. Drill an 8-inch borehole to 10 feet below the water table, as noted during drilling. Collect representative lithologic samples every 5 feet during drilling for preparation of the lithologic log.
2. Install a string of threaded, flush-joint, 2-inch, schedule 40 PVC well casing and well screen. Set the top of a 10-foot length of PVC well screen at the water table if the water table is within approximately 5 feet of land surface. If the water table is encountered at greater depths, some portion of the well screen should be set above the water table. The recommended well-screen slot size is 0.010 inch. The top of the casing should extend approximately 12 to 18 inches above ground level.
3. After the well casing and screen have been installed in the borehole, place a filter pack of fine- to medium-grained quartz sand in the annular space from the bottom of the hole to approximately 2 feet above the top of the screen.

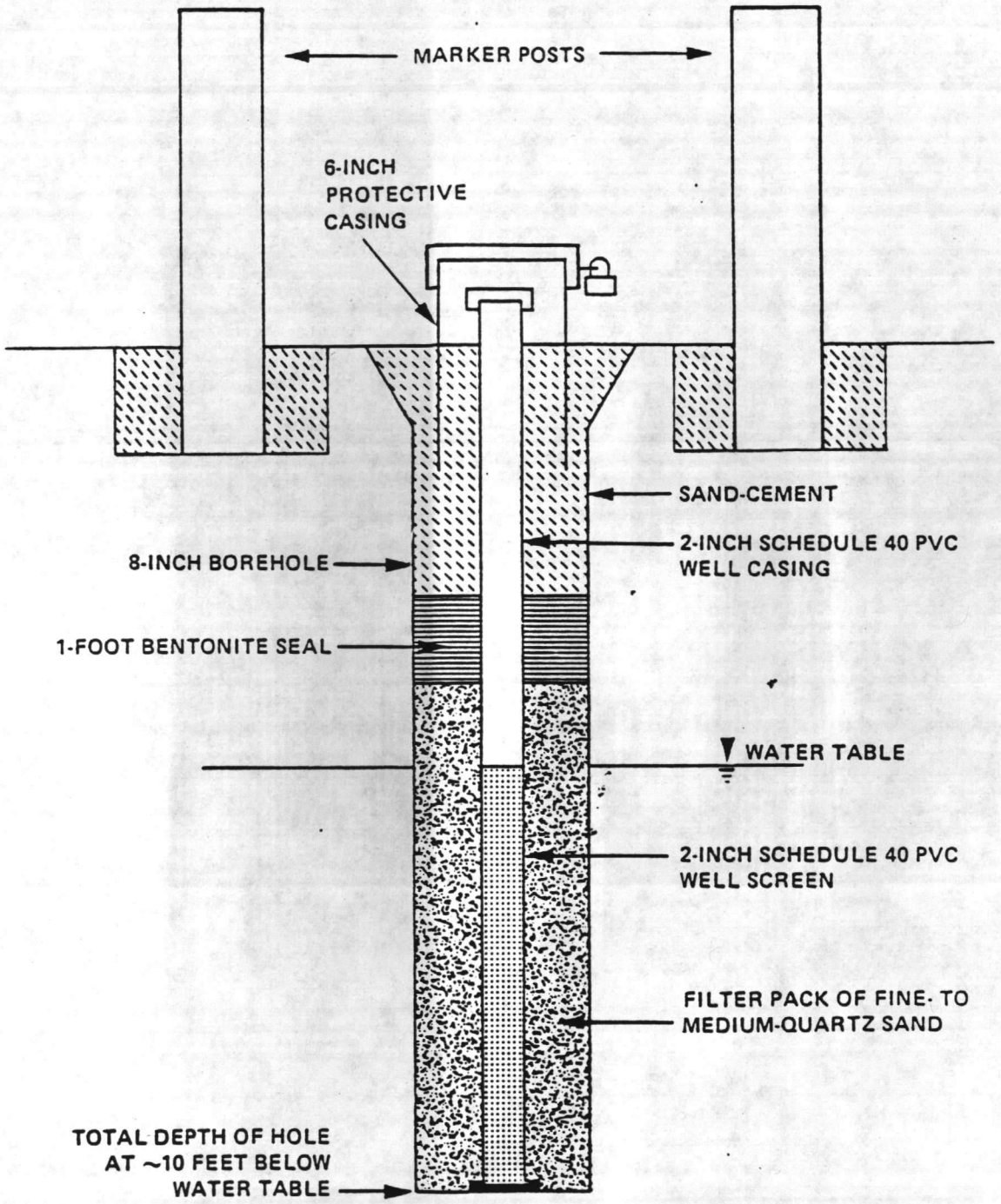

FIGURE A–1. Recommended Monitoring-Well Construction

4. Place a 1-foot seal of bentonite pellets in the annular space on top of the filter pack.
5. Fill the remainder of annular space with a sand-cement grout composed of two parts dry weight of sand to one part of cement with not more than 6 gallons of clean water per bag of cement (94 pounds or 1 cubic foot).
6. Install a 5-foot-long, 6-inch diameter, steel protective casing 3 feet into the grout. The protective casing should have a lockable steel cap and a padlock. The above-ground portions of both the protective casing and the PVC well casing should be vented with a 1/8-inch hole to permit the water in the well to fluctuate freely.
7. Install two 8-foot-long, 4-inch diameter, black steel marker posts adjacent to each well. Bury each marker post 3 feet and set it in sand-cement. Paint the upper 2 feet of each marker post day-glo orange.
8. Establish the vertical elevation and horizontal coordinates of the top of the casing (cap removed) to second order accuracy.

It may be necessary to vary the placement of the top of the screen and the thickness of the bentonite seal and the sand-cement grout if the water table is less than 5 feet below land surface.

Doc No. [illegible] 01/24/84
CL-3.0

(804) 444-9566

114:JGW:gkk
6280

2 9 FEB 1984

Environmental Science and Engineering, Inc.
Post Office Box ESE
Gainesville, Florida 32602

Re: Contract N62470-83-B-6106, Confirmation Study, Marine Corps Base, Camp Lejeune, North Carolina

Gentlemen:

The enclosed letter from the Commanding General Marine Corps Base, Camp Lejeune (MCB CAMP LEJEUNE) documents the State's variance approval for construction of monitoring wells for the subject contract. Additionally, it notes certain conditions of the variance approval.

You are directed to comply with the enclosure. Because you are subcontracting the drilling work with a North Carolina firm familiar with the State's requirements, it is not anticipated that this will impact on subject contract. Relative to notifying the State prior to initiation of construction, ESE will notify MCB CAMP LEJEUNE (Mr. Alexander) who will, in turn, initiate contact with the State.

If there are any questions, please contact our engineer in charge, Mr. J. G. Wallmeyer at (804) 444-9566.

Sincerely yours,

J. R. BAILEY, P.E.
Head, Environmental Quality Branch
Utilities, Energy and Environmental Division
By direction of the Commander

Enclosure

Copy to:
Commanding General
Marine Corps Base
Camp Lejeune, NC 28533
ATTN: ACS-F

Commandant of the Marine Corps
Headquarters, U.S. Marine Corps
Washington, DC 20380
ATTN: Code LFF-2

Blind Copy to: 09A21B6/114/114S/09BS(w/o encl). Doc #0281A.

Wallmey
Kemp
2/29/84
NRS

Doc. No.: CLEJ-00141-301-09/24/84

UNITED STATES MARINE CORPS
Marine Corps Base
Camp Lejeune, North Carolina 28542

IN REPLY REFER TO
FAC/REA/el
6280/2

10 FEB 1984

From: Commanding General
To: Commander, Atlantic Division, Naval Facilities Engineering Command, Norfolk, Virginia 23511 (Attn: Code 114)

Subj: N.A.C.I.P. Confirmation Study; construction of monitoring wells for

Ref: (a) CG, MCB ltr FAC/REA/6280 dtd 3 Jan 1984

Encl: (1) Dir., N.C. Division of Environmental Management ltr (undated) w/enclosed Well Record Forms

1. Per the request at the reference, the enclosure is forwarded indicating state approval for construction of the monitoring wells. In accordance with the enclosure, this command requests that LANTDIV include provisions in the confirmation study contract specifically for the following:

a. Compliance with paragraphs 1 - 4 of the enclosure for well construction.

b. Submission of well completion records per paragraph 5 to Marine Corps Base.

c. Notification of both Marine Corps Base and the Wilmington Regional Office prior to construction.

d. Abandonment of wells per state regulations (15 NCAC 2C) and submission of the report to Marine Corps Base.

2. Point of contact for this matter is Mr. Alexander, (AV) 484-3034.

M. G. LILLEY
By direction

Copy to: (w/encl)
CMC (LFF-2)

Doc. No. : CLEJ-00141-3.01-09/24/8

North Carolina Department of Natural Resources & Community Development

James B. Hunt, Jr., Governor Joseph W. Grimsley, Secretary

DIVISION OF ENVIRONMENTAL MANAGEMENT
Robert F. Helms
Director
Telephone 919 733-7015

Colonel M. G. Lilley
U. S. Marine Corps
Assistant Chief of Staff, Facilities
Marine Corps Base
Camp Lejeune, North Carolina 28542

Subject: Issuance of Variance to
Well Construction Standards
Camp Lejeune
Onslow County

Dear Colonel Lilley:

The United States Marine Corps is hereby granted permission to construct fifty-five (55) wells in variance to 15 NCAC 2C .0108(b)(2). The wells will be used to monitor groundwater quality at several sites located on the Camp Lejeune Marine Corps Base.

The variance is granted under the following conditions:

1. The wells must be located and constructed as shown in the diagrams submitted as part of the variance request.

2. The casing shall be installed in such a way as to insure the proper distribution of grout, bentonite, and gravel.

3. All identification and well head completion shall comply with the well construction standards.

4. Each well shall have a locking cap and a highly visible sign stating that the well is for monitoring purposes only, and not for a potable water supply.

5. A completed GW-1 ("Well Record" forms enclosed as requested) and a copy of the variance approval shall be submitted for each well constructed. A diagram may be submitted for much of the information on the GW-1 if attached to a GW-1.

6. When a monitor well is no longer useful for its intended purpose or its use is discontinued, it should be properly abandoned and an abandonment report filed.

7. The Wilmington Regional Office shall be notified prior to the construction of the wells.

ENCLOSURE (1)

The variance granted in this letter under the stated conditions does not exempt any other provisions in 15 NCAC 2C.

If you have questions or need further assistance, please contact Rick Shiver at telephone number (919) 256-4161.

Sincerely,

Arthur Mouberry

for Robert F. Helms
Director

RFH/MM/sf

cc: Perry Nelson
Central Files
Wilmington Regional Office

Doc. No.: CLEJ-00141-3.0(?)-09/24/84

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT

WELL RECORD

DIVISION OF ENVIRONMENTAL MANAGEMENT

P. O. Box 27687 — RALEIGH, N.C. 27611 919-733-2020

DRILLING CONTRACTOR ______ REG. NO. ______ WELL CONSTRUCTION PERMIT NO. ______

1. WELL LOCATION: (Show sketch of the location below)

Nearest Town: ______ County: ______

______ Quadrangle No. ______

(Road, Community or Subdivision and Lot No.)

2. OWNER: ______

3. ADDRESS: ______

4. TOPOGRAPHY: draw, valley, slope, hilltop, flat (circle one)

5. USE OF WELL: ______ DATE: ______

6. DOES THIS WELL REPLACE AN EXISTING WELL? ______

7. TOTAL DEPTH: ______ RIG TYPE OR METHOD: ______

8. FORMATION SAMPLES COLLECTED: YES ______ NO ______

9. CASING: Depth | Inside Dia. | Wall thick. or weight/ft. | type

From ______ to ______ ft ______ ______ ______

10. GROUT: Depth | Material | Method

From ______ to ______ ft ______ ______

11. SCREEN: Depth | Dia. | Type & Opening

From ______ to ______ ft ______ ______

12. GRAVEL: Depth | Size | Material

From ______ to ______ ft ______ ______

13. WATER ZONES (depth): ______

14. STATIC WATER LEVEL: ______ ft. above/below top of casing

Casing is ______ ft. above land surface ELEV: ______

15. YIELD (gpm): ______ METHOD OF TESTING: ______

16. PUMPING WATER LEVEL: ______ ft.

after ______ hours at ______ gpm.

17. CHLORINATION: Type ______ Amount ______

18. WATER QUALITY: ______ TEMPERATURE (°F) ______

19. PERMANENT PUMP: Date Installed ______

Type ______ Capacity ______ (gpm) HP ______

Make ______ Intake Depth ______

Airline Depth ______

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

If additional space is needed, use back of form

LOCATION SKETCH

(Show distance to numbered roads, or other map reference points)

20. HAS THE OWNER BEEN PROVIDED A COPY OF THIS RECORD AND INFORMED OF THE DEPARTMENTS REQUIREMENTS AND RECOMMENDATIONS? ______

21. REMARKS ______

I do hereby certify that this well was constructed in accordance with N.C. Well Construction Regulations and Standards and that this well record is true and exact.

SIGNATURE OF CONTRACTOR OF AGENT ______ DATE ______

GW-1 Revised 10/1/80

Submit original to Division of Environmental Management and copy to well owner

DOC. NO.: CLEN-00150-3.01-01/10/85

ESE

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

January 10, 1985

ESE No. 84 222 0200

Ms. Cherryl Barnett
Department of the Navy
Atlantic Division, Code 1143
Naval Facilities Engineering Command
Bldg. N-23, Gilbert Street
Norfolk, Virginia 23511

RE: Contract No. N62470-83-C-6106, Confirmation Study, Marine Corps Base, Camp Lejeune, North Carolina

Dear Ms. Barnett:

Enclosed are the analytical results for the ground water sample collected from Well No. 602, which we received on December 15, 1984.

If you have any questions regarding this data, please do not hesitate to call Paul Geiszler or myself.

Sincerely,

Russell V. Bowen, P.E.
Project Manager

RVB/ags

enclosure

cc: Paul Geiszler, ESE
Bob Gregory, ESE
Bruce McMaster, ESE

Doc No: CLEJ-00150-3.01-01/10/85

ENVIRONMENTAL SCIENCE AND ENGINEERING 842224.0 DATE : 1/09/85

PROJECT: CAMP LEJEUNE FIELD LEADER: GEISZLER/BERCOLL

FIELD GROUP: WL602 PARAMETERS: ALL SAMPLES: ALL STATUS: PRELIMINARY

PARAMETERS	STORET # METHOD #	SAMPLE NUMBERS WEL602 461400
DATE		12/20/84
TIME		
ACROLEIN (UG/L)	34210 0	<4
ACRYLONITRILE (UG/L)	34215 0	<6
BENZENE (UG/L)	34030 0	320
BROMODICHLOROMETHANE (UG/L)	32101 0	<0.40
BROMOFORM (UG/L)	32104 0	<0.80
BROMOMETHANE (UG/L)	34413 0	<1
CARBON TETRACHLORIDE (UG/L)	32102 0	<1.0
CHLOROBENZENE (UG/L)	34301 0	<0.50
CHLOROETHANE (UG/L)	34311 0	<1
2-CHLOROETHYLVINYLETHER (UG/L)	34576 0	<0.5
CHLOROFORM (UG/L)	32106 0	<0.40
CHLOROMETHANE (UG/L)	34418 0	<1
DIBROMOCHLOROMETHANE (UG/L)	34306 0	<0.70
DICHLORODIFLUOROMETHANE (UG/L)	34668 0	<0.5
1,1-DICHLOROETHANE (UG/L)	34496 0	<0.40
1,2-DICHLOROETHANE (UG/L)	34531 0	44
1,1-DICHLOROETHYLENE (UG/L)	34501 0	1.1
T-1,2-DICHLOROETHENE (UG/L)	34546 0	220
1,2-DICHLOROPROPANE (UG/L)	34541 0	<0.5
CIS-1,3-DICHLOROPROPENE (UG/L)	34704 0	<0.3

DOC No.: CLEJ-00150-3.01-01/10/85

ENVIRONMENTAL SCIENCE AND ENGINEERING 84222400 DATE : 01/09/85

PROJECT: CAMP LEJEUNE FIELD LEADER: GEISZLER/BERGDOLL

FIELD GROUP: WL602 PARAMETERS: ALL SAMPLES: ALL STATUS: PRELIMINARY

SAMPLE NUMBERS

PARAMETERS	STORET # METHOD #	WEL602 461400
DATE		12/20/84
TIME		1
T-1,3-DICHL*PROPENE (UG/L)	34699 0	<0.9
ETHYLBENZENE (UG/L)	34371 0	7
METHYLENE CHLORIDE (UG/L)	34423 0	4
1,1,2,2-TE*CH*ETHANE (UG/L)	34516 0	<0.5
TETRACHLOROETHENE (UG/L)	34475 0	6.5
1,1,1-TRICHL*ETHANE (UG/L)	34506 0	3.8
1,1,2-TRICHL*ETHANE (UG/L)	34511 0	<0.70
TRICHLOROETHENE (UG/L)	39180 0	470
TRICHL*FLUOROMETHANE (UG/L)	34488 0	<0.8
TOLUENE (UG/L)	34010 0	18
VINYL CHLORIDE(UG/L)	39175 0	6

Doc. No.: CLEV-00333-3.01-Ca/03/90
CL-HP- 3.01

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

FEB 3 1986

REF: 4WD-ER

Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511- 6287

Attention: J. R. Bailey, P.E.
Environmental Quality Branch

Dear Sir:

On November 1, 1985, Messrs. Mathis and Holdaway of this Agency met with Facilities Engineering Staff at MCB Camp Le Jeune to review activities and progress in assessment of past waste disposal practices through the NACIP program. During the course of discussion, the subject of ground water quality, and particularly the quality of the water obtained from wells in the Hadnot Point Area of Camp Le Jeune, was reviewed at some length.

Both Messrs. Holdaway and Mathis became aware that there was evidence, from sampling as early as 1983 or 1984, of diffuse contamination of the ground water with unspecified organic substances, and that as a result of detection of unspecified volatile organic compounds in raw potable water samples certain potable wells at Hadnot Point were taken out of service. In consideration of the fact that the major portion of the resident population of Camp Le Jeune, is dependent on the Hadnot Point well field as its potable water supply, the parties in the meeting agreed that any potential contamination of this resource should be investigated as expeditiously as practical. It was also established that there was no contamination detected in treated potable water distributed at Camp Le Jeune, however the extent and sensitivity of analytic procedures for specific organic substances was not fully discussed.

Mr. Mathis suggested it would be desirable to analyze ground water samples from the monitoring wells involved in the NACIP confirmation studies for the 129 priority pollutants (CFR261 Appendix 8), and that the same analysis should be performed on raw water from all potable wells to insure that there was no contamination of the Camp Le Jeune water supply. When EPA informally requested a copy of the analytical results from monitoring wells and potable wells, we were advised that these data were still in raw form and under review.

If these data are now available, please furnish us a copy. If these data have not been published yet, we would appreciate a brief description of what substances were analyzed, what substances were detected, and when the data will be available.

This Agency is concerned that a potential for human exposure to hazardous substances and hazardous wastes via the Camp Le Jeune water supply may exist due to the presence of such materials in ground water in the general vicinity of the potable well field. The existance of such a potential exposure would warrent consideration of this area for inclusion on the National Priority List, with an attendant increase in the expediency of investigation and remediation.

We appreciate your assistance in obtaining these data in order that this potentially significant problem may be addressed.

If you have any questions, please do not hesitate to contact me at (404) 347-3776 or FTS 257-3776.

Sincerely,

Arthur G. Linton, P.E.
Regional Federal Facilities Coordinator
Environmental Assessment Branch
Office of Policy and Management

cc: Commander, MCS Camp Le Jeune
Lee Herwig
Paul Hubbell, Navy Department, Washington, DC

Doc. No.: CLEJ - 00594 - 0.301 - 02/06/86

(804) 444-1179

6280
1143CFB

6 FEB 1986

U.S. Environmental Protection Agency
Attn: Arthur C. Linton, P.E.
Regional Federal Facilities Coordinator
Region IV
345 Courtland Street
Atlanta, GA 30365

Re: EPA's ltr 4 FFEA/TB of November 18, 1985

Gentlemen:

We requested comments on the Navy Assessment and Control of Installation Pollutants (NACIP) Phase I reports for the Marine Corps Air Station (MCAS), Cherry Point and the Marine Corps Base (MARCORB), Camp Lejeune in a letter dated October 31, 1985. We appreciate your timely response and would like to respond to the specific issues you raised.

1. General Comments

a. Concur. Although Phase I reports propose indicator parameters to confirm the presence of contaminants, we have expanded the parameter list in the Phase II studies to test for a variety of contaminants that could be present. For example, at sites such as landfills where a variety of wastes may have been disposed, we generally analyze samples for the 123 priority pollutants or combinations of priority pollutant classes such as volatile organics and pesticides. On the other hand, at former electrical transformer storage yards, we may test for only PCBs, and oil and grease, since these are the contaminants that would logically be present. Current sampling plans for both MCAS Cherry Point and MARCORB Camp Lejeune are enclosed for your review.

b. Concur. Again, at sites where a wide variety of materials have been disposed, background samples are tested for the priority pollutants or pollutant classes. At other sites such as fuel farms, background samples are only tested for specific contaminants. At least one upgradient well is installed at sites where groundwater is tested; upstream surface water and sediment samples are taken where possible; and background soil samples will be taken where needed to establish background levels.

c. Concur. The second step of the Phase II effort, Characterization, is designed to determine the levels and the vertical and horizontal distribution of contamination as well as site hydrogeology and specifics of site groundwater movement.

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d. Concur. The objective of the Phase II effort is to quantitatively determine whether contamination has the potential to or is presently affecting human health or the environment.

2. Comments Which Pertain Specifically to MCAS Cherry Point

a & b. Concur. Under the NACIP program, the landfill and the sludge pits are being studied as one site to confirm the presence of contaminants and determine the potential for migration from the site. The data being generated concurrently by the sludge pits post closure monitoring requirements will also be evaluated prior to any recommendations for remedial action. You will be given the opportunity to review our confirmation study efforts as each step is completed and to comment on the results and recommendations for remedial action.

3. Comments Which Pertain Specifically to MARCORB Camp Lejeune

a. This comment has been previously addressed.

b. Do not concur. We do not have any problem obtaining funding for NACIP efforts; therefore, inclusion of Camp Lejeune on the NPL will not enhance the funding priority. Instead, it will probably slow the progress toward cleanup, because of the additional time-consuming steps required for NPL sites. The public and the state are being kept informed; the state through meetings with Camp Lejeune personnel, and the public through articles in the local papers. We are proceeding as expeditiously as possible with the confirmation study and will forward you copies of the reports on the verification and characterization efforts as they become available.

4. If you have any additional questions or concerns, our point of contact for the NACIP Program is Ms. Cherryl Barnett.

Sincerely,

J. R. BAILEY, P.E.
Head, Environmental Quality Branch
Utilities, Energy and Environmental
Division
By direction of the Commander

Encl:
(1) Sampling Plans
for MCAS Cherry Point
& MARCORB Camp Lejeune

Doc No: CCEJ-0054-03.01-02/06/86

6280
1143CFP

Copy to:
COMNAVFACENGCOM
CMC (CP-45)
NEESA (w/copy of ref. ltr)
CMC (LFF-2) (w/copy of ref. ltr)
MCAS Cherry Point
MARCORB Camp Lejeune

Environmental Protection Agency
Attn: LTC Warren Hall
Office of Federal Activities
401 M. Street, S.W.
Washington, DC 20460

Blind Copy to: 11S, 114, 1143, 114S, 09BS (w/o encl), Doc #0129y/drd

ATTACHMENT D

CONFIRMATION STUDY VERIFICATION STEP (ROUND 2) SAMPLING AND ANALYSIS PROGRAM - MCB CAMP LEJEUNE

Site No.	Wells to be Installed	Total Wells to be Sampled	Surface Water	Sediments	Soil	Frequency	Analytical Parameters
1	-	6	2	2	-	1	* Cd;Cr;Cr^{+6};Pb;Sb;O&G;VOA; T.Phenols;o,m,p-xylene; MEK;MIBK;EDB
2	-	1	2	2	4	1	OCP,OCH,dioxin,VOA
	4	4	-	-	-	2	OCP,OCH,dioxin,VOA
6	8	8	-	-	-	2	DDT-R,VOA
	-	-	4	4	-	1	DDT-R,VOA
9	-	2	-	-	-	1	Cd;Cr,Cr^{+6};Pb;O&G;VOA; T.Phenols;o,m,p-xylene; MEK;MIBK;EDB
	1	1	-	-	-	2	Same as above
21	-	1	-	-	-	1	VOA,OCP,OCH,PCB,dioxin, xylene,MEK,MIBK,EDB,O&G
	-	-	-	-	32	1	OCP,OCH,PCB,dioxin
24	-	5	4	4	-	1	Metals A,Cr^{+6},VOA
	2	2	-	-	-	2	Metals A,Cr^{+6},VOA
28	-	3	7	7	-	1	Metals B;Cr^{+6};OCP;PCB; O&G;VOA;dioxin;o,m,p-xylene;MEK;MIBK

*See Key to Constituent Abbreviations.

Encl (1)

Site No.	Wells to be Installed	Total Wells to be Sampled	Surface Water	Sediments	Soil	Frequency	Analytical Parameters
	1	1	–	–	–	2	Same as above
30	–	1	1	1	–	1	Pb,O&G,VOA,xylene,MEK, MIBK,EDB
	1	1	–	–	–	2	Same as above
35	3	3	–	–	–	2	Pb,VOA,EDB,xylene,O&G
	–	–	2	2	–	1	Pb,VOA,EDB,xylene,O&G
36	–	4	4	4	–	1	Cd;Cr;Cr^{+6};Pb;O&G;VOA; T.Phenols;o,m,p-xylene; MEK;MIBK;EDB
	1	1	–	–	–	2	Same as above
41	–	4	4	4	–	1	Cd;Cr;Cr^{+6};Pb;VOA;O&G; T.Phenols; Ordnance Compounds;dioxin;o,m,p-xylene;MEK;MIBK;OCP; Mirex
	1	1	–	–	–	2	Same as above
#45	–	3	2	2	–	1	Pb,O&G,VOA,EDB,xylene
	1	1	–	–	–	2	Pb,O&G,VOA,EDB,xylene
	–	–	–	–	18	1	Pb,O&G
54	–	1	3	3	–	1	Cd;Cr;Cr^{+6};Pb;O&G;VOA; T.Phenols;o,m,p-xylene; MEK;MIBK;EDB
	2	2	–	–	–	2	Same as above
68	–	3	–	–	–	1	VOA;o,m,p-xylene;MEK; MIBK;EDB
69	–	8	5	2	–	1	OCP;PCB;VOA;Hg;Residual Chlorine;dioxin;o,m,p-xylene;MEK;MIBK;EDB;PCP
73	1	4	3	3	–	1	Cd;Cr;Cr^{+6};Pb;Sb;O&G;VOA; T.Phenols;o,m,p-xylene; MEK,MIBK;EDB
	1	1	–	–	–	2	Same as above

Site No.	Wells to be Installed	Total Wells to be Sampled	Surface Water	Sediments	Soil	Frequency	Analytical Parameters
74	-	2	-	-	-	1	OCP,OCH,PCB,dioxin,VOA
	1	1	-	-	-	2	Same as above
75	-	3	-	-	-	1	VOA,dioxin,chloropicrin
76	-	2	-	-	-	1	VOA,dioxin,chloropicrin
A	3	3	-	-	-	2	VOA,O&G,free chlorine
	-	-	1	-	-	1	Same as above
	-	-	-	1	-	1	O&G,VOA
Potable Wells	-	110	-	-	-	1	Priority pollutants, SDWA parameters,xylene, MEK,MIBK,EDB
	-	20	-	-	-	1	VOA
Soil Gas Wells	30	35	-	-	-	2	VOA,xylene,MEK,MIBK

CONFIRMATION STEP CHARACTERIZATION STEP AT HADNOT POINT INDUSTRIAL AREA

SAMPLING AND ANALYSIS PROGRAM

Site No.	Wells to be Installed	Total Wells to be Sampled	Surface Water	Sediments	Soil	Frequency	Analytical Parameters
22	14	17	-	-	-	3	Pb, O&G, VOA, xylene, MEK, MIBK, EDB

Key to Constituent Abbreviations:

Cd = Cadmium.
Cr = Chromium.
Cr^{+6} = Hexavalent chromium.
Pb = Lead.
Sb = Antimony.
O&G = Oil and grease.
VOA = Volatile organic analysis.
T. Phenols = Total phenols.
OCP = Organochlorine pesticides.
OCH = Organochlorine herbicides.
DDT-R = o,p- and p,p´-isomers of DDD, DDE, and DDT.
PCB = Polychlorinated biphenyls.
Metals A = Arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc.
Metals B = Arsenic, cadmium, chromium, lead, mercury, nickel, and zinc.
Ordnance Compounds = TNT, DNT, RDX, and white phosphorus (WP)
PCP = Pentachlorophenol.
Hg = Mercury.
MEK = Methyl ethyl ketone.
MIBK = Methyl isobutyl ketone.
EDB = Ethylene dibromide.
SDWA = Safe Drinking Water Act.

Organochlorine Pesticides (OCP)

Aldrin
a-BHC
b-BHC
d-BHC
g-BHC
Chlordane
4,4´-DDD
4,4´-DDE
4,4´-DDT
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan Sulfate
Endrin
Endrin Aldehyde
Heptachlor
Heptachlor Epoxide
Toxaphene

Organochlorine Herbicides (OCH)

2,4-D
2,4,5-T
Silvex

DDT-R

o,p-DDD
o,p-DDE
o,p-DDT
p,p´-DDD
p,p´-DDE
p,p´-DDT

Volatile Organic Analysis
VOA

Acrolein
Acrylonitrile
Benzene
Bromomethane
Bromodichloramethane
Bromoform
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
T-1,2-Dichloroethene
1,2-Dichloropropane
Cis-1,3-dichloropropene
T-1,3-dichloropropene
Ethylbenzene
Methylene Chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
Toluene
Vinyl Chloride
2-Chloroethylvinylether

Safe Drinking Water Act Analyses

Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver
Nitrate
Flouride
Turbidity
Endrin
Lindane
Methoxychlor
Toxaphene
2,4-D
2,4,5-TP Silvex
Radium 226 and 228
Gross Alpha

TABLE 1-9

CONFIRMATION STUDY
SUMMARY OF 1A STEP VERIFICATION STUDY SAMPLING RECOMMENDATIONS
ROUND 2 SAMPLING
MARINE CORPS AIR STATION, CHERRY POINT, NORTH CAROLINA

	Wells		Total Number of Samples				CONSTITUENTS															
							HSL(b)															
Site No.	New(a)	Exist.	Well Water	Surface Water	Sed.	Soil	Full	Org.	VOA	pH	Cr(6+)	CN	EDB	Asbestos	PCB	O&G(c)	Phenolics	EP(d) TOX	TCDD	GWCI(e)	Metals(f)	GC(g) Fuel
1 & 2	2	5	7				X			X	X	X	X									
4		5	5	1		5	X			X	X	X	X	X								
5	1	6	7	1	1			X X		X			X		X X	X			X		Pb Pb	X
6		4	4						X	X							X				X, AS	
7	1	2	3	3	3		X			X	X		X									
10		23(h)	23	5	5		X X				X X		X							X		
13		8 4	8 4						X				X			X					Pb	X
15		6	6	3	8				X	X		X					X	X			X	
16	2	4	6				X			X	X	X	X									
17						3									X				X			
19&21	1	7	8				X			X	X		X									
21						5								X								

(a) New Well recommended for Round 2 sampling.
(b) Hazardous Substances List.
(c) Oil and Grease concentration levels and measurement of petroleum, oil, and lubricant layer.
(d) Cd, Cr, Pb
(e) Groundwater Contaminant Indicators: specific conductance, pH, total organic halogens, total organic carbon.
(f) Metals: (Cu, Cr, Pb, Zn, Cd, Ni, Ag), unless otherwise noted.
(g) Fuel characterization by gas chromatograph. Standards to include heating oil.
(h) Includes 13 existing monitoring wells and 10 potable wells.