03.01-11/16/93-00558

INSTALLATION RESTORATION

UNITED STATES MARINE CORPS

ENVIRONMENTAL MANAGEMENT DEPARTMENT

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

ATTN: KATE LANDMAN

FAX#: (45) 262-4805 // (804) 322-4805

FROM: WALTER T. HAVEN (GEOLOGIST)

COMMENTS: ENCLOSED ARE COMMENTS FROM THE [redacted] RI/FS HASP, SAP, AND WORK PLAN. IN ADDITION, COMMENTS FROM THE OU #7 RI/FS SAP ARE ENCLOSED AS WELL. WE HAVE REVIEWED THE OU #7 RI/FS HASP AND WORK PLAN AND HAVE NO COMMENTS. - THANKS - WALT.

IF THERE IS A PROBLEM WITH THIS TRANSMISSION, PLEASE CALL (919) 451-5063/5068, EXT 404 (DSN 484-5063). OUR FAX NUMBER IS (919) 451-1164 (DSN 484-1164).

PAGE 1 OF 14 PAGES

DRAFT FINAL

HEALTH AND SAFETY PLAN
OPERABLE UNIT NO. 10 (SITE 35)

MARINE CORPS BASE, CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

CONTRACT TASK ORDER 0160

Prepared For:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
Norfolk, Virginia

Under the:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared By:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

OCTOBER 28, 1993

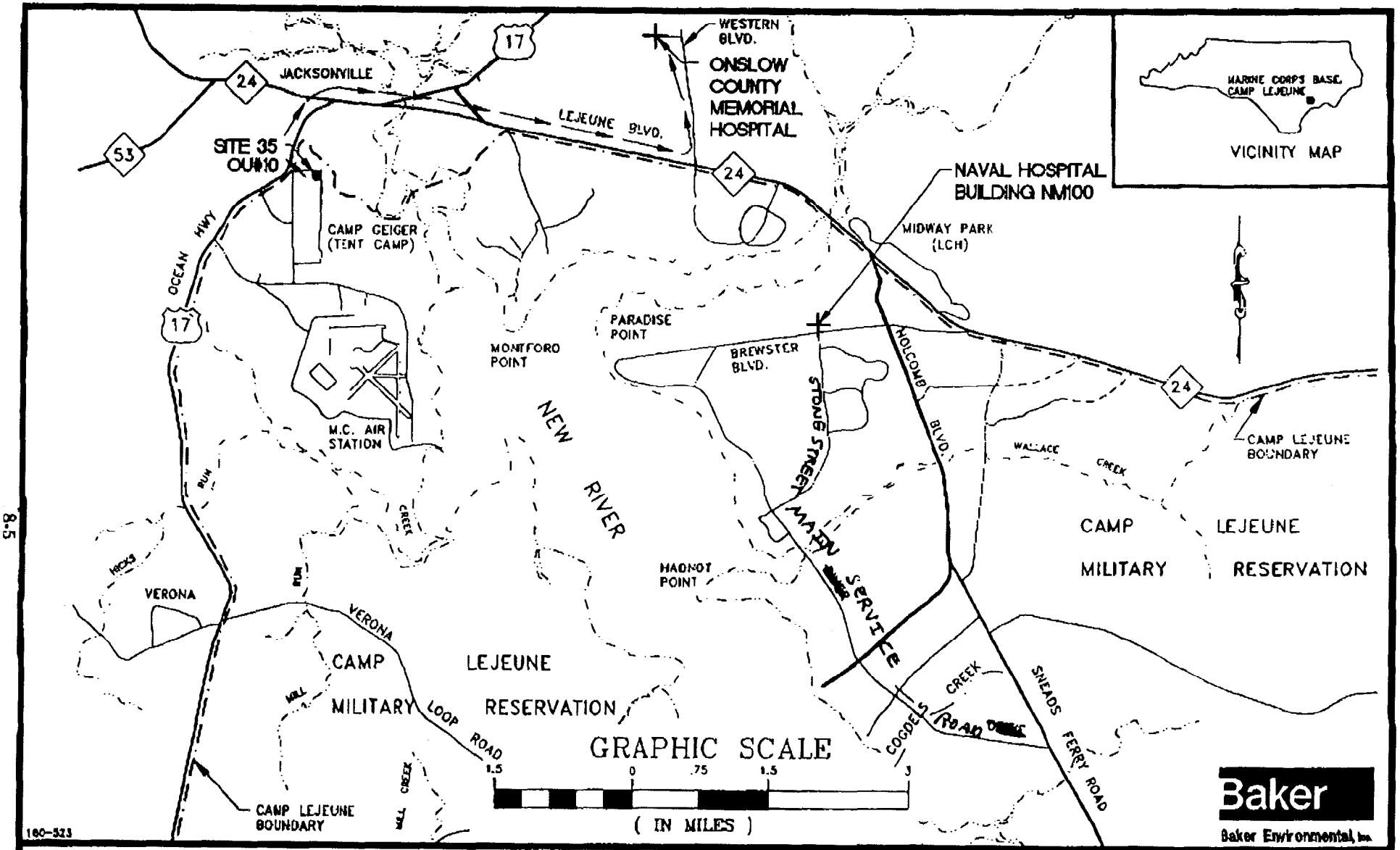

FIGURE 8-1
EMERGENCY HOSPITAL ROUTE
SITE 35

MARINE CORPS BASE, CAMP LEJEUNE

Draft Final

Remedial Investigation/Feasibility Study Work Plan

for Operable Unit No. 10 (Site 35 - Camp Geiger Area Fuel Farm)

Marine Corps Base Camp Lejeune, North Carolina

Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Comprehensive Long-Term Environmental Action Navy

The construction of nested wells is deemed appropriate at this site because the majority of the existing shallow wells (i.e., those installed by Law in 1991 and 1992) are similarly constructed. The results of groundwater sampling and analysis from several of the existing double-nested wells performed under previous investigations has indicated that contamination is present at higher levels in the deeper of the two screened intervals. It is assumed that all of the shallow wells will be constructed with flush-mounted casings and locking caps. Detailed well construction information and well installation procedures are provided in the FSAP and QAPP.

Additional wells may be required based on the results of the soil gas and groundwater field screening.

5.3.4.2 Deep Groundwater Wells

Five deep groundwater wells (GWD-1 through GWD-5) are to be installed under the RI/FS below the clay layer identified in borings SB-1, SB-2, and SB-3 (Law, 1992) at depths ranging from 35 to 43 feet bgs. This clay layer may represent the confining aquitard that separates the shallow water table aquifer from the regionally significant Castle Hayne formation. The proposed locations are shown on Figure 5-2. In effect, the screens for these deep wells would be set only a few feet deeper than the deeper of the two screens in the double-nested shallow groundwater monitoring wells and would be separated only by the assumed confining layer.

The purpose of the deep wells is to provide data to define the vertical extent of contamination in areas where analytical results of shallow groundwater samples obtained under previous investigations have identified elevated levels of organic contaminants. One of the five deep wells (GWD-1) will be installed in an area suspected to not have been impacted (i.e., at the northwest corner of the intersection of Third and "D" Streets) to provide background data. Two of the remaining four deep wells (GWD-3 and GWD-5) are located adjacent to wells MW-10 and MW-19 where elevated levels of halogenated organics were detected in the lower portions of these double-nested wells screened from 25.5 feet to 29.5 feet and from 22.5 feet to 24.5 feet, respectively. The other two deep wells (GWD-2 and GWD-4) are located near wells MW-2 at the former Mess Hall Heating Plant and MW-25 located north of the Fuel Farm (buildings TC362 and STC369). Both of these wells are located in areas where elevated levels of petroleum hydrocarbons were identified in previous studies (ATEC, 1993 and Law, 1992).

BASED ON EPA GUIDANCE AND CAMP LEJEUNE'S RECOMMENDATIONS, EACH WELL SHOULD HAVE ITS OWN BORE HOLE.

The deep wells will be constructed of 2-inch diameter, schedule 40, PVC casings. Well screens will be 5 feet in length and will be constructed of No. 10 slotted PVC. It is assumed that all of the deep wells will be constructed with stick-up (2 to 3 feet) steel casings, locking caps, and protective bollards. Detailed well construction information and well installation procedures are provided in the FSAP and QAPP.

5.3.4.3 Groundwater Sampling and Analysis

One round of groundwater samples will be collected from each well installed under this RI/FS. This will result in two samples (i.e., upper and lower zone) from each shallow double-nested well location for a total of 10 samples from newly installed shallow monitoring wells. In addition, deep groundwater samples will be obtained including one from each of the five deep wells.

→ REFER TO COMMENT ON PAGE #5-11.

Samples from four of the five newly-installed double-nested shallow groundwater wells (MW-29 through MW-32) will be analyzed for VOAs via EPA Method 601/602 including MTBE (methyl tertiary butyl ether)as these wells will be installed to provide data regarding the source and extent of the previously identified halogenated organic shallow groundwater contamination. In addition , a sample from well MW-33 will be analyzed for full-scan TCL organics and TAL inorganics.

Samples from four of the five newly-installed deep groundwater monitoring wells (GWD-1 through GWD-4) will be analyzed for VOAs via EPA Method 601/602 including MTBE, TCL SVOAs, and TAL Metals. A sample from well GWD-5 will be analyzed for full-scan TCL organics and TAL inorganics. This data will be used to support the baseline risk assessment and to provide information regarding the vertical extent of groundwater contamination.

In addition to the groundwater samples obtained from the newly installed shallow and deep monitoring wells, a single round of groundwater samples will be obtained from a selected number (12) of existing shallow groundwater monitoring wells to provide comparative data and for use in the baseline risk assessment. The existing wells to be sampled include shallow double-nested wells MW-2, 9, -10, -14, -16, -19, -21, -22, and -25, and single shallow wells EMW-3, -5, and -7. The selection of these 12 wells was based on the results of previous investigations (Law, 1992 and ATEC, 1993). Six of the wells (MW-10, -14, and -19, and EMW-3, -5, and 7) were identified as the only wells exhibiting elevated levels of the halogenated organic compound TCE (trichloroethylene). The remaining six wells (MW-2, -9, -

Draft Final
Remedial Investigation /Feasibility Study for Operable Unit No. 10 (Site 35) Marine Corps Base, Camp Lejeune, North Carolina

SAMPLING AND ANALYSIS PLAN

Baker Environmental

FOSTER WHEELER

WESTON

1. After sample collection, remove the soil from the split-spoon sampler. Prior to filling laboratory containers, the soil sample should be mixed thoroughly as possible to ensure that the sample is as representative as possible of the sample interval. Soil samples for volatile organic compounds should not be mixed. Further, sample containers for volatile organic compounds analyses should be filled completely without head space remaining in the container to minimize volatilization.

2. Record all pertinent sampling information such as soil description, sample depth, PID or OVA reading, sample number, sample location, and time of sample collection in the field logbook. In addition, label, tag, and number the sample bottle(s) as outlined in Section 6.0.

3. Pack the samples for shipping. Attach seal to the shipping package. Chain-of-Custody Forms and Sample Request Forms will be properly filled out and enclosed or attached (Section 6.0).

4. Decontaminate the split-spoon sample as described in Section 5.6. Replace disposable latex gloves between sample stations to prevent cross-contamination of samples.

5.2 Monitoring Well Installation and Well Development

5.2.1 Well Installation

THIS IS CONTARY TO EPA GUIDANCE AND CAMP LEJEUNE'S RECOMMENDATION EACH WELL NEEDS TO HAVE ITS OWN BORE HOL

Shallow, double-nested wells and deep monitoring wells (Type II and possible Type III deep wells) will be installed on site to monitor the shallow and deeper water-bearing zones. It is estimated that shallow, double-nested wells will be installed to depths of 20 to 35 feet bgs. As described in Section 3.0, the upper-screened interval of the shallow wells will be installed 12 to 15 feet below the water table. The upper screened interval will be 15 feet long, the lower screened interval will be based on the depth of the underlying clay layer identified previously by Law as a possible confining aquitard. The lower screened interval will be 5 feet long with its lower end set one to two feet above the underlying clay layer (estimated at 35 to 43 feet bgs).

Procedures for the installation and construction of shallow, double-nested monitoring wells are presented below:

MODIFY PROCEDURE BASED ON COMMENT ON PAGE #5-4.

- Fifteen feet of 2-inch I.D., Schedule 40, #10 slot (0.010-inch) screen with a bottom cap will be installed for the upper screened interval. The screen will be connected to a threaded, flush-joint, PVC riser. The screen will extend two to three above the seasonal high static groundwater table surface. The riser will extend to approximately six inches below the ground surface.

- The annular space above the bentonite seal will be backfilled with a cement-bentonite grout consisting of either two parts sand per one part of cement and water, or three to four percent bentonite powder (by dry weight) and seven gallons of potable water per 94 pound bag of portland cement. The cement-bentonite grout will be installed via tremie method in wells constructed with cement-bentonite grout seal layers longer than 25 feet.

- A sodium bentonite seal at least 24-inch thick, unless shallow groundwater conditions are encountered, will be placed above the sand pack. The bentonite shall be allowed to hydrate for at least 2 hours before further completion of the well.

- The depth intervals of all backfill materials shall be measured with a weighted measuring tape to the nearest 0.1 foot and recorded in the field logbook.

- The monitoring wells will be completed at the surface. The aboveground section of the PVC riser pipe will be protected by installation of a 4-inch diameter, 5-foot long steel casing (with locking cap and lock) into the cement grout. The bottom of the surface casing will be placed at a minimum of 2-1/2, but not more than 3-1/2 feet below the ground surface, as space permits. For very shallow wells, a steel casing of less than 5 feet in length may be used, as space permits. The protective steel casing shall not fully penetrate the bentonite seal.

- The top of each well will be protected with the installation of four, 3-inch diameter, 5-foot long steel pipes which will be installed around the outside of the concrete apron. The steel pipes shall be embedded to a minimum depth of 2.5 feet in 3,000 psi concrete. Each pipe shall also be filled with concrete. A concrete pad shall be placed at the same time the pipes are installed. The pad will be a minimum of 4-feet by 4-feet by 6-inches, extending two feet below the ground surface in the annular space and set two inches

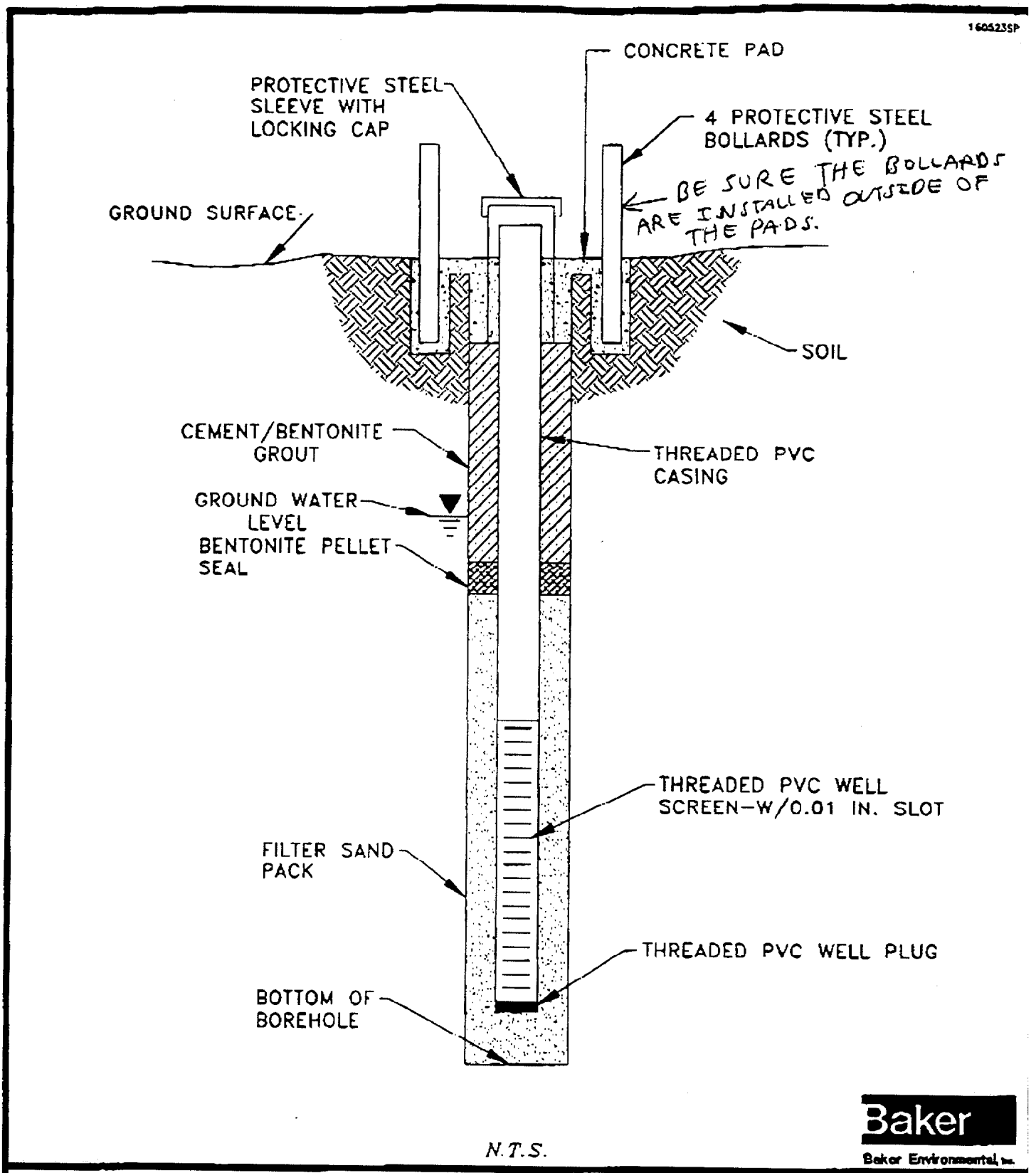

FIGURE 5-1
TYPICAL DEEP ABOVE GRADE TYPE II GROUNDWATER MONITORING WELL CONSTRUCTION DIAGRAM
SITE 35

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

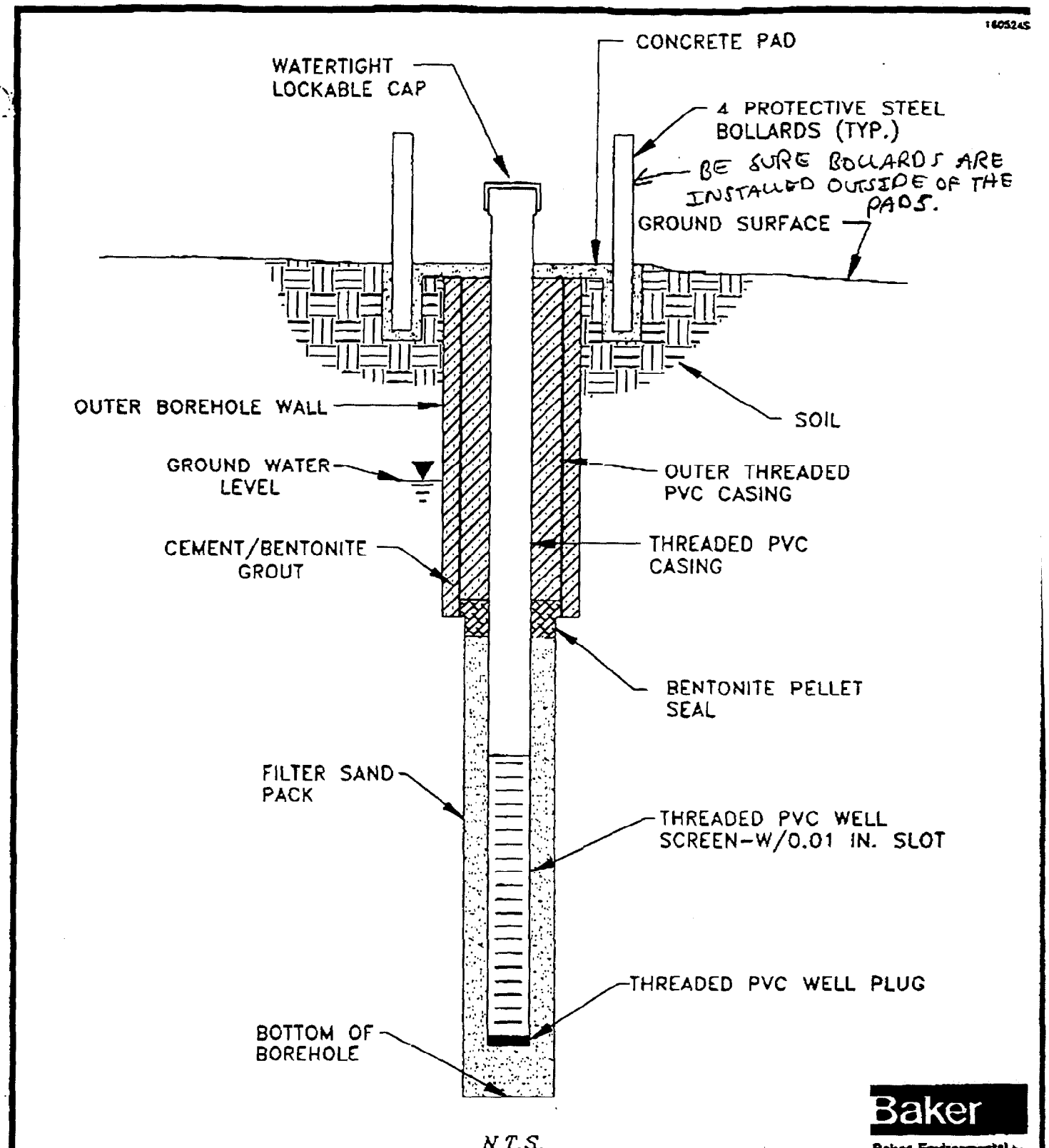

FIGURE 5-2
TYPICAL DEEP ABOVE GRADE TYPE III GROUNDWATER MONITORING WELL CONSTRUCTION DIAGRAM
SITE 35

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA