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June 8, 1993

Commander
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Attn: Ms. Linda Berry, P.E.
Code 1823

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0160
Removal Action Scenarios
Site 35 - Camp Geiger Fuel Farm
Marine Corps Base, Camp Lejeune, North Carolina

Dear Ms. Berry:

This correspondence has been prepared to present a discussion of potential removal action scenarios involving soil and sediment impacted with petroleum hydrocarbons at Site 35 - Camp Geiger Fuel Farm (CTO-0160), Marine Corps Base (MCB), Camp Lejeune, North Carolina.

BACKGROUND

The Camp Geiger Fuel Farm (Site 35) refers primarily to five, 15,000-gallon aboveground storage tanks (ASTs), a pump house, and a fuel unloading pad situated within Camp Geiger which is located in the extreme northeast corner of Camp Lejeune. The ASTs have been in place since the 1940's and are presently used to dispense gasoline, diesel, and kerosene. In past years the ASTs were also used to store No. 6 fuel oil.

Previous environmental investigations identified areas of petroleum hydrocarbon impacted soil and groundwater beneath and adjacent to the ASTs. The petroleum hydrocarbon contamination has been reasoned to be the result of various spills/leaks associated with operations at Site 35. It was reported that during one past incident that the level of fuel contamination was sufficient to allow for product collection in excavated ditches whereby the product was ignited and consumed. It has been reported that as much as five feet of product has been observed within the last several years on top of a small pond located between the drainage channels that lead to Brinson Creek.

In addition to the media impacted with petroleum hydrocarbons, previous investigations have identified areas of shallow groundwater impacted with volatile organic compounds (VOCs) including primarily trichloroethylene (TCE). TCE is a solvent component that, to date, has not been directly attributed to past operations at Site 35. An approximation of

the extent of impacted soil and shallow groundwater is depicted in the attached two figures by Law Engineering (dated November 1991) and Baker Environmental, Inc. (dated May 1993), respectively.

RESULTS OF RECENT BAKER SITE RECONNAISSANCE

Baker staff, during a recent site reconnaissance, observed areas of heavy contamination along and between the drainage channels that form the boundaries of the contaminated soil zone depicted in the Law figure. The most significantly contaminated zones were described as generally saturated, noticeably odiferous with fuel, and visibly contributing to contamination along Brinson Creek, the principal point of discharge for the site.

FUTURE SITE CONSIDERATIONS

Site 35 has been identified as intersecting a right-of-way for a planned limited access highway currently under consideration of the North Carolina Department of Transportation. Such a project, when implemented, would require that the environmental concerns at Site 35 be remediated. Geotechnical considerations will also likely require evaluation. Based on previous discussions with MCB, Camp Lejeune personnel, the construction of the proposed highway will likely commence as soon as the environmental concerns are addressed (and appropriately remediated) by the Base.

POTENTIAL REMOVAL ACTION SCENARIOS

Possible removal action scenarios were initially discussed at a recent meeting conducted on June 1, 1993 at LANTDIV offices in Norfolk, Virginia. The purpose of this meeting was to discuss the general sampling strategies for all of the sites under CTO-0160 and was attended by: Ms. Linda Berry - LANTDIV; Ms. Michelle Glenn - USEPA, Region V; Mr. Neal Paul - MCB, Camp Lejeune; Mr. Ray Wattras - Baker; and Mr. Dan Bonk - Baker.

The need for a removal action focused on petroleum impacted soil. The degree to which soil is impacted varies with the most significant contamination being located in the topographically lower reaches of Site 35 and along Brinson Creek.

Basis in Navy/Marine Corps IR Manual

In Chapter Three of the Navy/Marine Corps Installation Restoration Manual eight factors are presented for consideration in determining the appropriateness of a removal action. Three of these potential factors would appear to apply to conditions at Site 35. These factors are as follows:

- Actual or potential exposure of nearby human populations, animals, or food chains from hazardous substances or pollutants or contaminants;

- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

- Threat of fire or explosion.

Also in Chapter Three of the IR Manual two different procedures are identified for removal actions as per the National Contingency Plan (NCP). These procedures depend upon whether:

a. There exists at least a six month planning period prior to initiating the removal, or

b. The removal is an emergency.

Superfund Removal Manual Procedures

The Superfund Removal Procedures Manual (OSWER Directive 9360.003B, February 1988) refers to the procedure depending on (a) above as a Non-Time-Critical Removal Action. Procedures dependent on (b) above are identified in the same reference as either Classic Emergencies or Time-Critical Removal Actions.

It would appear that conditions at Site 35 do not represent an imminent threat to public health or the environment by virtue of the fact that these conditions have existed for several years. Therefore, it would be inappropriate to categorized these conditions as a Classic Emergency.

Conditions at Site 35 could be Time-Critical dependent on the schedule of construction activities associated with the planned highway. The principal difference in the execution of removal activities under the Time-Critical versus Non-Time-Critical scenarios is primarily that the latter requires the preparation of an Engineering Evaluation/Cost Analysis (EE/CA) which is brief analysis of the removal alternatives for the site. Time-Critical Removal Actions have established procedures that are required to be followed; however, the essence of this scenario is to provide for a fast-tracked remedial action that can be initiated in less than six months.

Procedures for documenting and gaining approval for a Non-Time Critical Removal Action are similar to those associated with an Interim Remedial Measures (IRM) under Superfund. Both are designed for remedial actions where a period of at least six months is deemed to be available to allow for proper planning. Both actions are media or waste specific and are intended to be part of an overall remedial action to be completed as part of the RI/FS/RD/RA process. The EE/CA serves a similar function to that of a Focused Feasibility Study. That is, both provide a formal means of evaluating and comparing the effectiveness and costs of various alternatives. Provisions are provided under both methods for obtaining public comment. Final implementation of an IRM is subject to the preparation, review, and approval by the USEPA of an Interim Record of Decision (Interim ROD). Final implementation of a Non-Time-Critical Removal Action is subject to the preparation, review, and approval by the Navy/Marine Corps Engineering Field Division Commanding Officer and the respective Installation Commanding Officer/General of an Action Memorandum (AM). Based on a review of the Federal Facilities Agreement it is uncertain as to whether or not USEPA approval of the AM is also required.

Treatment/Removal Alternatives

Based strictly on the data presently available, it will likely not be possible to accurately identify the most cost-effective and technologically feasible removal alternative without taking some time to evaluate several alternatives. During the meeting at LANTDIV, various in-situ and ex-situ alternatives were discussed. In-situ alternatives such as bioremediation and vapor extraction were identified. Ex-situ alternatives discussed included disposal at hazardous and/or non-hazardous waste landfills, as appropriate, on-site or off-site thermal treatment (i.e., desorption and/or incineration) and on-site biological treatment with aeration (i.e., landfarming or biopiling/vapor extraction).

The in-situ alternatives are generally only appropriate and cost effective when excavation is impractical due to physical constraints such as the presence of an operational facility. Since the site facilities will likely be removed to accommodate the planned highway, no physical constraints will be present to hinder excavation and, thus, provide cause for in-situ treatment to be considered. Additionally, the effectiveness of all in-situ treatment options is generally time dependent with the required period of treatment being difficult, if not impossible, to predict without a protracted field pilot-scale demonstration. Since time is a major constraint for this project, in-situ treatment options are likely not worthy of additional consideration.

The biological ex-situ alternatives will likely be impractical due to a lack of available space at the site. Based strictly on the outline of the impacted areas depicted on the Figure prepared by Law, as much as 35,000 cubic yards of impacted soil may be present at the site (assuming contamination extends from the ground surface to roughly the top of shallow groundwater located approximately eight feet below the ground surface. Additionally, observations made in the field by Baker personnel concerning impacted soils located along the drainage channels and Brinson Creek would increase the estimate of the volume of impacted soil to as high as 60,000 cubic yards. Recently published North Carolina clean-up criteria which could require residual levels of TPH as low as 10 ppm will likely be difficult to achieve biologically in a cost effective and timely manner.

Other potential ex-situ options include excavation and off-site disposal or excavation and on-site thermal treatment. The final cost of these options will depend to a large degree on the volume of highly contaminated soil. That is, thermal desorption, a commercially available technologically that is significantly more cost effective than incineration, is generally limited in its application to soils containing less than five percent (50,000 ppm) fuel. At levels in excess of five percent, a typical thermal desorption unit can not meet the requirements of its air emissions permit unless the feed time is increased significantly which, in turn, raises the cost of this option into or in excess of the range of incineration. Equally, off-site disposal facilities can not accept highly contaminated soils containing free liquids and sometimes restrict themselves to lesser contaminated materials for use as daily cover. The constraints for both on-site thermal treatment and off-site disposal can be accommodated, subject to regulator approval, via the on-site blending of highly contaminated soils with soils containing low levels of contamination.

Additional Data Needs

The number of variables and unknowns associated with the various alternatives are such that additional data, likely obtained via field sampling and the performance of one or more laboratory-based treatability studies, is needed to properly evaluate their effectiveness. Additional field sampling would be focused on defining the extent and degree of impact along the drainage channels and Brinson Creek. Useful treatability studies could include bioslurry tests to provide a yes/no to biotreatment and identify whether the maximum achievable residual levels of petroleum hydrocarbons are sufficiently low to meet North Carolina Clean-up criteria. Another useful treatability study might be thermal tray tests on samples impacted to various degrees. These tests provide data regarding final achievable residual levels of TPH at different temperatures and over varying heating periods.

Several treatability studies are likely justifiable economically based on the volume of material likely involved in a removal action and the potential for significant cost savings if the most cost efficient alternative is identified.

Time Requirements

The need to obtain additional data a nd conduct various treatability studies will probably require six months or more to complete. The design and preparation of subcontract documents could be completed within a reasonable time period (one to two months after the completion of treatability studies) particularly if excavation and thermal treatment or off-site disposal are selected because these alternatives are reasonably straightforward technically. Additional time (two to four months more or four to six months total) would be required to complete the design including reviews, if on-site, ex-situ treatment were selected as the preferred alternative.

SUMMARY

In summary, this letter has identified three possible scenarios under which a remedial action to remove impacted soils at Site 35 could be implemented. These scenarios include:

- Time-Critical Removal Action
- Non-Time-Critical Removal Action
- Interim Remedial Measure

A fourth scenario that was identified was Classic Emergency which, by definition, does not appear to be applicable because conditions at Site 35 are stable and have been stable for several years.

A Time-Critical Removal Action is designed procedurally to be the easiest to implement of the three scenarios. It is intended for sites where the initiation of a remedial action is needed within six months of the initiation of the process. The major drawback to this

scenario is that a formalized comparison of alternatives is not performed which could result in higher costs to the project.

Non-Time-Critical Removal Actions and Interim Remedial Measures are designed for situations where at least six months is available prior to the need to initiate an on-site removal action. These two scenarios differ primarily in the responsibility for final approval. Final approval of a Non-Time-Critical Removal Action is the responsibility of the Navy/Marine Corps; whereas, final approval of an Interim Remedial Measure is the responsibility of the USEPA. Based on a review of the Federal Facilities Agreement it is uncertain as to whether or a Non-Time-Critical Removal Action is also subject to the approval of the USEPA.

The major advantage of both of the above scenarios over the Time Critical Removal Action is that a variety of alternatives can be evaluated and, the lowest cost alternative can be identified and selected, if appropriate. The acquisition of additional data which is provided for under both scenarios will, at a minimum, provide for a more accurate delineation of the impacted area which could result in significant cost savings. Additionally, under both scenarios, treatability studies can be performed to provide engineering data regarding the effectiveness and ultimately costs of different technologies. Formal exemptions are required for removal actions under the Interim Remedial Measure scenario when more than 12 months is required to complete the execution of the action or the cost exceeds $2 million. At Site 35, the $2 million dollar figure could be exceeded if 40,000 cubic yards of impacted soil were encountered and the cost of the removal action exceeds $50 per cubic yard which is believed to be a low end unit cost value. The EE/CA conducted under a Non-Time-Critical Removal Action or the Focused Feasibility Study performed as part of the Interim Remedial Measure process would provide a means for accurately estimating the schedule requirements and costs prior to initiating the removal action.

All of the identified removal scenarios are not considered final remedial actions. Sites where one of these removal scenarios is implemented remains subject to review and additional remedial measures resulting from the completed RI/FS process.

RECOMMENDATIONS

Based on our review of available information, Baker recommends that the impacted soil at Site 35 be removed as either a Time-Critical or Non-Time-Critical Removal Action. The Time-Critical Removal Action scenario would likely result in the area being available for the proposed highway in six to 18 months. The Non-Time-Critical Removal Action scenario would likely result in the area being available in nine to 24 months. A potential for significant cost savings is associated with the Non-Time-Critical Removal Action because additional data can be collected to better define the extent of the impacted area. Additionally, the Non-Time-Critical Removal Action provides for the performance of treatability studies, the data from which are used as part of a formal EE/CA to afford the evaluation of various alternatives.

The Non-Time-Critical Removal Action has the advantage over an Interim Remedial Measure of not having term of construction and cost ceilings. Interim Remedial

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Measures require that application for exemptions be made if the term of construction is to exceed 12 months or the cost of the project is to exceed $2 million.

If you have any questions or comments regarding this correspondence, please do not hesitate to contact me at (412) 2692063.

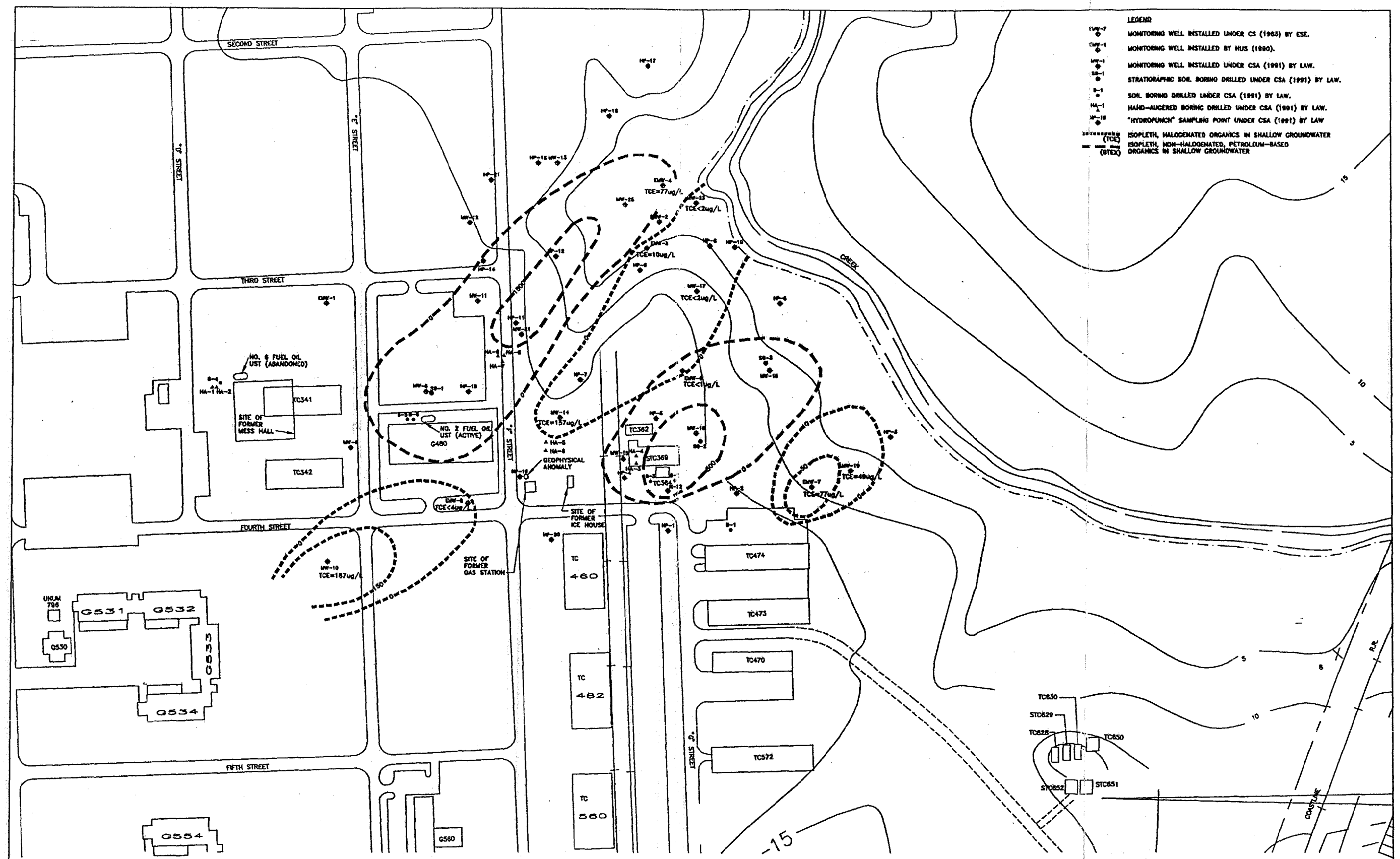
Sincerely,

BAKER ENVIRONMENTAL, INC.

Daniel L. Bonk, P.E.
Project Manager

DLB/nd
Attachment

cc: Mr. Keith Simmons, P.E., Code 0223 (without attachment)
Ms. Lee Anne Rapp, Code 183 (without attachment)
Mr. Neal Paul (with attachment)

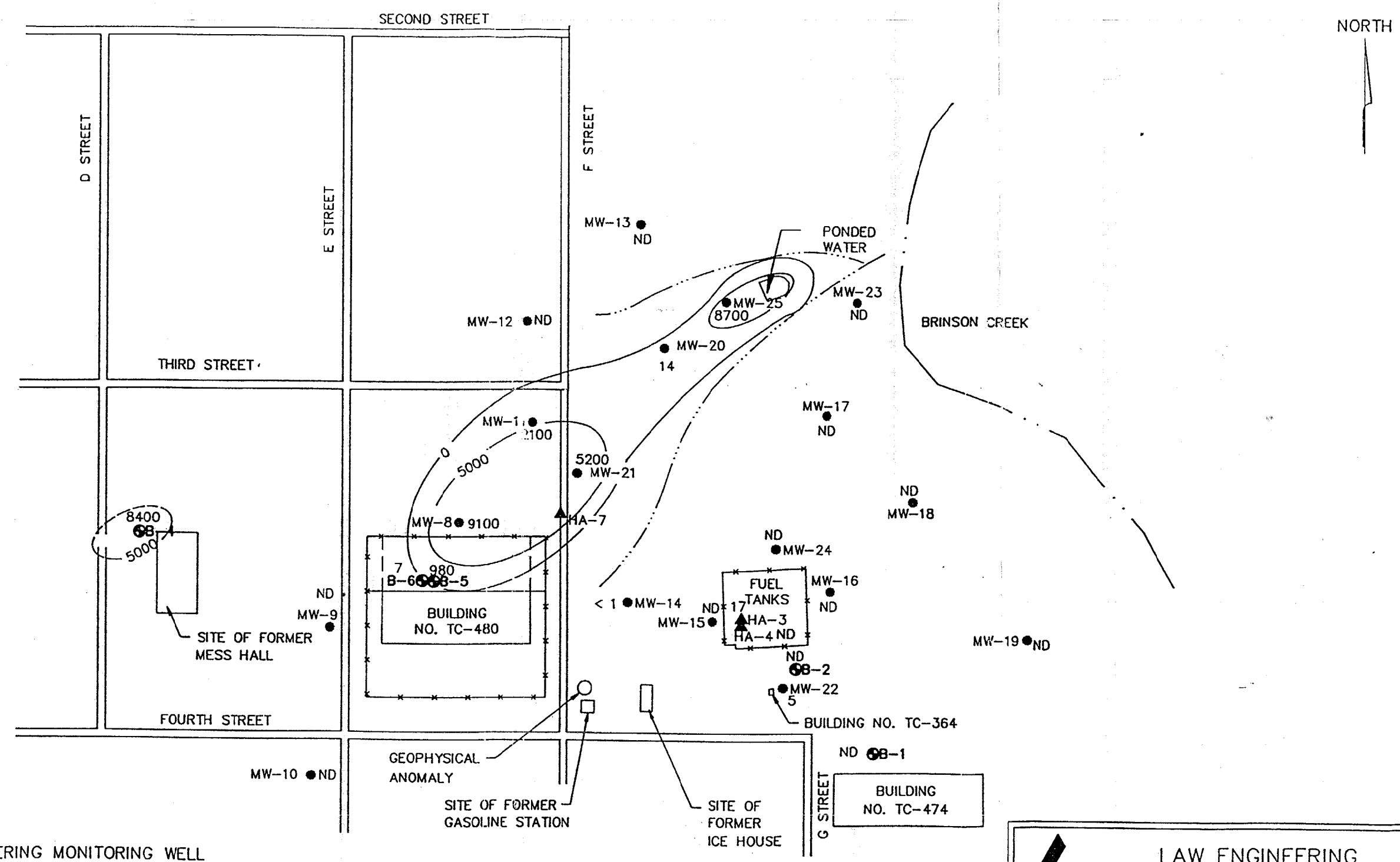


LEGEND				
SOURCE: LANTOW, FEBRUARY 1992	DATE MAY 1993 SCALE 1" = 80' DRAWN RCL REVIEWED B.O.# 10160-51-SRN CADD# SITE35A	NORTH	SITE 35 – CAMP GEIGER FUEL FARM MARINE CORPS BASE CAMP LEJEUNE NORTH CAROLINA BAKER ENVIRONMENTAL, Inc. Coraopolis, Pennsylvania	Baker Baker Environmental, Inc.

APPROXIMATE LIMITS OF SHALLOW OF GROUNDWATER CONTAMINATION
SITE 35 – CAMP GEIGER FUEL FARM

SCALE 1" = 80' | DATE MAY 1993 | FIGURE No.

02419H012



LEGEND

—×—×—	FENCE
●MW-1	LOCATION OF LAW ENGINEERING MONITORING WELL
⊗B-1	LOCATION OF SOIL BORING
▲HA-1	LOCATION OF HAND-AUGER BORING
—···—···—	TRANSITORY STREAM
— · · —	PERENNIAL STREAM
8400	CONCENTRATION OF TPH IN ug/L
ND	NONE DETECTED

NOTE: CONTOUR INTERVAL 5000 ug/L

J6014217

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP – TPH CONCENTRATIONS
COMBINED VOLATILES AND SEMI-VOLATILES
SOIL SAMPLES ABOVE THE WATER TABLE
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCG		DATE:	NOV. 1991
DFT CHECK:		SCALE:	1"=150'
ENG CHECK: WD Dixon		JOB:	J47590-6014
APPROVAL: WD Dixon		DWG:	4.3

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.

02419H022