UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

HSRL-6J

Thursday, 15 July 1993

Adrienne Townsel Wilson
Restoration Project Manager
Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Dr. P.O. Box 190010
North Charleston, S.C. 29419-9010

Re: **Review of the Remedial Investigation (RI) Work Plan and Quality Assurance Project Plan (QAPP) for Site 4 - Fire Fighting Training Unit and Site 12 - Harbor Dredge Spoil Area and the RI Work Plan for Underground Storage Tanks for Naval Training Center in Great Lakes, Illinois.**

Dear Ms. Wilson:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act and Executive Order 12088, the U.S. EPA and our contractor, WW Engineering & Science (WWES) have reviewed the above referenced documents for the Naval Training Center, Great Lakes, Illinois. We reviewed the document for compliance with the requirements of the National Contingency Plan (NCP), the format found in the United States Environmental Protection Agency (U.S.EPA) guidance: Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) under CERCLA (Interim Final, EPA540/G-89/004, October 1988), and the Region V Model Quality Assurance Project Plan (May 1991).

It is recognized that considerable effort was expended in the development of these RI Work Plans. The RI Work Plan for Sites 4 and 12 addresses the primary concerns of the sites. However, in order to allow a greater certainty in determining the level of environmental concern of the site, there are a few additional areas that require further investigation.

The RI Work Plan for USTs is too limited in scope. The U.S. EPA strongly recommends expanding the scope of field activities in this plan in order to save substantial time and expense as well as to eliminate additional field exploration activities that will be required in future work plans. These issues are addressed in the provided comments.

In general, the review of the RI Quality Assurance Project Plan (QAPP) for Sites 4 and 12 for the Naval Training Center uncovered several QAPP deficiencies. Accompanying this letter are comments that itemize these deficiencies and provide guidance for their correction. In addition a copy of the Region V Model QAPP and relevant attachments are provided. The U.S. EPA requests that the comments provided be considered when revising the document. At this time, the review of the QAPP included within the RI Work Plan for Underground Storage Tanks (USTs) has not been completed. The U.S. EPA recommends that a separate QAPP be written for the USTs and that the Region V Model QAPP be followed when making subsequent revisions.

Although the U.S. EPA does not review project health and safety plans unless we expect to be present to observe field work, it is to be noted that we did not receive the RI Health and Safety Plan for Sites 4 and 12.

Thank you for the opportunity to provide comments on these documents. If you have any questions, please contact me: (312) 886-0850.

Sincerely,

Laura J. Ripley

Laura J. Ripley
Work Assignment Manager

Enclosure

cc: Stephen Nussbaum, IEPA (w/all attachments except Model QAPP).
Robert Ogrodowski, NTC (w/all attachments except Model QAPP).
Ted Lietzke, WWES (w/o attachments).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
GREAT LAKES NTC COMMENTS

The U.S. EPA and WWES have prepared comments concerning the January 1993 reports titled "Remedial Investigation Work Plan: Site 4 - Fire Fighting Training Unit, Site 12 - Harbor Dredge Spoil Area", "Remedial Investigation Quality Assurance Project Plan (QAPP): Site 4 - Fire Fighting Training Unit, Site 12 - Harbor Dredge Spoil Area", and the February 1993 report titled "Remedial Investigation Work Plan for Underground Storage Tanks (USTs)," completed for the Great Lakes Naval Training Center (NTC), Illinois as prepared by SEC Donohue, Inc. (Donohue), for HALLIBURTON NUS Environmental Company. The following comments are based primarily on the information presented in the RI Work Plans and QAPP and do not address the validity of previous investigations.

WORK PLAN FOR SITE 4 - FIRE FIGHTING TRAINING UNIT AND SITE 12 - HARBOR DREDGE SPOIL AREA

GENERAL COMMENTS

1. The existence of a former landfill existing within 200 feet of the Fire Fighting Training Unit (FFTU) has not been discussed. Data collected during an investigation of the landfill may aid in the characterization of the site conditions at the FFTU.

2. The U.S. EPA recommends that the investigation of the underground piping system be more extensive in order to appropriately evaluate the potential impacts to soil this system may have at the FFTU.

3. Unburned diesel fuel, No. 2 fuel oil, gasoline, water, and foam were discharged directly to the Decant Ponds from 1942 to 1979, at which time an oil/water separator was installed. Prior to the installation of the oil/water separator, the discharged liquids may have drained through the bottom drains at the western end of each pond to the Skokie Ditch, approximately 250 feet west of the ponds. Investigation of soil and ground water contamination resulting from leaks in the drainage line as well as the Skokie Ditch, has not been included in the proposed Work Plan. These investigative omissions should be corrected.

4. The borings completed in the vicinity of Site 12, the harbor dredge spoil area, should be advanced until the native soils are encountered, regardless of the depth to ground water. This investigation must attempt to completely determine the vertical extent of the spoils, not only the contaminant level of the spoils existing above the water table.

5. The Work Plan, as written, does not allow for additional investigation activities. Depending on the results obtained during the scope of work outlined here,

additional work may be required to satisfy both the Illinois EPA and the U.S. EPA.

<u>Section 2.0</u> <u>SITE BACKGROUND AND SETTING</u>

6. **Page 2-3, Section 2.1.2.1, 2nd Paragraph and Figure 2-3** - Although the Dames & Moore (1991) report is cited as indicating that up to 300 55-gallon drums existed in the drum storage area in 1983, the area outlined as the "former drum storage area " on Figure 2-3 appears too small. Will the investigation be expanded if contamination is found to be present. Does Donohue mean to state "three-hundred " rather than "three ", drums were removed from the site?

<u>Section 3.0</u> <u>INITIAL EVALUATION</u>

7. **Page 2-9, Section 2.2.1,1st Paragraph** - ABMS is an undefined acronym. Please clarify.

8. **Page 3-1, Section 3.1** - Building 3305, the gas chamber, and building FC6, the torch shack were not included in the initial evaluation. Although we understand that their primary functions would not have contributed to any soil or ground water contamination problems, it is possible that the buildings could have been used to store potential source materials.

9. **Page 3-1, Section 3.2.2** - Donohue states that "VOCs are generally considered to be contaminants of interest for this investigation. " While true that VOCs are highly mobile and, hence, are the most likely ground water and surface water contaminants, semivolatile organic compounds, although less mobile, have been cited in past investigations as potential health hazards due to inhalation or dermal contact risks. As such, these semivolatile contaminants should also be considered "contaminants of interest. "

   Polynuclear aromatic hydrocarbons (PAHs) are a class of organic chemicals which are included among the broader group of semivolatile organic compounds (SVOCs), but to refer to SVOCs as PAHs is a misnomer.

10. **Page 3-2, Section 3.2.3.1, 1st Paragraph** - See comment 8. Surface soil samples should be collected in the vicinity of both buildings to substantiate the assumptions. Also, why are sediments not considered potential contaminant receptors?

11. **Page 3-2, Section 3.2.3.1, Underground Storage Tanks** - Although discussed in detail later in the Work Plan, the number of USTs which this section should describe, or may have existed on the site, as well as their capacities, should also be included.

12. **Page 3-2, Section 3.2.3.1, Oil/Water Separator System** - Are as-built diagrams of the oil/water separator system available? If so, a schematic of these diagrams,

including their construction material and dimensions, should be included in this Work Plan.

13. **Figure 3-1, Site Conceptual Model, Site 4** - Under the heading Release Mechanism the acronym ACM should be corrected to say ACBM.

14. **Page 3-3, Section 3.2.3.1, Christmas Tree Vaults** - Although described as "square metal structures ", no mention is made of the construction of the vault's floor. Is it made of steel, concrete, gravel over native soils, or other materials?

15. **Page 3-3, Section 3.2.3.1, Decant Ponds** - Navy personnel are cited as providing information about the bottom drains existing beneath both Decant Ponds. Has this information been confirmed during site visits? The fourth paragraph of page 2-6 indicates that a HALLIBURTON NUS Team visited the site on September 30, 1992, and a separate site visit was conducted during October 1992. In fact, during the October visit no liquid was observed in the south pond. Were bottom drains visible? Has the discharge outfall location been located along the Skokie Ditch?

16. **Page 3-3, Section 3.2.3.1,Underground Piping** - We concur with Donohue 's suggestions that the integrity of the underground piping system is suspect, and it has likely leaked. There are no indications within this or previous reports that major changes (other than the installation of a centrifugal oil/water separator in 1979) or site improvements have occurred since the training unit was constructed in 1942 (see page 2-2, fourth complete paragraph). If true, the underground piping may date back to 1942, over 50 years ago. The depth to the local water has been documented in previous studies to be as shallow as 2.27 feet beneath the surface in this vicinity. Therefore, the potential for contamination of the shallow ground water via piping leaks is very high.

17. **Page 3-3 , Section 3.2.3.1, Fire Fighting Rings** - No mention is made concerning the construction of the Fire Fighting Rings. Are they constructed from steel, concrete, gravel over native soils, or other materials?

18. **Page 3-4, Section 3.2.3.1, Burn Buildings** - How are the Burn Buildings constructed? Concrete, steel, gravel, or other materials? How are the floors of these buildings constructed?

19. **Page 3-4, Section 3.2.3.1, Drum Storage Area** - What are the area dimensions of the Drum Storage Area, based on aerial photographs and site visits? Although detailed as being 15' x 70' on page 4-8, we suggest that the dimensions be included here, as well.

20. **Page 3-4, Section 3.2.3.1, Pad-Mounted Transformers** - Water or sewer line repair is mentioned as having disturbed the soil in the vicinity of the transformers. Investigation of the previously-completed line repair project may provide

additional information about contamination in the vicinity of the transformers. Has this source of information been investigated?

21. **Page 3-4, Section 3.2.3.1, Building 3304** - Based on the information provided in the Work Plan, the paint may or may not be leaded. If it has not already been done, we suggest that the paint be analyzed for lead.

22. **Page 3-5, Section 3.2.3.2, 1st Paragraph** - Although two years have elapsed since fire training operations, future site improvements or soil disturbances may expose contaminants capable of volatile emissions. These should not be ignored until the degree and extent of site contamination has been characterized.

23. **Page 3-5, Section 3.2.3.2, Flaking Paint & Asbestos Containing Building Materials** -See comment #21. How would interior flaking paint and deteriorated ACBM impact the soils? Does Building 3304 have a dirt floor?

24. **Page 3-6, Section 3.2.3.3** - Depending on the depth to local ground water, leaking pipes (primary source) may contaminate the ground water (secondary source) directly, which may, in turn, effect downgradient surface water receptors and soils via capillary action and ground water fluctuations.

    Distinguish between soil and sediment. Clearly define each with regard to this investigation. Note that the determination of contaminant types and concentrations in the site's surface water (Decant Ponds and Drainage Ditch) and sediment were not listed among the RI objectives.

25. **Page 3-6, Section 3.2.3.5** - In this section, air should be listed as a pathway for human or environmental exposure.

26. **Page 3-7, Section 3.2.3.5,Air** - Impacted air may act as migration pathway of contaminants to off-siteand on-site receptors. On-site receptors of air impacts should not be ignored.

27. **Page 3-7, Section 3.2.3.6** - The exposure routes for soil (i.e., ingestion and direct contact) should be included in this section. Exposures to soils is particularly important in the evaluation of risks to potentially exposed populations under future land use scenarios (e.g., residential land use). A risk assessment performed as part of the RI will need to account for these potentially exposed future populations.

28. **Page 3-7, Section 3.3.1** - A complete list of the "past engineering reports" should be included. In addition, although SVOC contamination is mentioned in later sections of the Work Plan, it has not been included here.

29. **Page 3-8, Section 3.3.3.2, 1st Paragraph** - Site development (mentioned in the second paragraph of page 2-11) is a potential release mechanism not indicated by Donohue.

30. **Page 3-9, Section 3.3.3.4** - This section should include a discussion on lake organisms, such as shallow lake plants and fish, as potential environmental health receptors. Metals levels in fish, especially mercury, are a potential hazard given the exceedances indicated in the second paragraph of page 3-8. In addition, the fish could become an exposure route if ingested.

<u>Section 4.0</u> <u>REMEDIAL INVESTIGATION APPROACH AND RATIONALE</u>

31. **Page 4-1, Section 4.1, 1st Paragraph** - The list of purposes presented do not clearly coincide with the RI objectives as detailed on page 1-2 of this Work Plan.

<u>SITE 4</u> <u>Fire Fighting Training Unit (FFTU)</u>

32. **Page 4-1, Section 4.2, 4th Bullet** - If, as indicated in the top paragraph of page 2-11, lenticular and discontinuous sandy units are interbedded with predominantly clay units, then the interpretation of these units based on soil boring samples may be difficult. We suggest that trenching the native soils to a depth of 5-10 feet be considered. Such trenches may allow for a more accurate evaluation of the site stratigraphy near the surface (the zone of greatest interest). Although trenching may require subsequent stockpiling and disposal activities (as suggested in the last paragraph of page 4-3), the improved stratigraphic development may be cost-effective over the long-term. Deeper stratigraphic interpretations will require soil boring activities.

    Since the soils at the FFTU site may be considered hazardous under RCRA (solvents, regulated materials), the soils should not be returned to borings but should be containerized. A slurry of cement-bentonite grout should be used to fill each boring; a tremie-line is recommended for any boring deeper than 15 feet.

    In addition, previous experience with the Illinois Department of Natural Resources indicates that the soil cutting will be considered stored from the day the boring is drilled, not upon receipt of the analytical data.

33. **Page 4-2, Section 4.2, 1st Complete Paragraph** - See comment 8.

34. **Table 4-1, Table of Previously Detected Analytes for Site 4** - This table demonstrating the range of analytes detected at the site (FFTU) is interesting, but limited. We suggest including the number of samples analyzed for any single parameter, and a comparison with state and federal soil and water contaminant limits.

35. **Figure 4-1, Sample Locations - Site 4** - U.S. EPA assumes that this figure represents proposed sample locations. The following comments regard this figure:

    - Will soil borings be advanced in the vicinity of the suspected USTs regardless of the results of the geophysical survey?

- Do liquid-phase waste materials exist immediately east of the southern-most Burn Building (3304-A)?

- Will the solid phase-waste sample collected from within Burn Building 3304-B be of soil, sludge, or concrete?

- As previously stated, why are there no soil borings in the vicinity of fire fighting rings 2, 3, 4, and 6?

36. **Table 4-2, General Comment -** Although the investigative approach is described, the particular soil boring, hand-auger, surface water sample, or monitoring well location has not been identified in this table. For example, we suggest that the single soil boring to be advanced in the vicinity of the former 5,000 gallon gasoline UST east of Building 3305 be identified as SB-03.

 We recommend that the laboratory test methods be included in the table.

 What is the maximum depth a standard boring will penetrate if the water table is not discovered during any particular investigation?

 If the water table is observed very near the land surface, will soil samples still be collected at the pre-determined depths? For example, one investigation proposes to sample soil at 6'-8', 8'-10', and the two-foot interval above the water table. If the water table is observed at 5', will these proposed intervals be sampled?

37. **Table 4-2, Page 1 of 6 -** Among the rationales cited is the determination of indigenous bacteria and the nutrient concentrations at the site. Please elaborate on the proposed test methods.

38. **Table 4-2, Page 2 of 6 -** Why is the rationale, "obtain site geologic/hydrogeologic information," not among the rationales for <u>all</u> soil boring investigations?

39. **Table 4-2, Page 3 of 6 -** In addition to sampling and analyzing the soil for the presence of lead, we recommend that the paint, itself, currently existing on the building be analyzed for lead.

 Of critical importance during the Decant Pond investigation is the determination of bottom drains. Do they exist? Does drainage from these ponds go to the Skokie Ditch. Has the Skokie Ditch been impacted for potential contamination from the FFTU?

40. **Table 4-2, Page 4 of 6 -** Only two soil borings are proposed for the underground piping investigation. We recommend that this investigation be more extensive. Additional laboratory analyses may not be necessary, but more shallow soil sampling and field screening is appropriate.

Removal of pavement adjacent to the Burn Buildings prior to soil sampling is appropriate for investigating the contamination due to fire training activities conducted prior to laying the pavement. However, activities after the pavement was laid may have contaminated the soils further away from the building. How will this investigation address that situation?

41. **Table 4-2, Page 5 of 6** - Why are deposits from previous diesel fires (Item 2B) within the fire fighter rings suspected in the vicinity of the drum storage area?

    Only 4 new monitoring well locations are described on Table 4-2 while 5 monitoring well locations are shown on Figure 4-1. Please explain this discrepancy.

42. **Table 4-2, Page 6 of 6** - Why are no surface water or sediment samples being collected from the Skokie Ditch, the supposed Drainage Pond receptor?

43. **Table 4-3, General Comment** - The U.S. EPA suggests that the proposed investigative activity be correlated with the particular identifiers shown on Figure 4-1.

44. **Page 4-6, Section 4.2.1, 2nd Paragraph** - Since underground piping exists throughout the site, an electromagnetic survey may not produce visible results. We recommend that a ground penetrating radar (GPR) survey be used in conjunction with EM to verify the results, and further discern the extent of the tanks.

45. **Page 4-6, Section 4.2.6, 3rd Paragraph** - See comment to Table 4-2, page 3 of 6.

46. **Page 4-6, Section 4.2.6, 4th Paragraph** - See comment to Table 4-2, page 4 of 6.

47. **Page 4-7, Section 4.2.8** - According to Figure 4-1, three monitoring wells are proposed for the Fire Fighting Ring FF1 and FF5. However, in reading Section 4.2.8 it appears that only two monitoring wells are being proposed.

    Will the soils be screened during the installation of the second monitoring well at FF1? How will possible shallow soil and ground water contamination be isolated from impacting a possible deeper aquifer during the soil boring and monitoring well installation activities associated with the 20'-30' well?

48. **Page 4-7, Section 4.2.10, 1st Paragraph** - See the second comment to Table 4-2, page 4 of 6.

49. **Page 4-8, Section 4.2.11, 1st Paragraph** - The U.S. EPA concurs with the completion of one soil boring to the water table for an investigation of the Drum Storage Area. We also recommend that one additional soil boring be advanced within the area to a depth sufficient to define the vertical extent of soil contamination, which may be deeper than the water table.

50. **Page 4-9, Section 4.2.12,2nd Paragraph** - Bedrock is suggested as existing at a depth of 30 feet while the first paragraph of page 2-10 indicates that bedrock exists at depths of 170 to 210 feet below the surface. Please verify this.

51. **Page 4-9, Section 4.2.13** - No investigation of the Skokie Ditch has been indicated. If drainage from the Decant Ponds empties to the Skokie Ditch, as indicated on the second paragraph of page 3-3, and no oil/water separator system existed until 1977, then contamination of the Skokie Ditch is likely. An investigation of the Skokie Ditch should not be omitted from this Work Plan.

52. **Page 4-9, Section 4.2.14** - Collection of background soil samples from the Parade Grounds (assumed to be Ross Field); may not be appropriate since it is approximately 7500 feet east of the site and hydrogeologically isolated from the site's surficial ground water. This may cause problems later.

SITE 12 Harbor Dredge Spoil Area

53. **Page 4-10, Section 4.3.1** - Regardless of the depth to ground water, the borings should be advanced until the native soils are encountered. This investigation should also determine the vertical extent of the spoils.

What criteria will be used to distinguish the hand auger soil samples as spoils or natural soils? Will the soils be analyzed for grain size? Chemical parameters? Or field screened?

54. **Table 4-4** - Similar to the comment applied to Table 4-1, the data presented in Table 4-4 are useful for indicating presence/absence information, but the addition of such qualifiers as the sampling locations, number of samples analyzed, and/or the regulatory limits should be considered.

55. **Table 4-5, Page 1 of 2** - See second comment to #53.

A monitoring well should be installed in the general vicinity of SB-12 to determine the possibility of ground water flow fluctuations between the spoils area and Lake Michigan.

56. **Table 4-5, Page 2 of 2** - Why are surficial soils from the top of the bluff proposed for analytical determination of background levels? As with the background soil samples proposed for Site 4, these soils are not necessarily consistent with the dredge spoils and may present problems later. We recognize that comparable materials may not be available on the site.

Regarding the determination of ground water flow see the preceding comment.

57. **Page 4-11, Section 4.3.2** - Storm water outfall should be collected from the discharge point for analysis. This data will facilitate future determinations of the source of possible drainage ditch contamination.

58. **Page 4-11, Section 4.3.3** - See comments #52 and #56. The soils from the parade ground exist in a completely different environmental and depositional setting. A comparison of these soils with the dredge spoils is not recommended.

<u>Section 7.0 SITE-GENERATED WASTE DISPOSAL</u>

59. **Page 7-1, Section 7.5** - Since the soils at the FFTU site may be considered hazardous under RCRA (solvents, regulated materials), the soils should not be returned to borings but should be containerized. A slurry of cement-bentonite grout should be used to fill each boring; a tremie-line is recommended for any boring deeper than 15 feet.

    In addition, previous experience with the Illinois Department of Natural Resources indicates that the soil cutting will be considered stored from the day the boring is drilled, not upon receipt of the analytical data.

QUALITY ASSURANCE PROJECT PLAN (QAPP) for SITE 4 - FIRE FIGHTING TRAINING UNIT and SITE 12 - HARBOR DREDGE SPOIL AREA

(*) Denotes not required for QAPP approval, although it is highly recommended to insure Agency's concurrence.

I. DOCUMENT CONTROL FORMAT

(*) A. The QAPP must be prepared using the document control format consisting of the following placed in the upper right-hand corner of each document page:
- Project Name
- Section Number
- Date
- Page Number

B. This submittal is the first draft, therefore the next submittal will be called the "**first revision**".

(*) II. TITLE/SIGNATURE PAGE

Include signature provisions for the U.S. EPA Remedial Project Manager and Regional Quality Assurance Manager.

III. PROJECT DESCRIPTION

A. Revise the following in Table 1-1 and 1-2 (Sampling and Analysis Summary):
1) Revise these tables to include the number of QC samples, frequency and totals. *Use the attached example summary table.*
2) In areas where additional samples could be collected, identify them with a footnote.
3) Correct the following footnotes:
a) Footnote B - "*One equipment rinsate blank will be collected per group of ten or fewer investigative samples for aqueous samples.*"
b) Footnote D - "*One field duplicate sample will be collected per group of ten or fewer investigative samples.*"
c) Footnote E - "*Matrix spike/matrix spike duplicate (MS/MSD) samples are required for organic analysis. Samples designated for MS/MSD analysis will be collected, with extra sample volumes, at a frequency of twenty or fewer investigative samples. Triple the normal sample volumes will be collected for VOA, and double the normal sample volumes will be collected for semi-volatiles and pesticides/PCBs.*"

B. Provide a project schedule which has the dates anticipated for start, milestones, and completion of the project and monitoring activities. A milestone table or a bar chart consisting of project task and time lines is appropriate. *See the Superfund Model QAPP.*

C. Identify the CLP SOWs as "**CLP SOW for Organics Analysis 0LM01.8 or most current" and CLP SOW for Inorganic Analysis ILM02.0 or most current**" throughout the QAPP especially Sections 7.0 and 9.0.

IV. **PROJECT ORGANIZATION AND RESPONSIBILITY**

A. The discussion in this section is inadequate and must be expanded. *See the Superfund Model QAPP.*

(*) B. Expand Figure 2-1 to include the U.S. EPA RPM, U.S. EPA RQAM, and the laboratories.

V. **QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY**

A. In Section 3.1, the discussion of Data Quality Objectives (DQOs) is not acceptable. The document, "Data Quality Objectives for Remedial Activities (Development Process), EPA 540/G-87/003, March, 1987, shall be used in conjunction with the document, "Data Quality Objectives for Remedial Response Activities (Example Scenario RI/FS Activities at a Site with Contaminated Soils and Groundwater), EPA 540/G-87/004 " to develop the level of DQO.

The list of DQOs in Table 3-1 must be revised accordantly and must include all field measurements.

B. Specify the precision and accuracy acceptance criteria for all field measurement. *See the attached document (Field Audits) for guidance.*

C. In Sectiòn 3.2.2, correct the frequency for collecting equipment rinsate blank samples. One equipment rinsate blank will be collected per group of ten or fewer investigative samples for aqueous samples. Correct where appropriate throughout the QAPP, especially Sections 4.0 and 5.0 (Sampling Procedures).

VI. **SITE 4 - SAMPLING PROCEDURES**

A. Revise Table 4-1, for soil, sediment and solid phase waste, for Dioxin analysis:

1) Specify the preservative method as "**Cool to 4°C**".

2) Specify the holding time as "**extract within 30 days, analyze within 45 days**".

3) Identify the containers to be used.

B. Provide the procedure for filtering groundwater metals samples. Additionally, specify that the sample will be field filtered immediately, not longer than 15 minutes; prior to the addition of preservatives.

C. No discussion was provided on preparing sample containers. Sample container can be prepared according to the procedures specified in USEPA 's "Specification and Guidance for Obtaining Contaminant-Free Sample Containers, April ,1992" and certificates of cleanliness must be maintained by the contractor.

VII. SITE 12 - SAMPLING PROCEDURES

A. Revise Table 5-1, indicate the following soil for TCLP (lead):

1) Specify the holding times, "**TCLP extraction 180 days, determinative analysis 180 days**".

2) Identify the containers to be used.

B. Provide the procedure for filtering groundwater metals samples. Additionally, specify that the sample will be field filtered immediately, not longer than 15 minutes; prior to the addition of preservatives.

C. No discussion was provided on preparing sample containers. Sample container can be prepared according to the procedures specified in USEPA 's "Specification and Guidance for Obtaining Contaminant-Free Sample Containers, April ,1992" and certificates of cleanliness must be maintained by the contractor.

VIII. SAMPLE IDENTIFICATION, CUSTODY, PACKAGING, AND SHIPPING

A. Provide the procedures for recording sample history, sampling conditions, etc. into the bound logbooks.

B. Provide the chain-of-custody procedures for each laboratory.

IX. CALIBRATION PROCEDURES AND FREQUENCY

A. For non-CLP methods, Standard Operating Procedures (SOPs) are required and they must include detailed calibration procedures. Therefore, paragraph three of Section 7.2 is not acceptable. However, it is acceptable to reference the SOPs.

B. Modify discussions of DQOs throughout this section as per Comment V.A.

X. ANALYTICALPROCEDURES

A. Modify discussions of DQOs throughout this section as per Comment V,A.

B. Expand Table 9-1 to include the following:
   1) Specify the extractions procedure to be used on samples for PNA analysis.
   2) List each compound for BTEX and PNA determination.

C. Provide the SOPs for all non-CLP laboratory parameters listed in Table 9-1. *Use the attached guidance for preparing SOPs.*

D. In Sections 9.1.1through 9.1.3and 9.2.1state that the CLP organic and inorganic high-concentration SOWs will be used if the samples exhibit high concentration of contaminants. The list of detection limits must be included in this section.

XII. DATA REDUCTION, VALIDATION, AND REPORTING

A. In Section 11.1.2,for the non-CLP analytical data, reference the SOPs not the laboratory QA Plan.

B. In Section 11.3.2,Laboratory Data Reporting, the present discussion is not adequate, a listing of the data package contents is required. As a minimum, a data package equivalent to CLP deliverables is required. *See this section in the Superfund Model QAPP.*

(*)XIII. PERFORMANCE AND SYSTEM AUDITS

Specify that the Region 5 Central Regional Laboratory is responsible for the external performance and system audits of the laboratories.

XIV. PREVENTATIVE MAINTENANCE

Describe the preventative maintenance procedures to be used for both field and laboratory instruments. A table showing the type of maintenance to be performed and the frequency is appropriate.

For the maintenance of laboratory instruments used for the analysis of CLP TCL and TAL parameters, the CLP SOWs can be referenced.

XV. APPENDIX C - PCB FIELD SCREENING TECHNIQUE DESCRIPTION

A detailed SOP is required. Use the attached guidance for preparing the SOP. The following project-specific information must also be included:

- Identify all aroclors that will be determined.

- The calibration curve must include all aroclors that will be measured and the reporting limit must be the lowest point on the calibration curve.
- Specify any additional QC checks that may be used to supplement the manufacturer 's requirements.
- Describe how positive and negative biases will be handled.
- Specify the criteria for selecting samples for laboratory analysis.

Additional attachments:

(1) Example Summary Sampling Table
(2) Field QC Audits
(3) Guidelines for the Preparation of Standard Operating Procedure (SOP)

WORK PLAN FOR UNDERGROUND STORAGE TANK INVESTIGATIONS

GENERAL COMMENTS

The scope of this work plan is too limited. Preliminary soil borings are to be advanced around six underground storage tanks at different sites. Based on this information the RI could be expanded into a second phase where the extent of ground water contamination is determined.

Given the magnitude of time effort required to prepare a work plan of this nature, plus the time and expense to mobilize equipment and personnel for actual performance of the field work, it would make better sense to expand the scope of activities encompassed in this work plan. Specifically, the field activity should be expanded to define the horizontal and vertical extents of petroleum contamination if it is encountered. Monitoring wells should be installed during borehole drilling if it appears ground water has been impacted. This would also serve to define the hydrogeologic setting. By expanding the scope of this work plan, substantial time and expense for preparation of future work plans and for completion of additional field exploration activities could be eliminated.

Section 1.0 INTRODUCTION

1. **Page 1.1, Section 1.1, Items 1 & 2, and Last Paragraph** - The U.S. EPA disagrees (see general comments). During preliminary soil exploration activities, petroleum contamination should be clearly evident in the soil. Based on the degree of soil contamination adjacent to the potentiometric surface, a reasonable estimate of potential ground water contamination can be derived in the field. For this reason the scope of work should be expanded to actually define, rather than estimate, the horizontal and vertical extent of soil and ground water contamination.

Section 2.0 SITE BACKGROUND

2. **Section 2, Figure 2-2** - Since the locations of the 6 USTs are known, the map of the entire site should point out where, on the base, these UST's are located.

3. **Page 2-1, Section 2.2.1, 2.2.2, and 2.2.3** - Generalized regional topographic maps and hydrogeological cross-sections based on existing information to accompany the brief narratives contained in these sections would be helpful. These sections should be expanded.

Section 3.0 REMEDIAL INVESTIGATION OBJECTIVES AND TASKS

4. **Page 3-1, Section 3.2.1** - Depending on the location of the UST, a magnetometer survey may not provide the required information. We suggest using ground penetrating radar in conjunction with EM to confirm the results.

5. **Page 3-2, Section 3.2.3, 2nd Paragraph** - A photo ionization detector or a flame ionization detector is inadequate for screening heavier hydrocarbon fractions such as

diesel fuel and waste oil in soils. These instruments measure organic vapors which may be virtually nonexistent in the less volatile hydrocarbons. In older spills, primarily the non-volatile fractions would remain. A visual inspection of soil samples to detect waste oil or diesel fuel may not enable a positive determination of low level contamination, particularly if the soils are naturally dark.

To adequately screen for the presence of less volatile hydrocarbons, such as diesel fuel or waste oil, an ultraviolet illuminator may be the best available technology. The ultraviolet illuminator was originally developed to meet the needs of the petroleum industry. An ultraviolet radiation light source of a specific wavelength is used to detect subtle varying intensities of petroleum hydrocarbon fluorescence. Based on the fluorescing nature of the specific target petroleum hydrocarbon(s) present in the soil sample, the visual intensity of the fluorescent response assists in development of a qualitative evaluation of hydrocarbon presence. Ultraviolet illuminators are relatively inexpensive, simple to operate, and provide quick results in the field.

Section 4.0 - FIELD SAMPLING PLAN

6. **Page 4-10, Section 4.5.4,2nd Paragraph -** It is stated that sampling equipment will be decontaminated "at each individual UST drilling location". The meaning of this statement is unclear as to whether it is meant that decontamination of the sampling equipment will be performed at each UST site or between each boring. This statement should be clarified for the sampling equipment to be decontaminated between each boring.

7. **Page 4-14, Section 4.9, Last Bullet -** The cement bentonite grout mixture is not specified nor is the method of abandoning the borehole. A reasonable mixture is one bag (94#) of Portland cement to 6 gallons of water and no more than 5 percent bentonite. Boreholes remaining open more than 10 feet in depth should be filled from the bottom with a tremie pipe.

ATTTACHMENT NO. 2

EXAMPLE

OF

SUMMARY TABLE OF SAMPLING AND ANALYSIS PROGRAM

Attachment No. 2
Revision No.: 1
Date: 06-09-89
Page: 1 OF 3

TABLE 1

SUMMARY TABLE OF SAMPLING AND ANALYSIS PROGRAM

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	Investigative Sample			Field Quality Control Samples[1] Field Duplicate			Field Quality Control Samples[1] field blanks			MS/MSD[2,3]			MATRIX[4]
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	TOTAL
Sub-surface Soil	Soil gas screening using HNu	CLP TCL volatile organics	57	1	57	6	1	6	-	-	-	3	1	3	63
	Soil classification	CLP TCL extractables	57	1	57	6	1	6	-	-	-	3	1	3	63
		CLP TCL pesticides/PCBs	57	1	57	6	1	6	-	-	-	3	1	3	63
		CLP TAL metals	57	1	57	6	1	6	-	-	-	-	-	-	63
		Dioxin and Furans	26	1	26	3	1	3	-	-	-	-	-	-	63
		Hydraulic permeability	5	1	5	-	-	-	-	-	-	-	-	-	5
		Grain Size	15	1	15	-	-	-	-	-	-	-	-	-	15
		Atterberg Limits	5	1	5	-	-	-	-	-	-	-	-	-	5
		Oil & Grease	36	1	36	4	1	4	-	-	-	-	-	-	40
Leachate	pH, temperature specific conductance	CLP TCL volatile organics	12	1	12	2	1	2	2	1	2	1	1	1	16
		CLP TCL extractables	12	1	12	2	1	2	2	1	2	1	1	1	16
		CLP TCL pesticides/PCBs	12	1	12	2	1	2	2	1	2	1	1	1	16
		CLP TAL metals	12	1	12	2	1	2	2	1	2	-	-	-	16
		CLP TAL cyanide	12	1	12	2	1	2	2	1	2	-	-	-	16
Sediments	Organic vapor screening using HNu	CLP TCL volatile organics	12	1	12	2	1	2	-	-	-	-	-	-	14
		CLP TCL extractables	12	1	12	2	1	2	-	-	-	-	-	-	14
		CLP TCL pesticides/PCBs	12	1	12	2	1	2	-	-	-	-	-	-	14
		CLP TAL metals	12	1	12	2	1	2	-	-	-	-	-	-	14
		CLP TAL cyanide	12	1	12	2	1	2	-	-	-	-	-	-	14

1. The field quality control samples also include trip blank, which is required for VOA water and air samples. One trip blank, which consists of two 40-ml glass vials for water samples and one blank cartridage for air samples, is shipped with each shipping collor of VOA samples.

2. Matrix spike/matrix spike duplicate (MS/MSD) is required for organic analysis. Samples designated for MS/MSD analysis will be collected, with extra sample volumes, at a frequency of one per group of 20 or fewer investigative samples. Triple the normal sample volumes will be collected for VOAs, and double the normal sample volumes will be collected for extractable organics, pesticides and PCBs.

3. For inorganic analysis, no extra sample volume is required.

TABLE 1 (Continued)

SUMMARY TABLE OF SAMPLING AND ANALYSIS PROGRAM

			Investigative Sample			Field Quality Control Samples[1] Field Duplicate			Field blanks			MS/MSD[2,3]			MATRIX[4]
MPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	TOTAL
roundwater	pH, temperature	CLP TCL volatile organics	25	1	25	3	1	3	3	1	3	2	1	2	31
Phase I, Round 1	Specific conductance	CLP TCL extractables	25	1	25	3	1	3	3	1	3	2	1	2	31
	Organic vapor screening with HNu	CLP TCL pesticides/PCBs	25	1	25	3	1	3	3	1	3	2	1	2	31
	Slug Test	CLP TAL Metals(filtered)	25	1	25	3	1	3	3	1	3	-	-	-	31
		CLP TAL cyanide (total)	25	1	25	3	1	3	3	1	3	-	-	-	31
		TKN, Ammonia-N, TOC	13	1	13	2	1	2	2	1	2	-	-	-	17
		COD, BOD,	6	1	6	1	1	1	1	1	1	-	-	-	8
		NO_3, NO_2	13	1	13	2	1	2	2	1	2	-	-	-	17
urface water	pH, temperature specific conductance	CLP TCL volatile organics	17	1	17	2	1	2	2	1	2	1	1	1	21
		CLP TCL extractables	17	1	17	2	1	2	2	1	2	1	1	1	21
		CLP TCL pesticides/PCBs	17	1	17	2	1	2	2	1	2	1	1	1	21
		CLP TAL metals(unfiltered)	17	1	17	2	1	2	2	1	2	-	-	-	21
		CLP TAL cyanide (total)	17	1	17	2	1	2	2	1	2	-	-	-	21
		COD, BOD	9	1	9	1	1	1	1	1	1	-	-	-	11
urface Soils	Soil gas screening using HNu/OVA	CLP TCL volatale organics	35	1	35	4	1	4	-	-	-	-	-	-	39
		CLP TCL extractables	35	1	35	4	1	4	-	-	-	-	-	-	39
		CLP TCL pesticides/PCBs	35	1	35	4	1	4	-	-	-	-	-	-	39
		CLP TAL metals	35	1	35	4	1	4	-	-	-	-	-	-	39
		CLP TAL cyanide	35	1	35	4	1	4	-	-	-	-	-	-	

1. The field quality control samples also include trip blank, which is required for VOA water and air samples. One trip blank, which consists of two 40-ml glass vials for water samples and one blank cartridage for air samples; is shipped with each shipping collor of VOA samples.

2. Matrix spike/matrix spike duplicate (MS/MSD) is required for organic analysis. Samples designated for MS/MSD analysis will be collected, with extra sample volumes, at a frequency of one per group of 20 or fewer investigative samples. Triple the normal sample volumes will be collected for VOAs, and double the normal sample volumes will be collected for extractable organics, pesticides and PCBs.

3. For inorganic analysis, no extra sample volume is required.

4. The number of samples to be collected for MS/MSD are not included in the matrix total. The number of trip blank samples is also excluded

TABLE 1 (Continued)

SUMMARY TABLE OF SAMPLING AND ANALYSIS PROGRAM

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	Investigative Sample			Field Quality Control Samples[1] Field Duplicate			Field blanks			MS/MSD[2,3]			MATRIX[4] TOTAL
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Residential well water	pH, temperature specific conductance	CLP TCL volatiles with low detection limits	6	1	6	1	1	1	1	1	1	1	1	1	8
		CLP TCL extractables with low detection limts	6	1	6	1	1	1	1	1	1	1	1	1	8
		CLP TAL pesticides/PCBs with low detection limits	6	1	6	1	1	1	1	1	1	1	1	1	8
		CLP TAL metals with low detection limits	6	1	6	1	1	1	1	1	1	-	-	-	8
		CLP TAL cyanide with low detection limits	6	1	6	1	1	1	1	1	1	-	-	-	8
Air Samples		CLP TAL metals	10	1	10	1	1	1	1	1	1	-	-	-	12
		CLP TCL volatile organics	10	1	10	1	1	1	1	1	1	-	-	-	12
		CLP TCL pesticides/PCBs	10	1	10	1	1	1	1	1	1	1	1	1	12

1. The field quality control samples also include trip blank, which is required for VOA water and air samples. One trip blank, which consists of two 40-ml glass vials for water samples and one blank cartridage for air samples, is shipping collor of VOA samples.

2. Matrix spike/matrix spike duplicate (MS/MSD) is required for organic analysis. Samples designated for MS/MSD analysis will be collected, with extra sample volumes, at a frequency of one per group of 20 or fewer investigative samples. Triple the normal sample volumes will be collected for VOAs, and double the normal sample volumes will be collected for extractable organics, pesticides and PCBs.

3. For inorganic analysis, no extra sample volume is required.

4. The number of samples to be collected for MS/MSD are not included in the matrix total. The number of trip blank samples is also excluded from the matrix total.

samples or for each 20 samples received, whichever is more frequent. Samples identified as field blank can NOT be used for spiked sample analysis. If two analytical methods are used to obtain the reported values for the same element for a batch of samples (i.e., ICP, GFAA), spike samples will be run by each method used. If the spike recovery is not within the limits of 75-125%, the data of all samples received associated with that spiked samples will be flagged with the letter "N". An exception to this rule is granted in situations where the sample concentration exceeds the spike concentration by a factor of four or more. In such a case, the spike recovery should not be considered, and the data shall be reported unflagged even if the percent recovery does not meet the 75-125% recovery criteria. In the instance where there is more than one spiked sample per matrix per batch, if one spike sample recovery is not within contract criteria, all samples of the same matrix in that batch will be flagged. The individual component percent recoveries (%R) will be calculateed and reported. The CLP acceptance criteria for all CLP parameters are outlined in the Organic CLP SOW and the Inorganic CLP SOW.

1.1 FIELD QC AUDITS

Procedures used in field measurement of pH, dissolved oxygen, specific conductivity, and temperature along with recommended calibration and maintenance procedures are given in Appendix __. Procedures to determine permeability using the slug test is similarly described in Appendix ____. Procedures used for the moisture testing are described in Appendix ___. Air monitoring (VOC) will be done using an HNu. Field measurement, calibration, and maintenance procedures are described in Appendix ____.

The accuracy of field measurements of pH, dissolved oxygen, temperature, VOC's, and specific conductance will be addressed through pre-measurement calibrations and post-measurement verifications in the field. The pH will be assessed by performing two measurements on three standard buffer selections. Each measurement will be within +0.05% standard unit of buffer selections. Precision will be assessed through replicate measurements. The standard deviation of four replicate measurements must be less than or equal to 0.1 standard unit. The electrode will be withdrawn, rinsed with deionized water and re-immersed between each replicate. The calibration and verification will be done in the field before the first replicate and after the last. The instrument used will be capable of providing measurements of 0.01 standard unit.

The dissolved oxygen meter will be assessed by performing calibration and assessment as described in Appendix ____. Measurements for accuracy should be within +0.02 mg/l of the estimated dissolved oxygen concentration of the solution being measured. Precision for the dissolved oxygen is performed in the field similar to the description for the pH procedure. The dissolved oxygen meter will be capable of providing measurements of 0.1 mg/l.

Temperature will be measured using a thermometer on the conductivity meter with a range of -2 to 50 degree C and with divisions of 1.0 degree C. Accuracy of measurement will be + 1.0 C. The thermometer will be calibrated againt an ASTM thermometer.

Specific conductance will be measured using a conductivity meter. The meter will be read to the nearest 10 mhos/cm within a range of 0 to 20,000 umhos/cm. Accuracy of measurements shall be +5 percent of a standard. Precision shall be a standard deviation of +15 percent.

Soil screening will be conducted using a photoionization analyzer (HNu). The HNu will be used to measure the concentration of trace gases to the nearest 0.1 ppm on the 0-20 ppm scale, the nearest 1 ppm on the 0-2000 ppm scale, for an HNu with a range of 0.1 to 200 ppm. Accuracy shall be within +1 percent of the meter scale.

1.2 ACCURACY, PRECISIO, COMPLETENESS, SENSITIVITY OF ANALYSES

All monitoring well, surface water, soils, and sediment samples taken will be analyzed using the Contract Laboratory Program (CLP). The level of QA effort for the CLP RAS analyses are specified in the CLP Statement of Works. In addition to routine CLP organic and inorganic analyses, Special Analytical Analysis (SAS) will analyze samples for additional parameters. These parameters and their respective QA objectives are listed in Appendic _____.

The residential well water samples will be analyzed using the Central Regional Laboratory (CRL) or the CLP SASs. The level of QA effort for these analyses are secified in Appendix __ and __. Accuracy should be +20%, precision +10%, and sensitivity as specified in Appendix ____.

For completeness, it is expected that the CLP procedures proposed for chemical characterization of the samples collected will provide data meeting QC acceptance criteria

GUIDELINES FOR THE PREPARATION OF STANDARD OPERATING PROCEDURES (SOPS)

FOR

FIELD AND LABORATORY MEASUREMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION V

MONITORING AND QUALITY ASSURANCE BRANCH

QUALITY ASSURANCE SECTION

536 S. CLARK STREET

CHICAGO, ILLINOIS 60605

MARCH 16, 1989

ATTTACHMENT No. 7

GUIDELINE

FOR

THE PREPARATION OF STANDARD OPERATING PROCEDURE (SOP)

GUIDELINES FOR THE PREPARATION OF STANDARD OPERATING PROCEDURES (SOPS) OF FIELD AND LABORATORY MEASUREMENTS

Field and laboratory protocol for qualitative and quantitative measurements, that are selected for a specific project shall be submitted to the Region V Quality Assurance Section (QAS) as an attachment to the sit-specific Quality Assurance Project Plan (QAPjP) for review/approval prior to the start of the measurement activity.

The field and laboratory measurement protocol should be documented in a standard operating procedure (SOP) format. This SOP shall describe in "cookbook" details the exact instructions to follow and the equipment and materials required to make the measurement.

This document outlines the elements that are to be considered for inclusion in all SOPs.

1. Parameter(s) to be measured.
2. Range of Measurement (Working Linear Range).
3. Limit of Detection. (Where appropriate procedure used for determination of method detection limit shall be specified).
4. Sample Matrix.
5. Principle, Scope and Application.
6. Interferences and Corrective Actions. (Specify method/steps to be taken to eliminate the interferences. Method shall be matrix-specific).
7. Safety Precautions.
8. Sample Size, Collection, Preservation, and Handiing (Describing for each matrix which measurement procedure is applicable).
9. Apparatus (including instrument and instrumental parameters) and Materials.
10. Routine Preventative Maintenance, including procedures and frequency.
11. Reagents and Calibration Standards (including preparation procedures, storage and shelf life).

- Calibration Procedures (including instrument tuning and routine performance checks, etc. If appropriate, specify whether internal standard or external standard techniques are to be used).

- Sample Preparation (i.e., Extraction, Digestion, etc.)

- Analytical Measurement (Describing in cookbook detail. Include separate details for each sample matrix if the procedure is applicable to more than one sample matrix).

- Flow Chart or Table that describes the method step by step.

- Data Treatment (Details of calculation, including equations).

- Data Deliverables (define the content of data packages), as a minimum, the following shall be provided:

  a) Case narrative, briefly describe the sample preparation and analysis, problems encountered and corrective action taken during the process of sample preparation and analysis.

  b) Summary of initial calibration and continuing calibration check results.

  c) Summary of Sample Analysis, arranging in increasing order of sample number.

  d) Summary of QC sample analyses.

  e) Raw data including instruments printout, mass spectra, Chromatograms, etc.

  f) Instrument logbook (including serial number, date of purchase, date brought on line, maintenance and repair history over the period of service provided for this specific project. Daily entries should include name of analyst, parameter measured, instrument setting, comments on the sample analysis and any other information that may be deemed of interest.

Quality Control Requirements (Specify internal requirements for blanks, spikes, duplicates, and external requirements for reference and QC samples).

References.

20. Method Validation Data (if available) should be included to support the validity, limitation and the applicability of the measurement method. If the method is a "Standard Method", i.e., EPA APHA, ASTM or AOAC, this element need not be addressed. If the method has not been validated, then the description of the SOP should include the process for method validation to be conducted for approval prior to the use of the method for sample measurements. If the parameter(s) being measured is for health and safety requirement for field screening to select sampling locations, then method validation data is not required.