UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

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Ma. Linda Martin
Remedial Activities Branch
Department of the Navy - Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston, South Carolina 29411-0068

Re: Review of Draft RI/FS Work Plans for Operable Units 6-9;
NAS Pensacola, Florida
EPA Site ID No.: FL 9170024567

Dear Ms. Martin:

The Environmental Protection Agency (EPA) has completed its review of the Draft RI/FS Work Plans for Operable Units (OUs) 6 through 9 which were received in this office on April 17, 1992. Enclosed are our general and specific comments. As per Section VIII.G.5. of the Federal Facilities Agreement (FFA), the Navy's Response to Comments is due 60 days from your receipt of this letter.

Also, at the June 16, 1992 Remedial Project Manager's (RPM) meeting, the RPMs agreed to substantially modify the investigative groupings presented in these work plans. The parties agreed to reprioritize the investigative schedules for all known RI/FS and screening sites and to reduce the number of sites scheduled for simultaneous investigation. While EPA recognizes that it would not be time or cost-effective to reformat the current work plans, all future documents must reflect these changes. In particular, all future deliverables must be Operable Unit-specific, as specified in Sections VIII. C. and D. of the Federal Facilities Agreement (FFA). Screening site documents must not be submitted as sections or chapters in the documents prepared for RI/FS sites. This change should expedite the RI/FS and site cleanup processes.

Should you have any questions or concerns regarding these matters, please contact me at 404/347-3016.

Sincerely yours,

Allison W. Drew

Allison W. Drew, RPM
Department of Defense Remedial Section
Federal Facilities Branch

cc: Ron Joyner, NAS, Pensacola
Eric Nuzie, FDER

.Enclosure

TECHNICAL REVIEW AND COMMENTS
DRAFT PHASE II WORK PLANS FOR GROUPS F, G, J, K, M & N
NAVAL AIR STATION (NAS), PENSACOLA
PENSACOLA, FLORIDA

GENERAL COMMENTS

1. The figures presented are of very poor quality. Shading or hatching, rather than letter codes, should be used to indicate pavement and other types of ground covering. All site features which are pertinent to the interpretation and evaluation of analytical, and other, results should be presented in the figures, including past and proposed sampling points, surface drainage (including direction of flow), groundwater flow direction, the industrial sewer, buried fuel lines, the locations and supposed boundaries of all sites and supply wells within the area of the figure, etc.. These deficiencies must be corrected before the next submittal.

2. The analytical results revealed some major flaws in the implementation of the Phase I investigation at these sites. The lack of any apparent attempt to correct these flaws suggests that the contractor made little use of the expensive rapid turnaround times (2-3 days) used in these investigations. These flaws, outlined below, will have a significant adverse impact upon the length and course of future investigations at NAS Penaacola. In the future, when quick turnaround times are used, the data must be used to provide feedback to laboratory and field personnel to quickly correct obvious and major QA/QC problems with the continuing investigation.

a. Examination of the groundwater data clearly indicates a trend of unacceptably high metals concentrations in groundwater samples collected from temporary monitoring wells. This trend is clearly not evident in samples collected from previously installed permanent monitoring wells. The conclusion drawn by the Navy that sediments entrained in the samples artificially elevated the concentrations in the temporary wells is undoubtedly correct. What is unacceptable is that apparently no effort was made to correct this problem at its source in the field, despite the fact that the results of metals analyses were available within 2-3 days, due to the use of rapid turnaround times. Apparently all temporary wells were sampled with bailers. If an attempt was made to utilize a different sampling technique to minimize entrained sediments such as a low capacity pump, the text does not mention this. Thus, the Navy has continued to collect data for the past two years which is of little or no use in selecting future sampling locations.

b. Examination of the field QA blanks indicates that the Batch 1 and Batch 2 Phase I investigations were conducted with little regard for field QA/QC. Field blanks, equipment rinse blanks, and preservative blanks were heavily contaminated with inorganic analytes, volatile organice, and extractable organics at both Batch 1 and Batch 2 sites. It is very apparent that either organic free water was not used in the field as specified in the GQAPP, or that it was handled inappropriately by field personnel.

3. The ultimate goal of these investigations is rapid, effective site cleanup. As stated on page 9-2 of the GQAPP, Phase I reeulte "will not be used to eliminate areas from further investigation". Thus, under the current process, a minimum of two years of investigation and reporting is required for

all sites. This represents an inefficient use of time and resources. More specifically, the "focusing" objective of Phase I is conceptually sound, but the contractor's implementation of this phase, using DQOs Level I and II, is not. Phase I does not permit the identification of "No Further Action" sites, which would allow the Navy to focus future resources on remaining higher priority sites. There is also a substantial overlap of Phase II sampling locations with the Phase I screening locations, suggesting that Phase I has not achieved its intended "focusing" objective. As such, little progress towards site deletion or description has been made during Phase I.

EPA recommends that the following investigative approach be used in continuing the investigation for Batch 2, and all other, sites at NAS Pensacola. This approach should expedite completion of the RI/FS and facilitate progress towards site cleanup.

a. For Screening Sites, the next round of field work should consist of an initial/site assessment aimed at determining whether significant contaminants at levels of concern have, or have not, been released into the environment. This work should be done with an absolute minimum of highly biased soil and groundwater samples, utilizing analytical procedures which will provide high quality data (DQO Level III or IV). If existing suitable permanent wells are available, these should be sampled. If permanent wells are not available, groundwater samples should be obtained using one of the temporary sampling methodologies outlined in Appendix A. Permanent wells ehould only be installed in those portions of the site where contaminants other than metals were detected at levels exceeding MCLs during Phase I. The function of these wells would be to confirm, characterize and monitor the detected contamination.

   The results of this next round of field work should be presented to the parties for evaluation and final determination as to whether a full-scale RI/FS will be required for the site. The emphasis must thus be on performing work and collecting samples which are of sufficient caliber to determine whether or not the site requires further action.

b. For RI/FS sites, EPA is in agreement with the Navy on the objectives of the upcoming field event, i.e. to (i) "[identify] the full spectrum of potential on-site contaminants as well as the maximum levels of occurrence" and to (ii) delineate and confirm the extent of contamination. In order to aesure accomplishment of these goals, EPA recommends the following investigative approach.

   First, perform the site assessment described in "a." using rapid analytical turnaround times to achieve a preliminary list of the contaminants and concentrations (goal (i)). Use this information to devise a list of screening parametere tailored to individual PSC characteristics. Submit the proposed list and justification to EPA and FDER for review/approval prior to proceeding with the investigation.

Use the focused analyte list to perform a subsequent screening delineation sampling round, the purpose of which is to delineate the full lateral and vertical extent of soil and groundwater contamination a0 quickly and cheaply as possible. This can be effectively done using hand augers and/or one or more of the sampling methodologies described in Appendix A. Quick turnaround data for the limited analytes determined in the site assessment should be used extensively and fed directly back into the ongoing field study to guide sampling and field QA/QC until the extent of contamination is sufficiently known. A small percentage of the samples collected in this manner (e.g. 10-20%)should be analyzed using DQO Level IV methodologies to assure the continued accuracy of the screening analytical results.

The final investigative step will be to perform confirmation sampling in order to verify the screening results and collect data which is of adequate quality and quantity to support final risk and remedial action decisions. This should entail sampling from permanent sampling stations with analysis of the resultant samples using CLP (DQO Level IV, TCL/TAL) protocol. Thus, as soon as data sufficient to achieve the "delineation' goal has been obtained, the Navy should prepare a graphic and tabular presentation of the analytical results (as well as providing it in electronic format) and a graphic presentation of the proposed confirmatory sampling points. Following presentation of these reeults and recommendations to the parties and a brief evaluation period, confirmation sampling should proceed immediately to complete the investigation.

Finally, it should be noted that the sole purpose of using screening methodologies and a limited analyte list for purposes of extent delineation is to expedite this potentially lengthy portion of the investigation. In instances where the extent of contamination appears small, and/or may be readily delineated, it may be more time-, and cost-effective to combine the delineation and confirmation eteps. In this case, permanent wells should be installed and all samples analyzed using CLP (DQO Level IV, TCL/TAL) methodologiee. However, for sites or areas where no contamination, or only the questionable metals contamination, wae detected during Phase I, EPA recommends that one of temporary sampling methodologies described in Appendix A be used to collect samples for CLP (DQO Level IV, TCL/TAL) analyses. This practice should prove time- and cost-effective for those sites which are unlikely to require further monitoring or action. The preceding decisions must be made on a site-specific basis.

The current work plane must be expanded to include a description *of* the strategies to he employed in implementing each of the above steps. Finally, screening sites, or sites that are strongly suspected of not being significantly contaminated should be examined together, under a separate schedule, so that they do not impede the progress on higher priority sites.

4. The work plans should contain a discussion of data quality objectives (DQOs). DQOs *are* qualitative and quantitative statements, established prior to data collection, which specify the quality of the data required to support

decisions during remedial responee activities. Please refer to the U.S. EPA guidance document: "Data Quality Objectives for Remedial Response Activities" (EPA 540/G-87/003) for further information.

5. For Batch 2 sites with known/suspected groundwater contamination, the revised work plans must include plans for delineating the vertical, as well as horizontal, extent of groundwater contamination. The limited available data indicate that a relatively high downward hydraulic gradient exists between the two unite of the Sand and Gravel Aquifer for numerous sites. If either Phase I results or the site assessment samples collected in the early stages of the upcoming field work reveal the presence of shallow groundwater contamination, then one or more of the temporary groundwater sampling methods described in Appendix A should be used to delineate the vertical extent of contamination during this next round of field work. Particular emphasis should also be placed on adequate characterization of the presence, thickness, lateral extent and hydraulic characteristics of the reported "low permeability zone" for sites where groundwater contamination exists.

6. In general, selected soil samples collected from beneath the surficial water table during the initial/site assessment and the final confirmation sampling should be analyzed for full scan analytical parameters, not just metals, since numerous sites have known or suspected contamination with solvents and waste oils. Contaminated soils beneath the groundwater will act as continuing sources of contaminants to the groundwater.

7. In each Interim Data Report the contaminant concentrations in soils were compared to the RCRA Proposed Corrective Action Levels (PCALs) for soil Contamination. It should be noted that these action levels apply only at RCRA sites and were designed as part of the Risk Assessment to protect humans that may be directly exposed to surface soils. These values cannot be ueed at Superfund sites as a guideline for the contaminant concentration levels in soils that will protect ground water. Soil Action Levels that will be protective of ground water must also be determined on a site and chemical specific basis.

8. Each Work Plan should include a potentiometric surface map of the surficial aquifer for the site area.

9. At some sites it is propoeed that specific capacity testing will be conducted during the development of the newly installed wells. Specific capacity tests performed during well development will not provide accurate test results, since the specific capacity will increase as the well is being developed. The values obtained during development may thus be lower than the actual specific capacity. In order to assure accurate results, the well must be developed, and the water level allowed to recover, before performing these teste.

10. The Phase I RI data indicate'that groundwater contamination exceeding MCLs or ARARs exists at numerous sites in Groups F, G, J, K, M and N. The Sand and Gravel Aquifer (S&GA) is classified as G-1, potable sole-source, according to the RI/FS Work Plan. The analogoue EPA aquifer classification is designated

as Class 1 "irreplaceable" groundwater. As such, groundwater remediation is likely to be required at NAS Pensacola.

The proposed hydraulic characterization of the S&GA using "slug" teete and short-term specific capacity tests is appropriate only to assist in the design of full-scale aquifer teats. Slug teete, particularly in high-permeability eande, only evaluate the hydraulic conductivity of a small cylinder of the aquifer immediately adjacent to the well bore. The data generated by a specific capacity test in an unconfined aquifer will yield data only on the pumping rate that the tested well will sustain with a specific level of drawdown. This data is useful for the design of a full-scale aquifer test, but will not characterize the hydraulic properties of the aquifer.

A full-scale aquifer test should be conducted on a background well location at each group location where groundwater extraction and treatment is likely. If the main producing zone of the S&GA can be shown to be unaffected by waste disposal for the Operable Unit, the aquifer test should be conducted on a well that fully screens the surficial unit. If the main producing zone hae been affected, the aquifer pumping test program should be conducted in this, as well as the surficial, zone of the S&GA. The aquifer test should be designed by an experienced hydrogeologist to evaluate the hydraulic properties of the aquifer and underlying aquitard, the leakance between the units of the S&GA, and the radial influence of pumping and any boundary effects.

11. Computer modeling of groundwater systems can be a valuable, powerful tool when correctly applied to site studies by an experienced hydrogeologist. In light of the hydrogeologic description provided in the RI/FS Work Plan, the proposed groundwater modeling, utilizing one or more of the listed two-dimensional flow models, does not seem appropriate. A flow model which allows vertical discretization of hydraulic properties, as well as horizontal and vertical boundary effects, would be more appropriate for evaluating groundwater and advective contaminant movement at these sites.

With regards to computer modeling at sites where radionuclide contamination exists, EPA recommends use of one of the following two models for determining the risks, doses, etc. as a result of the transport mechanism: RESRAD (from DOE-Argonne National Lab) and GENII (from DOE-Pacific Northwest Lab).

The appropriate work plan text (i.e. Section 16) should be revised to state that models other than the proposed 2-dimensional RANDOMWALK will be considered and utilized as appropriate. A list of potential models, as well as the factors which will likely determine which model(s) will ultimately be used, should be provided in this section.

12. The comparison of groundwater samples to standards should include federal maximum contaminant levels (MCLs) and treatment technique action levels as well as the proposed MCLs when they are lower than the Florida standards or where there is no Florida standard. For example, the federal proposed MCL for nickel is 100 ug/L, the MCL for Cadmium is 5 ug/L, the treatment technique action level for lead is 15 ug/L, and the proposed MCL for methylene chloride is 5 ug/L.

13. The proposed soil sample intervals (0-0.5, 0.5-2.5, and 2.5-5 feet) are not consistent with risk assessment data needs. For risk assessment purposes, EPA Region IV defines surface soil as 0 to 1 foot below land surface.

14. The results of the habitat/biota survey should be provided for each site. These results were not included in the Interim Data Reports for Sites 9, 29 and 34. If the site primarily consists of buildings and pavement, this should be stated in the survey summary. The habitat/biota map for each site should indicate the types of habitats present in each unpaved/vegetated area. This information is needed to evaluate the proposed Phase II locations for purposes of ecological risk assessment.

15. While it is acceptable to defer any biological sampling until after the Contaminants of concern have been sufficiently characterized, the need for such sampling should be identified, and the sampling performed, as early in the process as possible (i.e. probably during the latter portion of the screenins delineation). Biota sampling must be performed as part of the PSC-specific investigation when it is needed to assess the ecological rieke that exist within, or immediately adjacent to, PSC boundaries (e.g. burrowing organisms). This information will be needed to complete the Baseline Risk Assessment for the individual PSC, not for OUs 15-17. Its collection should therefore not be delayed to the investigation of these latter Operable Unite.

16. Interim reporting, when necessary, should be done in an expeditious manner which emphasizes rapid, succinct communication of only the essential information. Description of field, and any other, methodologiee should be limited to a reference to the approved work plans unless modifications occurred during the implementation. The reeults should be communicated/ presented through the use tables and figures to the maximum extent possible. Text should primarily be limited to interpretation and evaluation of the results and description of the remaining data gaps. A verbal presentation by the contractor, followed by the reviewer's evaluation of the data in electronic format, may also expedite and improve the reviewers understanding of the investigative results.

17. The discussion of FS tasks and reporting is very brief and needs significant expansion. The RI/FS guidance document should be consulted for particular requirements. Previous comments on RI/FS Work Plane for other Operable Units/Groups at NAS Pensacola must be addressed. These comments include the following:

a. description and details of the specific tasks to be performed as part of the FS must be included in the present RI/FS Work Plan.

b. The text should be clarified to show that the FS scoping activities will be performed concurrently with the RI.

c. Specify what is meant by the term "applicable". Specify how the determination will be made as to whether a given technology is "applicable". The contractor's engineering judgement" is not an appropriate selection criteria. Please refer to chapter 4 of the

guidance for further clarification of the screening and remedial technologies.

d. General response actions must be developed prior to the identification of potential treatment technologies. This process must be more clearly identified and described. Pleaee refer to the RI/FS guidance.

e. Specify how the screening and assessment of potential technologies differ. Please review and expand this section in accordance with pertinent portions of the RI/FS guidance document (e.g. Sections 4.1.2.1, 4.2.4, Fig. 4-4). The selection criteria listed here are incomplete and incorrect.

f. The Risk Assessment does not play a role in the technology or process option selection processes. Some of the evaluation criteria used in the Detailed Analysis of Alternatives are risk-based (e.g. will the remedial action provide for overall protectiveness of human health and the environment). However, the Risk Assessment is not formally tied in to the process until after the RI/FS is completed (see Section 6.3 of the RI/FS guidance).

g. Please refer to the RI/FS guidance for a complete listing and description of those steps in the FS procees which follow the identification of potential technologies and revise/expand this section accordingly. Also, please note that treatability studies are typically needed whenever treatment has been identified as an alternative. If treatability studies will be conducted, then the necessary information and plans, as per the RI/FS guidance (Chapter 5) must also be included.

h. The final task of the FS is to present a comparative analysis of alternatives against the evaluation criteria (see Section 6.22 of the RI/FS guidance). It is not the taek of the contractor to select the Remedial Action for a site. Please refer to Section 6.3 of the RI/FS guidance document for further description of the selection process.

i. Greater detail on the organization and content of the FS report is needed. Please refer to appropriate sections of the RI/FS guidance document (e.g. Table 6-5).

18. In general, EPA recommends the eubmittal of three separate technical memos prior to eubmittal of the Draft Baseline Risk Assessment (BRA), in order to assure the adequacy and completeness of the latter document. These technical memos are as follows:

a. Preliminary remediation goals
b. Hazardous substances present at the site, including those selected as site contaminants of concern (COCs)
c. Exposure scenarios and descriptions of the exposure assumptions for each scenario
d. Environmental Evaluation

For further deecription of the contents of each memo, please refer to Appendix

B which contains excerpts from a statement of work which is provided to BPA contractors tasked to prepare risk assessments for private sites.

19. The Navy proposes to perform the upcoming field work under the guidance of the previously-approved GQAPP. This is acceptable to EPA provided the GQAPP is revised to meet the minimum specifications of the Region IV, Environmental Services, Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM), February 1991. This is necessary because the Phase I field work performed under the guidance of the GQAPP was of poor quality. In addition, EPA recommends closer oversight of the Navy contractor field activities by U.S.EPA at NAS Pensacola to ensure full compliance with the approved work plans.

20. The following comments, all of which have been made for numerous preceding work plans, pertain to the Baseline Risk Assessment section (Section 18) of each work plan:

A. The selection of indicator chemicals is not appropriate for site characterization and risk assessment purposes. Section 5.8 of Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A) (RAGS-I) details the selection of chemicals of potential concern.

B. The final step in the exposure assessment is to develop quantitative estimates of exposure. A qualitative estimate is not acceptable in the vast majority of contaminant pathway scenarios.

C. The reference to IRIS should be moved to Section 18.3. IRIS should be utilized as the primary source of toxicity information.

21. For each work plan, the reference to Standard Methods for the Examination of Water and Wastewater on page 8 of Appendix B needs to be updated to the 17th edition, 1989.

Group F: Site 9 (Navy Yard Disposal Area).

GENERAL COMMENT:

1. Examination of the Phase I data, including borehole lithologies, OVA/Hnu response and analytical results indicates that either little contamination exists in this area or that all samples were collected outside the boundary of the site. No trash or fill material was noted in the descriptions of cuttings, indicating that these were not located in the disposal area. A borehole to examine the industrial sewer (site 36) constructed in the approximate center of site 9 likewise encountered no fill material or contaminants, The only contaminant encountered on the site was lead in groundwater collected from temporary monitoring wells.

This site should be assessed with the working assumption that no remedial action will be required. There is no indication that any permanent monitoring wells are required at this site.

SPECIFIC COMMENTS:

1. Page 14-17:
There is some indication of low level radioactivity in certain areas of the site. A biased soil sample must be collected from the precise area of the highest readings of radioactivity and analyzed for alpha, beta, and gamma parameters.

2, Pages 14-20, 14-25 and 14-52:
A. An additional soil sample must be collected in the vicinity of soil boring B003 to confirm and characterize the nature of the elevated PAH concentratione.

B. In the course of Phase II boring installation and soil sample collection, if field observations or sample screening techniques suggest the presence of significant contamination in the vicinity of borings B002 or B003, then additional soil samples must be collected during this same field event in order to adequately delineate the extent of the contamination.

C. Since only metals were detected in the samples from temporary wells, and the metals concentrations in samples collected from permanent welle were below MCLs, groundwater samples should be collected first using one of the alternate methods described in Appendix A. Existing permanent wells should also be resampled. If these samples contain concentrations below MCLs, then additional permanent monitoring wells will not be needed for the site.

Group F: Site 10 (Commodore's Pond)

GENERAL COMMENT:

1. Examination of the Phase I data for this eite indicates that this area may be contaminated. However, neither the source of the contamination, nor any other firm conclusions, can be drawn from the Phase I data due to the numerous QA/QC difficulties which were encountered. Available historical information indicates that this area wae not ueed as a disposal site, while the Phase I analytical data indicates that contamination is present. If the area is contaminated, the source may be either the industrial sewer or possibly contaminated soils ueed to backfill the pond.

This eite should be assessed with the working assumption that remedial action may be required.

SPECIFIC COMMENTS:

1. Page 14-17, Paragraph *8:*
Lead concentrations of 6 to 34 times the drinking water action level are too high to be considered "endemic or ambient".

2. Pages 14-20, 14-26, 14-52, and 14-54 through 14-57:
A. As stated on page 14-20, one of the goals of the Phase II sampling is to evaluate and delineate the extent of soil contamination. Soil samples ehould be collected from beneath the water table as needed to accomplish this goal. Specifically, probable locations for the collection of such additional soil samples include Phase II boring locations 5, 12, 23 and 28. Highly elevated phenol concentration6 were detected at each of these locations during Phase I.

B. The majority of the contaminants detected in ground-water samples at Site 10 were metals. The moet notable exception wae the sample collected from TW002, where 10,000 ppb of trichlorophenol wae detected. High concentrations of phenols were also detected in borings B002 and B005. In order to delineate the lateral and vertical extent of this groundwater and soil contamination, one of the alternate methodologies described in Appendix A ehould be ueed.

C. Permanent monitoring wells should be installed at proposed locations 12 and 23 in order to monitor the phenols plume detected in the soils and/or ground water (i.e. borings B002 and B005).

D. Due to the high concentrations of phenols detected in monitoring well TW002, an intermediate ground water sample using one of the screening techniques deecribed in Appendix A muet be collected adjacent to proposed well 12.

E. As discussed on page 3-2 of the Interim Data Report, culvert 751 discharges surface water runoff into a stormwater drain eyetem which, in turn, outfalls into a paved drainage ditch located on site 23. A surface water/sediment sample must be collected at the latter outfall area.

F. As stated on page 3-5 of the Interim Data Report for Site 10, "Water in the paved drainage ditch...exhibited an oily sheen at the time of the survey, and several seep-like discharges from the paved banks were identified." A surface water/sediment sample must be collected at the discharge point of this ditch, shown in figure 14-9, and from each of the observed seeps.

G. As stated on page 3-30 of the Interim Data Report, "The persistence of TRPHs in all the intervals sampled at boring B00S (in the west-central area of the site) and the very high phenol concentrations detected above the water table indicate another potential source impacting Site 10, possibly from an area west of the site.". Additional soil samples aimed at confirming, characterizing and delineating this source, as needed, must be proposed for collection during Phase 11.

3. Page 14-26, Figure 14-9:
A. The rationale presented for the clusters of soil borings and/or monitoring wells shown in this figure is inadequate. The proposed sampling seems to be excessive. This comment is applicable to several other sites and work plans and must be addressed for these as well.

B. What was the purpose/function of the two concrete pads located in the northeast corner of the site. Do the aerial photographs indicate when the pads were first installed?

Group F: Site 23 (Chevalier Field Pipe Leak Area)

GENERAL COMMENT:

1. This site should be assessed with the specific goal of determining whether contaminants which are not attributable to the fuel pipeline *are* present. If no euch contaminante are present, but fuel-related contaminante are confirmed, this site should be remediated under the guidelines of the **UST** program.

The installation of permanent monitoring wells is premature, given the lack of a definitively located source area.

SPECIFIC **COMMENTS:**

1. Page **14-18,** paragraph **6:**
Arsenic, chromium, lead, cadmium, nickel, copper and silver all exceeded federal MCLs at this site. The levels of lead (18 to **2,300** times the drinking water action level) and arsenic (maximum concentration of **2** times the **HCL)** are too high to be considered "endemic or ambient".

2. Pages **14-26:**
While it is helpful to include the proposed soil and groundwater locations for adjacent sites in this, and other, figures, the samples proposed for the site depicted in the figure at hand (in this case, Site **23)** must be more clearly indicated. For example, either assign a "Site Number" prefix to each proposed sample (e.g. boring **B23-001** as opposed to boring 8001) or include the believed site boundaries in each of the figures. This will allow the reviewer to accurately determine and evaluate the samples proposed for each site and relate these to the subsequent text. This comment is applicable to each of figures **14-8** through **14-12.** It should also be addressed for the remaining work plane in this batch, where appropriate.

3. Pages **14-27** and **14-52:**
Soil samples must be collected from beneath the water table surface as needed in order to ensure that the vertical extent of any soil contamination present is adequately delineated. Probable locations for such soil samples include the proposed shallow well locations, since these represent locations where significant soil and/or groundwater contamination was detected during Phase I.

Group F: Site 29 (Soil South of Building 3460)

GENERAL COMMENTS:

1. EPA recommends thie site be combined with site 36 and eliminated ae a separate entity. The recommendations for site 36 should address the issues for this site. Following evaluation of the condition of the sewer line in thie area, if additional investigation is needed to delineate the extent of contamination, the following specific comments muet be considered.

SPECIFIC COMMENTS:

1. Pages 14-28, 14-53 and 14-54:
A. Additional soil samplee should be collected from beneath the water table eurface at each of the proposed "shallow" monitor well locatione and analyzed for Analytical Suite A to characterize soil contamination with depth.

B. Surface water/sediment samplee muet be collected from the stormwater draine shown in Figure 14-11. Aleo, indicate where the surface water entering these drains diachargee to. Does it eventually reach the paved ditch which leade to the creek and Bayou Grande?

C. A permanent well should be inetalled at proposed location 52 to monitor for the methylene chloride contamination which wae detected in the sample from TW008. Remaining wells should be installed using one of the temporary methods described in Appendix A, since only metals contamination was detected in the remaining Phase I ground water samplee.

Group F: Site 34 (Solvent North of Building 3557)

GENERAL COMMENT:

The historical data states that chlorinated solvent was spilled in this area. The available Phaee I data indicates that this area is contaminated, but not with the spilled material. Rather, the contamination may be attributable to the industrial sewer. This site should be assessed with the goal of determining whether or not a source of contamination separate from the industrial sewer is present. If such a source cannot be identified, this site should be combined with site 36 and eliminated as a separate entity.

The existing wells should be resampled as part of the assessment.

SPECIFIC COMMENTS:

1. Pages 14-29, 14-53 and 14-54:

A. Additional soil samples should be collected from beneath the water table surface at each of the proposed "shallow" monitor well locations and analyzed for Analytical Suite A to characterize soil contamination with depth.

B. A permanent well should be installed at proposed location 7 because of concentrations of PAHs (190 ppb) and phenols (960 ppb) detected in ground-water samples from TW0011. The remaining proposed locations can be screened as described in previous comments to confirm the absence, or delineate the extent, of groundwater contamination.

Group G: Site 25 (Radium Spill Area)

GENERAL COMMENTS:

1. The following Interim Remedial Measures (IRMs) are recommended for this site:

A. Fences and warning signs should be posted in all portions of the site where values exceeding two times background were detected during the radiation survey.

B. Soils in this area should be immediately assessed for radioactivity, and remediated to the radiation standards set for surface and subsurface soils, if these are exceeded.

C. The soils around the transformer should be examined and remediated to the standards for PCB contaminated soils set by TSCA.

2. Following completion of the above IRMs, Site 25 should undergo a screening investigation, if sufficient data to determine contaminants of concern and their levels of concern can be determined. In general, the VOC groundwater contaminant plume in this area should be delineated prior to installing more permanent monitoring wells.

SPECIFIC COMMENTS:

1. Page 14-1, Paragraph 1:
"Learn[ing] more about the history of this site" will be critical to determining how far the investigation should go to achieve full characterization of the radium contamination. EPA agreee that some of the elevated gamma levels may be from the natural radionuclides in the asphalt and concrete. However, there appears to be enough current and historical evidence to suggest the presence of contamination beneath these areas. In order to fully characterize the radium contamination and determine it's migration potential, it may be necessary to remove the overlaying concrete or asphalt (see p.3-4 of Interim Report). The problem lies in determining whether disturbing the surface will cause more contamination and/or migration of the radium. This problem must be addressed and resolved in the upcoming investigation.

2. Page 14-15:
Proving that there is no offsite migration or contamination should also be an objective of the upcoming investigation.

3. Pages 14-20, 14-24 through 14-25, and 14-30 through 14-33:
A. Additional soil samples should be collected from beneath the water table surface at each of the proposed soil boring locations east of building 780 to characterize soil contamination with depth.

B. Permanent monitoring wells should be installed at locations of known radioactive contamination and hot spot areas, including proposed locations 21 and 27. Also, a permanent background well should be installed at proposed

location 2. The remaining proposed well locations should be screened ueing one of the techniques described in Appendix A to determine the extent of contamination prior to installing additional permanent welle at the site.

c. In order to determine the vertical extent of contamination proximate to the reported spill area, a ground-water sample should be collected adjacent to well 21 in the basal portion of the surficial aquifer.

4. Page 16-1:
The proposed assessment for modeling current and future groundwater flow, fate, and transport should include more than just flow models. For radionuclides migration and soil cleanup guidelines, EPA suggests DOE's RESRAD computer model. This code was developed out of Argonne National Lab for FUSRAP sites (Ra, U, and daughters), but is now being applied at a variety of sites, including: Cs-137 leak at a radiation sterilizer, Georgia; NORM site, Kentucky; several DOE sites; etc.. With enough site-specific parameters a good estimate of soil cleanup guidelines can be achieved. A contact for the code is Charley Yu at 708/972-5589.

5. Ra-226 contamination in groundwater exceeding 5 pCi/L is said to be "widespread" (Interim Data Report, page 4-1). This is not apparent from the levels reported so far. Phase II must focus on the spread of Ra in groundwater to ensure that the offsite public has not been exposed, and to ensure against future exposure.

Group Gt Site 27 (Radium Dial Shop Area)

GENERAL COMMENTS:

1. The following Interim Remedial Measures (IRMs) are recommended for this site:

A. Fences and warning signs should be posted in all portions of the site where values exceeding two times background were detected during the radiation survey.

B. The soils in this area should be Immediately analyzed for radioactivity, and remediated to the radiation standards set for surface and subsurface soils where these are exceeded,

C. It seems very likely that the abandoned sewer line (now plugged) may exceed the cleanup standards for radioactive materials. The line should be located, evaluated, and removed if necessary.

2. Following removal of the radioactive contaminants, this site should undergo a screenina investiaation, if sufficient data to determine contaminants of concern and their levels of concern can be determined. In general, the VOC groundwater contaminant plume in this area should be delineated prior to installing more permanent monitoring wells. Some shallow groundwater samples showed elevated Ra levels. The next round of field work should adequately delineate the extent of this latter contamination and it's migration history and potential as well,

SPECIFIC **COMMENTS:**

1. Page 14-8:
The statement is made that a sediment sample will be collected from the sewer outfall, yet Section 3.2 (page 3-3, paragraph **4)** states that the sewer line "terminates in the sewage treatment plant". Clarify whether there **is an** open aewer outfall associated with the sewer line.

2. Pages 14-21, 14-31 and 14-32:
A. Additional soil samples should be collected from beneath the water table surface at each of the proposed soil boring locations to characterize soil contamination with depth.

B. Due to the elevated radium-226 concentrations detected at boring B016 and the potential for PCB contamination, soil samples should be collected adjacent to the transformer concrete slabs on the south side of the former building *709.* A soil sample should also be collected adjacent to the concrete slab near manhole N-5 unless the use of this alab can be determined and verified as **an** unlikely source of contamination.

C. Permanent wells should **be** installed in areas **of known** contamination, including locations proximate to Phase I temporary wells TW015 and TW017, where Significant levels **of** radium-226 were detected. During installation of these wells, ground-water samples should be screened by an alternative method

(temporary well, hydropunch, etc.) to determine the extent of the contaminant plume.

3. The following comments pertain to the radiation survey conducted for Site 27, as described in Sections 2.4 and 3.4 of the Interim Data Report. These comments are applicable to Site 25 as well.

A. The instruments used for the radiation surveys (ae described in Section 2-4 of the Interim Data Report) are not adequate for the low microR levels, e.g. in the general areas. EPA recommends using a Pressurized Ion Chamber (PIC) and a Ludlum microR-meter. When calibrated for the Ra-226 gamma energies they are much more accurate in providing real radiation exposure rates. The reported levels of approximately 25,000 dpm for background and 653,000 for the highest level translate to approximately 11,000 pCi and 294,000 pCi, respectively.

6. The 1.0 uR/hr readings for the Bicron are too low to be accurate. There is no area with background levels this low. 5 to 10 uR/hr are typical background levels for Florida (away from phosphate areas). The PIC can be very accurate for 1 m and general area readings.

C. It is assumed that the dpm and uR/hr readings provided are relative radiation readings and not true readings. Regardless of the instrument used, it must be calibrated against Ra-226, and the radiation units given must be explained against actual radiation units and background levels.

Group J: Site 3 (Crash Crew Training Areal

GENERAL COMMENTS:

1. This site should be assessed with the goal of determining whether or not materials other than pure petroleum products were burned in these areas. If feasible, Site 3 should be exempted from CERCLA/RCRA requirements under the petroleum exclusion clause. This would enable this area, and the associated groundwater contamination detected during Phase I, to undergo immediate remediation.

2. The fire training areas should be moved to an uncontaminated portion of the site and reconstructed on a containment pad or pit to prevent future releases of materials.

SPECIFIC COMMENTS:

1. Page 5-9, Section 5.2:
The wetland areas at Site 3, as noted in Figure 3-1 of the Interim Data Report, should be mentioned in this section.

2. Page 6-2, Section 6.2:
The same wetland areas and the stormwater drainage system should be mentioned in this section.

3. Page 14-8, Section 14.2:
If possible, the area of pereistently stressed vegetation aseociated with Site 19 (page 2-4, Section 2.2) should be addressed in conjunction with future activities under the Navy's Underground Storage Tank Program.

4. Pages 14-17 and 14-30, Figure 14-4 and Section 14.2.3.1:
The portion of the stormwater drainage system viewed during the recent Ecological Scoping Tour was an open ditch with standing water; no catch basins with grates were viewed. Would surface water and sediment samples from the catch basins be more representative of contaminant migration than aamples from the ditch itself, especially given the presence of wetland vegetation in the ditch?

5. Pages 14-17 through 14-19 and 14-30 through 14-33:
A. Additional soil samples must be collected from beneath the water table surface at each of the proposed "shallow" monitor well locations and analyzed for "Suite A" parameters to characterize soil contamination with depth.

B. Permanent monitoring wells should be installed in areas of known organic contamination, i.e., proposed well locations 79 and 81. A permanent background well should also be installed, either at location 72 or location 74. The remaining proposed monitoring well locations should first be screened using one of the temporary methods mentioned described in Appendix A. Once the contaminant plume is delineated, permanent monitoring wells should be installed at the appropriate locations.

Group K: Site 7 (Firefighting School)

GENERAL COMMENTS:

1. Available information indicates that this site is not significantly contaminated. The site should be assessed with the goal of determining whether it can be exempted from CERCLA/RCRA requirements under the petroleum exclusion clause. If the site assessment finds no significant contamination, the site should be dropped from further consideration.

SPECIFIC **COMMENTS:**

1. Pages **14-21,** and **14-34** through **14-36:**
A. Additional soil samples should be collected from below the water table surface at each of the proposed "shallow" monitor well locations and analyzed for "Suite A" parameters to characterize soil contamination with depth.

B. Ground-water samples collected from TW007 contained significant levels of benzo(a)pyrene (190 ppb). Therefore, a permanent monitoring well (proposed well 4) should be installed here to monitor the concentration levels. A background well should also be installed at the site. The additional proposed locations for collecting ground-water samples should be screened using one or more of the alternative techniques described in Appendix A. Samples should be collected at sufficient locations to delineate the extent of the contaminant plume. Following evaluation of these results, permanent wells should be installed, where appropriate, to monitor the plume.

Group K: Site 21 (Sludge at Fuel tanks Areal

GENERAL COMMENTS:

1. Following completion of the Interim Remedial Measure (IRM), all of site 21 should undergo a site assessment/screening delineation with the goal of determining and characterizing (i) the extent of the VOC groundwater contaminant plume, and (ii) areas of heavily contaminated soil.

SPECIFIC COMMENTS:

1. Pages 14-17 through 14-19:
The Interim Remedial Measure (IRM) on tanks 643 and 644 ehould take place ae soon as possible. The IRM should also addrese the soil adjacent to and southeast of Tank 357. The Interim Data Report indicates that soils adjacent to and southeaet of Tank 357 exhibit elevated concentratione of lead, polynuclear aromatic hydrocarbons, phenols, VOCs and total. recoverable petroleum hydrocarbone. Furthermore, it is important that the IRM be coordinated with the site assessment such that soil samples are collected in the removal area prior to its being backfilled.

2. Pages 14-22, and 14-34 through 14-37:
A. Additional soil borings/soil sampling should be conducted around the perimeter of the five former aboveground tank locations north of Radford Boulevard to characterize the extent of soil contamination at these locatione.

B. Additional soil boring/soil sampling must be conducted around the perimeter of existing tank locations 643, 644 and 357 to delineate the extent of soil contamination at these locations.

C. Following completion of the site assessment in the upcoming round of field work, additional "shallow" groundwater samples muet be collected as needed to delineate the extent of any groundwater contamination downgradient of existing tanka 643 and 644. These should be collected using one of the temporary sampling methodologies described in Appendix A.

Group M: Site 31 (Soil North of Building 648)

GENERAL COMMENTS:

1. Table 3-1 of the subject document indicates substantial groundwater contamination with chlorinated solvents may be associated with thie site (wells GM-55 and GM-58). The origin of the contaminants in wells GM-55 and GM-58 must be determined in the next round of field work. If Site 31 cannot be confirmed as the source of the contaminant plume and no on-site soil contamination of significance is detected, thie site should be dropped from further consideration.

SPECIFIC COMMENTS:

1. Page 14-9, Paragraph 1:
This site is designated as an RI/FS site in Appendix A of the Federal Facilities Agreement. The statement that "A full-scale RI/FS will not be warranted at Site 31" must therefore be deleted. The RI may indicate that no remedial action is necessary. However, an RI Report, including a Baseline Risk Assessment, must be completed for this site.

2. Page 14-11, Section 14.2.1:
The structural integrity of the waste oil tank and aseociated piping should be evaluated by pressure testing during the "Contaminant Source Survey". Elevated levels of polynuclear aromatic hydrocarbons and total recoverable petroleum hydrocarbons have been detected at the site, and the waste oil tank is a probable source of these types of contaminants.

Group N: Site 36 (IWTP Sewer Areal

GENERAL COMMENTS:

1. The industrial waste sewer site cannot be characterized as a conventional site. The underlying assumption of the RI/FS process is that there is no continuing release of contaminants to the environment. It is EPA's strong recommendation that no further monitoring of this site be performed until the Navy adopts and implements an engineering plan that addresses these issues. The Navy should therefore make a proposal to U.S.EPA to provide positive confirmation of the current condition of the sewer. This proposal should also include recommendations to repair or replace this sewer line in order to stop the ongoing release of any contaminants. The following proposals should be considered by the Navy:

(i) Complete excavation and replacement of the sewer line: especially those sections that are not force main. The replacement sewer line should either be unjointed and compatible with the waste materials it will carry, or double walled, etc. It must be constructed in such a manner that leaks can be easily detected and located. If the existing parts of the line that are force main are retained, tests must be performed to USEPA's satisfaction to show that these are not leaking. A schedule of periodic testing must be submitted for review. The Navy should also institute a waste minimization program.

(ii) Complete excavation and abandonment of the sewer line: institute a waste minimization program and haul hazardous waste off site for treatment.

(iii) Complete excavation and abandonment of the sewer line: institute a waste minimization and haul the waste material to the on site industrial wastewater treatment plant.

It will be noted that all of the suggeetione outlined above entail complete excavation of either the entire sewer line or at least those sections that are not force main. EPA believes that this is the only approach which will eneure that all leaks are successfully located and marked for future monitoring/ remediation. However, EPA is willing to examine alternate proposals that may be put forward by the Navy. The most contaminated soils should be removed during the excavation and examination of the existing sewer line as an IRM.

2. Given the large amount of data collected €or Site 36 during Phase I, the following comments regarding presentation of the data are provided:

(i) Contaminant isopleths outlining the extent of contamination must be prepared using data no older than August of 1990. The isoplethe ehould be drawn for both the shallow and intermediate well depths and should reflect various cleanup goals or options. Areas of'the site where this cannot be done due to lack of data would be candidates for further sampling. In other words, the locations of sampling sites, proposed wells, etc. should not be finalized until the data gaps pertaining to the extent of contamination have been positively identified. Once the

isopleths have been generated and the data gape identified, the Navy ehould consider collecting theee eamplee ueing one of the temporary groundwater sampling methodologiee described in Appendix A. If any additional permanent wells are needed, theee may be installed immediately following collection of the data via one of the temporary sampling methodologiee.

(ii) Groundwater contour maps ehould be prepared showing water level elevations during operation of the groundwater recovery eystem

SPECIFIC COMMENTS:

1. Page 2-3, Figure 2-2:
The building numbere muet be legible, since specific buildings are mentioned in the text.' If the building numbers on this figure cannot be enlarged, a copy of Plate 1 (Plan Map) from the Interim Data Report must be included in the Work Plan.

2. Page 3-1, Paragraph 3:
Thie section mentions a fish kill resulting from an industrial waste epill. The location of the pump that failed and the eurface water body and epecific location where the fish kill occurred muet be provided in the work plan text.

3. Pagee 3-1 to 3-2:
Plate 1 (Plan Map) from the Interim Data Report shows the industrial waete line near Building 3460 ae a gravity line rather than a force line. It also shows inpute from other buildings in addition to Buildings 71 and 72, indicating other possible sources of the waste. The work plan text ehould be clarified accordingly.

4. Pagee 14-13 and 14-15, Figure 14-2 and Table 14-3:
The rationale presented for sampling protocole C through H is inadequate to justify the extensive eampling propoeed. Unless adequate justification can be provided, the number of propoeed samples ehould be reduced.

5. Pages 14-53 through 14-54:
A. If permanent welle are installed, the surface casing muet have a large enough inner diameter (ID) to allow for a 2-inch annular space. For the propoeed 4-inch wells, an 8-inch ID surface caeing is far too small. The surface casing muet be large enough to accommodate the 8-inch ID auger that will be used to install the well.

B. EPA recommends that any wells inetalled in this area be conetructed of stainless eteel.

C. All wells muet be installed and developed in accordance with the U.S.EPA, Region IV, Environmental Services, Environmental Compliance Branch Standard Operating Proceduree and Quality Aseurance Manual (ECBSOPQAM), February 1991.

APPENDIX A

Following is a list, and brief description, of several alternate methods for collecting groundwater samples. These methods have all been effectively used by personnel in U.S. EPA Region IV's Environmental Services Division / Hazardous Waste Section (ESD/HWS) during various in-house remedial investigations over the years. As a general rule, ESD/HWS does not install permanent monitoring wells at a site during the site assessment. Instead, ESD/HWS has evaluated a variety of techniques for obtaining shallow groundwater samples quickly and cost effectively without permanent wells. ESD recommends that the following alternative methods be considered for use in the remaining field investigations in an effort to regain some of the time that has been lost.

a. Temporary Monitoring Wells as installed in the Phase I field work are a quick and effective method of obtaining shallow groundwater samples. The amount of sediment in the sample can often be reduced to an acceptable level by the use of a peristaltic pump if metals are a concern.

b. The GeoProbe is a device that can be successfully used in unconsolidated materials to a depth of 30 feet to obtain a groundwater sample. It is generally faster than a temporary well as outlined above, but the volume of sample retrieved often reetricte its use to characterizing VOC contamination. For many sitee, however, this is sufficient. One advantage of this device is that it generates very little if any Investigation Derived Waste (IDW). In addition, because cuttings are not brought to the surface, personnel can often use this device in highly contaminated areas with no protective clothing or respiratory protection.

c. The Piezocone and the HydroCone are devices for logging lithology and obtaining groundwater samples. Like the GeoProbe, no cuttings are brought to the surface. Because of sensors located in the tip, this device can sense when it is in water, enabling samplers to obtain the sample at a desired depth. This is an excellent method for determining where permanent wells ahould be constructed, types of screen to be used, the depth of screens, etc. Again, no cuttings are brought to the surface. In addition, temporary wells can be puehed by the firm that offers this technology, to obtain larger volumes of water.

d. The HydroPunch is a device mounted on a conventional drill rig. It is used to push the temporary well to a desired depth and obtain a groundwater sample. It can generally reach much greater depths than the devices outlined above. No cuttings are brought to the surface unless a pilot hole is drilled.

APPENDIX B

should contact the Regional Office of Health and Risk Assessment in the Waste Management Division when information cannot be obtained from other sources. The contractor shall utilize the Risk Assessment Guidance for Superfund - Volume II - Environmental Evaluation Manual in preparing the Environmental Assessment. EPA will provide other guidance for the Environmental Assessment as necessary during scoping of the work assignment.

TASK 1 - SCOPING

After a meeting with EPA, the contractor shall review the site Health Assessment prepared by ATSDR, the Hazard Ranking System (HRS) package and Preliminary Assessment/Site Investigation (PA/SI) documents, [list other specific documents to review], and other relevant file data in order to identify data needs which will be addressed by the Remedial Investigation. Additionally, the contractor shall identify chemical-specific ARARs and develop Preliminary Remediation Goals (PRGS) for both human health and ecological exposure pathways. The contractor shall submit a technical memorandum outlining these PRGs and data needs to EPA prior to the RI/FS Scoping meeting with the PRPs. The contractor shall also attend the Scoping Meeting, and review the PRPs' Draft RI Work Plan, to ensure that the quality and quantity of data that are planned to be obtained will satisfy all requirements for its use in the BRA.

TASK 2 - DEVELOPMENT OF BASELINE RISK ASSESSMENT

During the RI/FS, the PRPs will prepare a document, called a Site Characterization Report, which will contain the validated laboratory data from all sampling phases. This report shall be provided to the contractor by EPA in a timely manner. After receipt of this data, the contractor shall proceed with the Human Health Risk Assessment and the Environmental Assessment.

A. Human Health Risk Assessment

The Human Health Risk Assessment process consists of the four components listed below. During the scoping of the work assignment, the contractor shall discuss with EPA the format of the BRA Report as well as any additional references to be utilized during the Human Health Risk Assessment.

1. Data Collection and Evaluation:

The contractor shall review the information that is available on the hazardous substances present at the site and shall identify the contaminants of concern (COC). The initial reduction shall be based on an evaluation of quantitzsion limits, qualifiers, blank contamination, and background data. If necessary, a further reduction of these

contaminants of concern can be performed based on the frequency of detection, the concentration of contaminants on-site as compared to PRG levels, and relative toxicity. The contractor shall submit to EPA for review and approval a technical memorandum which contains a list of all the hazardous substances present at the site, including those selected as site contaminants of concern (COC). This memorandum shall include a discussion of the rationale for the selection of the COC. The data shall be tabulated to show the frequency of detection, the arithmetic mean and range of concentrations, and the sample collection date(s). In calculating the arithmetic mean for the data summary table, only samples with detected contamination ("hits") should be used. (Note: The non-detects are included in the mean calculation for the exposure concentration term in the daily intake equation.)

2. Exposure Assessment and Documentation:

The contractor shall identify actual and potential exposure points and pathways. Exposure assumptions must be supported with validatad data and must be consistent with Agency policy. Validation of data that has not previously undergone Agency review may be conducted as long as it does not delay the RI/FS schedule. For each exposure point, the release source, the transport media (e.g., ground water, surface water, air, etc.) and the exposure route (oral, inhalation, dermal) must be clearly delineated. Both present and future risks at the site must be considered and weighed, using reasonable maximum exposure (RME) scenarios. The Human Health Evaluation Manual, Part A and the supplemental guidance entitled Standard Default Exposure Factors, OSWER Directive 9285.6-03 should be consulted in development of exposure assumptions. The contractor shall submit to EPA for review and approval a technical memorandum describing the exposure scenarios and a description of the exposure assumptions for each scenario. If it is appropriate to use fate and transport models to estimate the exposure concentration at points spatially separate from monitoring points or media not sampled, these models shall be presented and discussed.

The Exposure Assessment Section in the BRA shall contain exposure concentrations typically based on the 95 percent confidence limit on the arithmetic average. The exposure concentration shall be used with the exposure assumptions from the technical memorandum to determine chemical-specific intake levels for each exposure scenario.

3. Toxicity Assessment and Documentation:

The contractor shall utilize the information in IRIS, HEAST, and if needed, other similar data bases and other

information sources to provide a toxicity assessment of the contaminants of concern. This assessment shall include the types of adverse health and/or environmental effects associated with chemical exposures (including potential carcinogenicity or the toxic effect observed in deriving the Reference Dose (RfD)), the relationships between magnitude of exposures and adverse effects, and the related uncertainties of contaminant toxicity (e.g., the weight of evidence for a chemical's carcinogenicity or the degree of confidence in the RfD). The toxicity information for each chemical derived from IRIS need only be summarized in this section, with a reference to IRIS. The toxicity section shall include tables which summarize the non-carcinogenic RfDs and carcinogenic slope factors for the contaminants of concern. If the dermal exposure route is considered to be complete, this section should also contain toxicity values adjusted to express absorbed doses and the absorption efficiency used to make the adjustment (See Appendix A of guidance).

4. Risk Characterization:

The contractor shall integrate the chemical-specific intake levels and chemical-specific toxicity values developed during the exposure and toxicity assessments to characterize and quantify the current and potential risks to human health and the environment posed by the site. The risk relative to chemical-specific ARARs should also be discussed in this section. The risk characterization must identify and discuss the uncertainties associated with contaminants, toxicities, and exposure assumptions.

5. Risk-based Remediation Goals

The contractor shall revise the PRGs based on site-specific information. The media, chemicals of concern, exposure scenarios, exposure assumptions shall reflect the information contained in the BRA. This analysis shall include exposures under both current and potential future use conditions. For carcinogens, the concentrations corresponding to a 10^{-6}, 10^{-5}, and 10^{-4} risk level should be presented. For systemic toxicants, exposure levels shall represent concentration levels to which a human population may be exposed without adverse effect during a lifetime (plus incorporation of an adequate margin of safety). For non-carcinogens, concentrations should be presented that correspond to a hazard index of 1 and 10. Remediation goals shall establish acceptable exposure levels that are protective of human health and the environment. Where appropriate, the risk-based remediation goals shall be compared with the risk-associated ARARs at the site. The remediation goal assessment section shall be the final chapter of the BRA Report.

B. Environmental Assessment

In addition to the BRA for human health, the risk to the environment from exposure to the contaminants must be addressed. A technical memorandum providing an environmental evaluation shall be submitted to EPA for review and approval. At a minimum, the environmental evaluation shall include the identification of potential receptors (species lists, including scientific names, of flora and fauna which may be affected by the site contaminants whether they are located on or off site), including the identification of any endangered or threatened species, or critical habitats which may be affected by the site contaminants whether they are located on or off site; identification of all existing and potential exposure pathways; estimation of the receptors' exposure to the site contaminants; and an estimation qualitative or quantitative, of the nature and extent of ecological risk or threat and environmental impact resulting from the site. Evidence should be provided which indicates the U.S. Fish and Wildlife Service and the appropriate state agency has been contacted for information concerning threatened and endangered species, and critical or sensitive habitats. The Environmental Assessment should address both existing and potential ecologic effects, under the "no action' alternative, of the site.

TASK 3 - REPORT PREPARATION

The contractor shall be required to prepare a work plan memorandum and the initial technical memorandum concerning PRGs and data gaps, as well as the three technical memoranda listed in tasks 2A and 2B above. The Baseline Risk Assessment Report shall be submitted within [Timeframe listed in Schedule of Deliverables] of receipt of the PRPs' Site Characterization Report.

The Baseline Risk Assessment Report shall include a comprehensive description of the four components of the Human Health Baseline Risk Assessment, and shall follow the principles established in the risk assessment guidance documents. A discussion of sources of uncertainty, data gaps, incomplete toxicity information, and modeling characteristics must be included. The contractor shall refer to page 9-4 of the Human Health Evaluation manual for an outline of the report format. The Baseline Risk Assessment Report shall include an environmental assessment which evaluates the environmental risk posed by the site contaminants of concern. All tables in the technical memoranda and the BRA Report shall be submitted in Lotus 1-2-3® format.

The work assignment will require submittal of monthly reports to EPA. The reports should contain all information required by the contract, plus the following: