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RESPONSE TO SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL  
CONTROL COMMENTS ON RESOURCE CONSERVATION AND RECOVERY FACILITY  
INVESTIGATION REPORTS DATED 14 APRIL 1998, 19 AUGUST 1997 AND 12 SEPTEMBER  
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ENSAFE INC.

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY  
NAVAL BASE CHARLESTON  
CHARLESTON, SOUTH CAROLINA  
CTO-029**



**RESPONSE TO COMMENTS FOR**

**FINAL ZONE A RFI REPORT**  
*(Section 10 - Site-Specific Discussions  
Dated April 14, 1998)*

**DRAFT ZONE A RFI REPORT**  
*(Site-Specific Discussions for SWMUs 1, 2 and 39  
Dated August 19, 1997)*

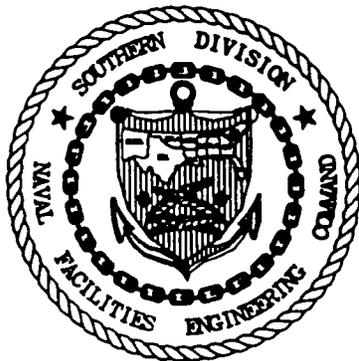
**DRAFT ZONE A RFI REPORT**  
*(Dated September 12, 1998)*

**NAVAL BASE CHARLESTON**

**Prepared for:**

Department of the Navy  
Southern Division  
Naval Facilities Engineering Command  
Charleston, South Carolina

**SOUTHDIV Contract Number:  
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**August 7, 1998  
Revision: 0**

**South Carolina Department of Health and Environment Control  
Comments on the Final Zone A RFI Report  
Section 10 — Site-Specific Discussions  
Dated April 14, 1998**

**Paul Bergstrand, SCDHEC**  
**(Comments received via e-mail July 8, 1998)**

**Comment 1:**

Pages 10.1.8, 10.1.11, 10.4.6 and 10.4.22

The tables on these pages compare contaminants detected to RBCs but do not compare contaminants with SSLs or MCLs. Previous comments have been made regarding the applicability of MCLs at CNAV. Also, there are several constituents, such as with mercury, where the RBC is greater than the MCL. SSLs and MCLs should be included on all appropriate tables.

**Response 1:**

*All requested data comparisons (RBCs, SSLs, and RCs for surface soil; SSLs and RCs for subsurface soil; RBCs and MCLs for groundwater) are provided within for each site-specific discussion. This comment specifically addresses the lack of all comparisons in the "nature and extent" subsections. The goal of this subsection is to provide a full data summary and prepare the reader, by calling attention to critical data, for the subsequent fate and transport and risk assessment subsections (where the data comparisons to applicable screening values are required and appropriate). While an advanced reader might want comparisons of the data to all potentially applicable screening values in the nature and extent subsection, the redundancy and complexity of providing all comparisons in this subsection would be detrimental to the overall presentation.*

**Comment 2:**

Page 10.2.34

This section of the report compares the maximum soil contaminants to SSLs then compares those values to maximum groundwater detections. It is not clear if the groundwater detections are downgradient from the highest SSL values. This type of comparison should be made using a figure or map. Please revise.

**Response 2:**

*Figures 10.2.9 through 10.2.16 (pages 10.2.47 through 10.2.61), which present all SSL exceedances and groundwater detections, have been added to the final version of the report.*

**Comment 3:**

SWMU 39

The possibility of groundwater influence from the storm sewers or the sanitary sewer should be included in the CMS investigation for this SWMU. The area of wells 39-013 should be included because some of the higher levels of contamination are detected here and they are in the vicinity of storm drain manholes. This contamination should also be considered along with any results from the Zone L investigation.

**Response 3:**

*The Navy concurs with this comment, and the influence of storm/sanitary sewers at this site will be addressed in the CMS.*

**Comment 4:**

Page 10.4.74, Data Contouring

The computer generated contaminants maps for SWMU 39 lack closure in the intermediate and deep wells. Groundwater flow maps indicate intermediate and deep groundwater flows to the east. The CMS workplan must provide resolution to this lack of data.

**Response 4:**

*The Navy concurs with this comment, and additional intermediate and deep monitoring wells have been proposed to fill this data gap as described in the July 30, 1998 technical memorandum, "Proposed Permanent and Temporary Well Locations at SWMU 39".*

**Comment 5:**

Pages 10.4.92 and 10.4.94

This section of the report discusses geoprobe data and the laboratory confirmation samples. It is not clear how the geoprobe data results compared to the laboratory samples. Please address.

**Response 5:**

*The text on page 10.4.118 has been revised to make it clearer to the reader how split samples were labeled and to compare the offsite data in Table 10.4.24 to the onsite data in Table 10.4.23 (pages 10.4.121 to 10.4.123). A detailed statistical analysis was not performed because the two datasets were comparable (i.e., compounds detected, concentration ranges, etc.), verifying that the onsite dataset was suitable for its primary intended use (i.e., selecting monitoring well locations).*

**Comment 6:**

Page 10.4.92

This section of the report discusses the extent of the shallow groundwater contamination based on shallow groundwater geoprobe data. This information should be presented on a map or figure 10.4.26. Please note, samples 4 and 6 were included in the samples which approximated the contaminate boundary. Sample 4 reported the highest PCE levels in the shallow aquifer and sample 6 reported moderate levels of Vinyl Chloride, both being above MCLs. Please revise.

**Response 6:**

*As requested, Figure 10.4.26 (page 10.4.119) has been revised to illustrate the extent of shallow groundwater contamination. The comment is correct in stating that groundwater samples collected at geoprobe locations GP004 and GP006 contained the aforementioned detections. However, the text refers to monitoring wells NBCA-002-004 and NBCA-002-006 when describing the approximate contaminant boundary.*

**Comment 7:**

Page 10.5.31, Section 10.5.5.1

This comment is similar to comment # 2. This section of the workplan discusses the leaching potential of soils to groundwater. In this case PCE was detected in soils at levels that are less than the SSL but PCE was reported in the groundwater above the MCL. The implications are that the SSL is not protective of groundwater or that the soil sample locations have not identified the hot spots at the spill site. This issue should be addressed in the report. Any other similar situations should be addressed in the CMS work plan.

**Response 7:**

*Section 10.5.5.1 (page 10.5.34) has been modified to address this issue. In this case, the neighboring VOC plume in SWMU 39 groundwater should be considered prior to concluding that the data indicates the SSL is not protective of groundwater or that the soil sample locations have not identified the "hot spots" onsite. The PCE detections in soil that this comment refers to are unrelated to the groundwater sample detections because the soil borings are approximately 300 feet downgradient of NBCA-042-001 and the monitoring well near the soil borings (NBCA-505-001) did not detect PCE.*

*Section 10.5.7 (page 10.5.106), Corrective Measures Considerations, has also been modified to discuss the SWMU 39 plume as the possible source of the groundwater PCE contamination at SWMU 42/AOC 505.*

**Comment 8:**

Page 10.5.36, Section 10.5.5.1

This section states that Arochlor 1260 was above the SSL at soil boring 505SB008. There are apparently no downgradient wells from this soil boring location to verify if groundwater has or has not been impacted. Please address.

**Response 8:**

*The text has been revised (page 10.5.16) to point out that the lower-interval Arochlor-1260 detection (59 µg/kg) did not exceed the SSL. Also, this hydrophobic compound is not typically a groundwater concern because it is practically insoluble in water. As Table 6.1 indicates, the critical range for solubility is 0 to 100 mg/L, with lower values indicating a greater tendency to sorb to soil and be immobile in water. The solubility of Arochlor-1260 is 0.08 mg/L. It is the Navy's belief that a downgradient monitoring well is not necessary.*

**Comment 9:**

Page 10.6.15

This section describes two VOCs were detected in the duplicate sample which was sent to the off site laboratory for analysis. It is not clear which sample the duplicate was collected from or how the results reflect on the quality of the geoprobe data. While both sample results were below the respective RBCs, it is not understood how the groundwater was contaminated by the constituents or if the sample was upgradient or downgradient of the SWMU. Please address.

**Response 9:**

*The text (pages 10.6.10 and 10.6.17) has been modified to indicate that the offsite duplicate sample was collected from upgradient geoprobe location GP002. The "J-flagged" (estimated) detections of acetone and toluene in the offsite sample that were not reported in the onsite sample have no bearing on the onsite data quality for two reasons. First, the toluene detection in the offsite sample approached the onsite laboratory's practical quantitation limit (PQL), resulting in very little difference between the split sample results. There are numerous possible explanations (i.e. sample collection, analytical variability, laboratory artifact, etc.) for this narrow difference in analytical results. Second, acetone was not on the onsite laboratory's target compound list, therefore, the split sample results cannot be compared for this compound. The comment is accurate in that no definitive conclusions can be made regarding the source of these groundwater detections. It is noteworthy, however, that such low detections could be "false-positives", are far below RBCs, and were not detected in four quarters of groundwater samples collected from the downgradient well. The Navy believes that these detections in the*

*upgradient geoprobe location are not indicative of a site-related problem and do not warrant further investigation.*

**Comment 10:**

Pages 10.7.11 and 10.7.12

There is a discrepancy between the text which states 1,1-trichloroethane was detected in shallow groundwater and table 10.7.5 which lists 1,1-dichloroethane in four groundwater samples. Please revise.

It should be noted that 1,1-dichloroethane is a breakdown product of TCA and was consistently detected in four of four samples in the permanent monitoring well at this SWMU. 1,1-dichloroethane does not have a MCL and all detections were below the RBC of 810 ppb.

**Response 10:**

*Page 10.7.13 has been corrected to indicate that 1,1-dichloroethane was detected in shallow groundwater.*

**Comment 11:**

GRID SAMPLES

This section of the Report states TCE was detected in 8 of 13 soil boring locations. However the levels detected and the locations was not discussed. This may indicate the selected sample locations are not suitable for grid based samples. Please address.

This section of the Report stated that 1,1,1-trichloroethane was detected below the MCL in one of three monitoring wells during one quarters sampling. Neither the text or the tables indicated which well the VOCs were detected in or how the detections may affect the grid sample results. Because there is no explanation of how the groundwater was contaminated with TCA, this detection may require further investigation in the CMS. Please address.

**Response 11:**

*The grid-based data presentation has been reformatted. The new nature and extent subsection parallels other site-specific presentations. Because no fate and transport or risk assessment subsections were completed for the grid-based samples, Tables 10.8.7 and 10.8.8 (pages 10.8.30 through 10.8.39) have been added to provide locations and screening comparisons for all grid-based detections.*

**Johnny Tapia**

(Verbal comments presented at the June 9, 1998 Project Team Meeting)

**General Comment**

Dioxins should be screened against RBC not EPA RGO.

*By project team consensus, Zone A will continue to use 1 µg/kg for dioxin comparison, rather than the residential RBC. The justification for this risk management decision will be provided in Section 11 of the final version of the report. It was also agreed that future zones will use the residential RBC as the default screening concentration for dioxin, with exceptions to the default evaluated on a zone-by-zone basis.*

**SWMU 1 Comment**

If we are to separate SWMU 1 from SWMU 2 then we will need to provide a risk assessment specific to SWMU 1.

*A detailed risk assessment for SWMU 1 has been included in the final version of the report. Justification for risk management decisions pertinent to this site will be provided in Section 11.*

**SWMU 2 Comment**

Need to explain why well CNSY-02-05 was abandoned. It presents a problem because numerous hits occurred but were not included in the BRA.

*As described on pages 10.2.28 and 10.2.66, CNSY-02-05 was damaged by heavy equipment rendering it unavailable for fourth-quarter sampling. The numerous hits not included in the BRA were from the initial 1993 sample collected after the well was installed. This data is presented in the "nature and extent" portion of the site-specific discussion. As noted on page 10.2.36, turbidity measurements were not taken during the 1993 pre-RFI sampling event although field notes indicate the sample was "gray and cloudy". In order to use the 1993 wells during the RFI, the Final Zones A and B RFI Work Plan specifically called for their redevelopment prior to sampling primarily due to the turbidity issue associated with CNSY-02-05. This well was again noted to be highly turbid and slow to recharge during redevelopment and sampling in December 1995 for the first-quarter RFI sampling event. Redeveloping efforts prior to collecting the first-quarter sample were successful in reducing the turbidity in this well.*

*As described on page 10.2.66, this data was not included in the risk assessment due to the time-dependence of groundwater samples. Because there is no indication that the 1993 data is representative of current ambient groundwater conditions, it is not appropriate for risk analysis and subsequent corrective measures considerations. The 1995 dataset is considered both adequate and representative.*

### **SWMU 38 Comments**

Johnny asked what will be done about the 2400 ppm hit of TPH. Was the hit co-located with a pesticide hit and excavated already?

*This TPH detection was in sample 038SB00101, co-located with significant pesticide detections that warranted interim measures at the site. Although the RFI report theoretically precedes interim measures and does not summarize or document IM activities, a reference to the removal of the TPH detection has been added to page 10.3.84 of the final version.*

Well NBCA-002-004 was only sampled for metals yet it was not analyzed for all constituents.

*NBCA-002-004 was sampled for all parameters outlined in the work plan during the first-quarter sampling event. The omission of pesticide/PCB sampling in subsequent quarterly samples collected from this well is detailed on page 10.3.16 both in the text and as a "deviation" in Table 10.3.5. It is appropriate to include data from this well in the groundwater summary of SWMU 38 because it was adequately sampled during the first-quarter event, which is the most crucial for determining groundwater COPCs at the site.*

*This oversight is not likely to impact the conclusions or corrective measures considerations for SWMU 38, although one additional pesticide/PCB sample will be collected from this well during the CMS. Also, there is no indication that the pesticides detected in monitoring well NBCA-038-001 are indicative of a large-scale groundwater contamination problem. As detailed in the text, the elevated concentrations in soil boring 038SB001 are a likely source of the pesticide detections and subsequent identification as COCs for groundwater at SWMU 38.*

FI/FC - sometimes calculated based on frequency of detection, sometimes based on area. Johnny was used to area. When is it more appropriate to use the different methods?

*This comment will be addressed in a brief technical memorandum as it does not require changes to the Zone A RFI Report.*

Missing page 59 and 60 from BRA.

*These pages are included in the final version of the report (page numbers 10.3.63 and 10.3.64).*

### **SWMU 39 Comments**

Do you have any screens that overlap due to shallow depth of the marsh clay? If so what is the potential impact on data?

*None of the well screens at SWMU 39 "overlap". There are three well pairs (NBCA-039-008/-08D, -014/-14D, and -015/-15D) and five well clusters (NBCA-039-004/-04I/-04D, -009/-09I/-09D, -010/-10I/-10D, -012/-12I/-12D, and -013/-13I/-13D). The screened intervals for each of these wells are shown on Figure 10.4.30 (page 10.4.137) and the monitoring well construction diagrams are included in Appendix A.*

For the groundwater BRA several compounds were excluded. Johnny was okay with everything but 1,2-dibromo-3-chloropropane which was detected 1 of 5 times, Table 10.4.34.

*As indicated in Table 10.4.34, 1,2-dibromo-3-chloropropane is identified as a COPC for groundwater at SWMU 39. As described on page 10.4.221, this compound was eliminated as a COC due to its low frequency of detection. The report states that associated risk maps and tables include all COPCs, and the contribution of risk due to this detection is on the second page of Table 10.4.49. Considering the numerous volatile organic groundwater COCs for SWMU 39, additional sampling will be required as part of the CMS. If this compound is detected in future sampling, the frequency of detection will inherently increase, and the compound will be included as a COC.*

Table 10.4.31 appears a page is missing. The list of VOCs seems short based on what was in the text.

*A complete version of Table 10.4.31 (pages 10.4.167 through 10.4.169) is included in the final version of the report.*

Table 10.4.37 some EPCs considered (average data in plume) seem higher than the maximum detected.

***Table 10.4.37 (page 10.4.187) has been checked for accuracy and only 1,1,2,2-tetrachloroethane fits this description. The low frequency of detection (1 detection of 108 samples) resulted in the EPC exceeding the maximum detection because one-half the SQL was substituted for the non-detects.***

Table 10.4.51 some MCLs missing.

***Table 10.4.51 (page 10.4.251) has been revised.***

SWMU 39 addition not due to regulatory comment.

***During recent review of the database for QA/QC prior to the submittal of the final report, an additional subsurface soil sample was discovered that has not been previously reported. During the installation of NBCA-039-10I, soil was encountered with strong petroleum odor at 3' to 5' bgs. A biased sample of this material was collected and analyzed for VOCs and SVOCs. This sample has been added to the lower-interval dataset. Due to the omission, the final version of the report contains significant detail of both sample collection and results (pages 10.4.2, 10.4.5, 10.4.6 and 10.4.16).***

**South Carolina Department of Health and Environmental Control  
Comments on Draft Zone A RFI Report  
Site-Specific RFI Discussions for SWMUs 1, 2 AND 39.  
Dated August 19, 1997**

**SCDHEC Comments Dated November 5, 1997**

**Comment 1:**

For SWMU 2, detections at the former wetland should be compared to soils Risk Based Screening levels (RBCs) and zone A reference concentrations. This should be corrected on table 10.2.10.

**Response 1:**

*Data for these samples collected from the former wetland has been removed from the sediment section (including Table 10.2.10) and incorporated into the surface soil data set. See Tables 10.2.5 (new addition) and 10.2.6 (former 10.2.5) in the revised report for the requested comparisons. Also, a paragraph specifically detailing this change has been added on page 10.2.8.*

**Comment 2:**

It seems that the information contained on tables 10.2.24 and 10.2.25 are switched. Table 10.2.24 appears to have commercial industrial assumptions, while table 10.2.25 appears to be for residential assumptions.

**Response 2:**

*The information in these tables has been switched to match the correct title. Because a new table was created for organic soil data at SWMU 2 (Table 10.2.5), these tables have been renumbered (see Tables 10.2.25 and 10.2.26 in the revised report).*

**Comment 3:**

The calculations made using the Adult Exposure Model for lead should be included in the final report. The information included should be able to provide enough detail so the Department would be able to verify assumptions and results obtained.

**Response 3:**

*The calculation used to determine lead cleanup levels based on the Adult Lead Model have been provided in the revised report on page 10.2.74. Currently, the Project Team are in the process of agreeing on parameters to be used in the Adult Lead Model. The original number used in the Draft Zone A RFI has not been changed in the Final Zone A RFI. Once the Project Team has reached agreement on parameters to be used in the Adult Lead Model, errata pages can be issued for the Final Zone A RFI.*

**Comment 4:**

Page 10.53 states that site-specific soil screening levels were calculated using a Dilution Attenuation Factor (DAF) of 14. The final report should include the calculations and assumptions used to obtain site-specific SSLs and DAF. Identical request is made for travel-time analysis which is mentioned on page 10-54. All the requested information should be detailed, clear and has to be included in the final report.

**Response 4:**

*Following the Technical Subcommittee meeting on February 9, 1998, Johnny Tapia and Paul Bergstrand of SCDHEC and Ron Severson of EnSafe agreed that a DAF of 10 was appropriate for determining soil to groundwater SSLs for Zone A. Section 6.2 of the revised report provides details of the fate and transport screening process. Section 6.3 provides a comparison of site conditions with the Soil Screening Guidance default conditions. It is important to note that the background sections for the Zone A RFI report were submitted with the draft version of the report, and not included with the SWMU 1, 2, and 39 document.*

**Comment 5:**

Thallium needs to be identified as a COC at SWMU 2. Its hazard contribution to the future child residential scenario is 0.14. Although the final decision about thallium presence at NAVBASE will be based on the results of a base-wide study, it still needs to be identified as a COPC/COC if the detections/ risk results meet the criteria.

**Response 5:**

*Thallium has been identified as both a COPC and COC for soil at SWMU 2 in the revised report.*

**Comment 6:**

The Department received a set of contour maps dated September 30, 1997 for specific contaminants present at sites in Zone A. This maps should be placed in their corresponding location in the final RFI report. Visual representations of contaminants and their levels are helpful on making decisions about the fate of these sites.

**Response 6:**

*Thirteen contour maps have been included in the nature and extent portion of SWMU 39 (Figures 10.4.13 through 10.4.25). In addition to the set received by DHEC, benzene groundwater contour maps have been added. Also, two contour maps (surface soil lead and surface soil arsenic) have been included in the nature and extent portion of SWMU 2 (Figures 10.2.4 and 10.2.6).*

**Comment 7:**

Page 10-261 states that a DNAPL sample collected on the first round at well NBKA-039-005 was analyzed for VOCs instead of the "requested characterization analyses". This event should be explained further. What are the "requested characterization analyses"? How not getting the expected results affected evaluation and conclusions about the site?

**Response 7:**

*The revised report has been modified for clarity on page Page 10.4.88. Analytical characterization of the unknown material to determine the type of product (e.g. solvent, pesticide, or petroleum) was not performed due to a misunderstanding at the laboratory. The VOC analysis does provide useful information for determining that the product did not contain large quantities of either chlorinated solvent or BTEX constituents. The text in the report was not expanded because the DNAPL was not present during subsequent sampling events and any conclusions would be speculative.*

**Comment 8:**

Table 10.4.22 shows detections of the Geoprobe sampling event. Although this technique is only used as a screening tool it should be discussed how high detection limits could influence the results and the validity of using this screening tool. It was observed that 7 out of 12 Geoprobe sampling locations had a detection limit for Vinyl Chloride higher than the MCL (2 µg/L). How this high detection limits affect the screening process? Was this fact taken into consideration when reaching conclusions about the presence/absence of contaminants? Please provide a discussion of this issues in the final report.

**Response 8:**

*Although the reported detection limit (Practical Quantitation Limit) for vinyl chloride during the geoprobe sampling event exceeds the MCL, detections between the Method Detection Limit and the PQL would have been reported as a detection with a "J" flag. For example, two 1,2,4-trimethylbenzene detections were reported as such in the data set.*

*Inserting the requested discussion would imply that the data from the geoprobe investigation was used to define the extent of individual contaminants. Instead, the geoprobe data were used to select locations for the second-round installation of monitoring wells. Data from these monitoring wells have been incorporated into the groundwater "nature and extent" section, and the geoprobe data is reported simply for documentation. Ultimately, the coverage provided by the SWMU 39 monitoring wells either delineates a vinyl chloride plume or identifies vinyl chloride data gaps. The Navy believes no data gaps exist for vinyl chloride in shallow groundwater at SWMU 39. Therefore, no additional discussion was added to this section of the revised report.*

**Comment 9:**

Section 10.4.8 makes only mention of analysis/detections on surface water and sediments. This section should provide a more adequate discussion of the findings in these media. This section should compare detections to appropriate levels and reach a conclusion. As written it does not contribute with useful information to the report.

**Response 9:**

*The text on page 10.4.100 has been revised to include a discussion of this data. Because the only VOC detected in these samples, methylene chloride, was detected both infrequently and at much greater concentrations than SWMU 39 groundwater samples, NAVBASE is not a suspected source for the detections in the marsh. Therefore, there is no need for comparison to "appropriate levels" as part of this project.*

**Comment 10:**

(a) Section 10.4.12 "Fate and Transport for SWMU 39" states that the results of groundwater detections (shallow and deep) have been combined and screened as one. Section 10.4.12.1 "Soil to Groundwater Cross Media Transport", for inorganics includes table 10.4.30 where all the maximum detections for surface soil, subsurface soil and groundwater are compared to the highest of soils (surface or subsurface) and groundwater (shallow or deep) reference concentrations. The purpose and/or rationale for this comparison and for choosing the highest levels is not explained in the report.

Detections in surface soil should be compared to soil ingestion RBCs and/or surface soil reference concentrations. Subsurface soil detections should be compared to SSLs and/or subsurface soil reference concentrations. Detections in groundwater should also be compared to their respective shallow or deep reference concentrations. Since we are trying to assess the transport of contaminants from soil to groundwater, it makes sense to use the values calculated for the media directly related to the process.

It is not understood why inorganics are separated into a different table. The SSLs used for screening differ from generic SSLs. The calculations should be submitted for review and the text should clearly identify that site-specific SSLs were used at this site. None of these has been done. This part of the comment also applies to table 10.4.31.

Table 10.4.30 has not been prepared according to the above stated criteria, which reflects approved NAVBASE procedures. The purpose of this table is unknown and confusing. Refer back to table 10.2.11 for SWMU 2, which reflects the usual screening process followed for soil to groundwater cross-media transport. In addition, the conclusions reached, which are based on this unjustified approach should be revised and modified if

necessary. Table 10.4.30 and related sections should be modified to follow the approved approach.

**Response 10:**

*(a) This comment was a discussion point of the February 9, 1998 meeting following the Technical Subcommittee meeting and subsequent conference calls between Johnny Tapia, Paul Bergstrand, and Ron Severson. In summary, the greater of the shallow and deep background reference concentrations were used for screening in the Fate and Transport and Risk Assessment Sections of the revised report. The rationale for using the greater of the shallow and deep groundwater reference concentrations for screening purposes is provided in Section 6.2 of the revised report. In the Nature and Extent Sections, shallow groundwater data were screened using shallow background reference concentrations and deep groundwater were screened using deep background reference concentrations.*

*Paragraph 2: Surface soil data were screened as noted in this comment because they were associated with direct contact exposure pathways. When considering indirect exposure pathways, such as soil to groundwater cross media transfer, no distinction is made relative to soil interval since the water has to pass through both, and since there is no physical barrier separating the two soil intervals. Additionally, the soil screening guidance makes no distinction between soil intervals since it considers an evenly contaminated one-half acre parcel where the contamination continues down to the water table in developing SSLs. However, in conference calls following the February 9, 1998 meeting SCDHEC requested that background reference concentrations only be used for comparison purposes, rather than screening purposes, in the soil to groundwater cross-media transfer assessments. For groundwater, since there is no clear physical distinction between the shallow, intermediate, and deep water bearing zones, then no distinction is made between the reference concentration at different water column depths. Since there are no continuous physical barriers to vertical mixing in the aquifer, the highest reference concentration is representative of background conditions regardless of water column depth.*

*Paragraph 3: The organic and inorganic fate and transport screening tables have been separated to allow for an additional comparison to background reference concentration to be presented on the inorganic screening table. A memo was provided to Johnny Tapia on February 18, 1997, for his review. The memo presented the SSL partitioning equation and identified all of the terms in the equation, giving their equation symbols and their sources. It also provided sample SSL calculations for acetone (a VOC with a low  $K_{oc}$  value) and benzo(a)pyrene (an SVOC with a high  $K_{oc}$  value). On March 5, 1997, EnSafe informed Johnny Tapia via e-mail that the secondary source of some of the data values ( $K_{oc}$  and Henry's law constants) for the SSL calculations had been changed from the source identified in the memo (a TNRCC document) to the Superfund Chemical Data Matrix (SCDM), as recommended in the*

***USEPA Soil Screening Guidance. The screening process used for fate and transport is provided in Section 6.2 of the revised report.***

***Paragraph 4: The screening process and table format used in the fate and transport analysis for Zone A was discussed via a conference call between Johnny Tapia of SCDHEC and Ron Severson of EnSafe. SCDHEC requested that additional information (i.e. frequency of detection and mean concentration) be added to the fate and transport screening tables. This was not done because this information is provided in the nature and extent section. Instead, the fate and transport tables refer to the appropriate nature and extent tables for these data.***

#### **Comment 11**

Section 10.4.12.2 does not present a discussion of the possible groundwater to surface water cross-media transport. Instead this section focuses on groundwater contamination and migration. This section should be more directed towards its purpose with a clear discussion of how contaminated groundwater could affect or has already affected surface water.

#### **Response 11**

***A detailed discussion of the hydrogeology of the surficial aquifer is presented for SWMU 39 in Section 10.4.11 of the revised report. Potential surface water receptors (Cooper River and Noisette Creek) are provided in Section 10.4.11. Comparison and discussion of AWQCs has been added to Section 10.4.12.2.***

#### **Comment 12**

Section 10.4.13.2 and table 10.4.32 present the selection process for COPCs in soils. For carcinogenic PAHs, it was noted that for B(a)P and Dibenzo(a,h)anthracene analysis, the lowest sample quantitation limit (SQL) was higher than their respective soil ingestion RBCs. This section needs to note this situation and discuss how detection limits at higher levels than the RBCs would affect sampling results. This section also states that only a few detections happened, but if the SQL is lowered there is the possibility that the frequency of detection would increase. Higher SQLs could also affect the calculation of BEQs, which is the value we use to make remedial decisions. Please provide a complete discussion of this issues on this part of the report.

#### **Response 12**

***A complete discussion of how sample quantitation limits are managed, including use of estimated concentrations for non-detected analytes, is provided in the Zone A revised report, Section 7.3.3, Management of Site-related Data. It is important to note that the background sections for the Zone A RFI report were submitted with the draft version of the report, and not included with the SWMU 1, 2, and 39 document.***

### **Comment 13**

(a) Same as previous comment. On table 10.4.33 the SQL for Arsenic, Antimony and Thallium are higher than their respective Tap water RBC equated to a HQ of 0.1. In the case of Antimony and Thallium the SQLs are higher than their respective MCLs. Include a discussion of how this event would affect the assessment at this site.

(b) In addition , the rational for screening detections in groundwater against the highest of either shallow or deep groundwater reference concentrations should be provided.

(c) The COPCs on table 10.4.33 have not been identified with an asterisk and some of them were not identified as COPCs based on the low frequency of detection, but they also had high detection limits that could have allowed them to escape the screening process. Please provide a complete discussion of this issues. If SQLs are higher that the screening levels we cannot eliminate COPCs based on the low frequency of detection assumption; even more so when some sample locations indicate that such chemical may be present.

### **Response 13**

(a) *It is still possible to detect analytes at concentrations below SQLs, but above method detection limits (MDLs), and report them as "estimated" with a 99 percent confidence level. Depending on matrix interferences, it is also possible to detect analytes at concentrations below the MDL and above the instrument detection limit (IDL). These results would also be flagged as estimated, but at a lower confidence level. For example, the Navy recently requested its laboratories conduct MDL vs. SQL studies. Southwest Laboratory reported that its MDLs for antimony and thallium are 1.6 µg/L (MCL = 6 µg/L) and 5 µg/L (MCL = 2 µg/L), respectively. Thus, the lab could detect antimony at concentrations below the MCL, but not thallium. If matrix interferences prevent the lab from detecting thallium at concentrations between the IDL and MDL or SQL, there is little that can be done about this because it is a matter of limitations of available technology.*

(b) *See Response 10*

(c) *RAGS allows for the elimination of parameters that are reported in less that 5% of samples collected if there is no reason to believe that they are present in other media. The parameters that were eliminated from the formal groundwater risk assessment that had SQLs above screening criteria were not detected in any other media. Additionally, subsequent quarterly sampling did not reproduce these parameters. However, to address the uncertainty resulting from the elimination of these parameters from the formal risk assessment, point risk estimates were provided for all COPCs in the risk summary section. This approach allows the formal risk assessment to focus on the obvious concerns regarding SWMU 39 groundwater while still*

*providing risk-based tools for making decisions regarding the less apparent groundwater concerns.*

#### **Comment 14**

There is a new proposed approach to obtain the Exposure Point Concentrations for chemicals in groundwater at SWMU 39. This "plume approach" should have been first proposed to SCDHEC to allow the Department the opportunity to become familiar with it before it is used in the preparation of a report. The Department has not had the opportunity to review the guidance document mentioned in the report to verify assumptions, site conditions needed, etc.. Averaging the four quarters of data on wells located in "the most concentrated area" of the plume appears to be a less conservative approach than the previously used. At this time, this approach should not be used until the Department has had the opportunity of reviewing the mentioned guidance document. NAVBASE has to remember that any new approach that differs from a previously approved one, and is less conservative, needs previous approval by the Department before is used.

#### **Response 14**

*Dr. Ted Simon (USEPA Region 4) has indicated that the methods used to determine the groundwater EPCs for SWMU 39 were consistent with USEPA Region 4 guidance. He also mentioned that South Carolina was present at the unveiling of the RAGS Supplemental Guidance which was the basis for the EPCs determination used for SWMU 39 groundwater. It is apparent that the reference to determining groundwater EPCs provided in the guidance is vague at best, and is subject to interpretation. As a result of the Technical Subcommittee meeting on February 9, 1998, 95% UCLs were used as EPCs for COPCs that could not be associated with distinct plumes and the mean in the most concentrated area of the plume was used as EPCs for COPCs that could be associated with a plume. Plume maps have also been provided in the revised report to support "most concentrated area of the plume" determinations. Some plumes were isolated to one monitoring well. In these cases no graphical presentation was provided.*

#### **Comment 15**

Thallium should be included in the list of COCs for the groundwater ingestion pathway at SWMU 39. The ongoing base-wide study will be considered at the time of making risk management decisions. Detection of chemicals in excess of MCLs should still go to a risk assessment and if meets the criteria, be identified as COC. In this instance, thallium should be a COC, although it may not require remediation based on the results of the base-wide study.

**Response 15**

*Thallium has been added to the list of COCs for SWMU 39 groundwater.*

**Comment 16**

Page 10-360 "Risk Uncertainties" explains the selection of Exposure Point Concentrations (EPCs) for groundwater, based on a "plume approach". It is unclear how the "most concentrated area" is chosen from the total investigated area of a SWMU and how individual plumes areas are separated. How wells contributing to the calculations are chosen? Is there a minimum number of wells needed to have a good "plume" approach?

As stated in previous comments, the Department needs to approve any new method proposed for use at NAVBASE. Until then NAVBASE should continue the use of 95% UCL on the mean to choose a value for the (EPC).

**Response 16**

*See Response 14*

**Comment 17**

Table 10.4.48 contains the point estimates of risk and hazard for all the sampling event at SWMU 39. For groundwater, wells 6-12 seems to have been sampled only during the fourth round of sampling and wells 13, 14, and 15 seem to have been sampled only during the first round of sampling. Other wells show sampling at different quarters.

Since SWMU 39 had a series of groundwater sampling events that started at different times, it should be appropriate to add a table that details rounds of sampling with sampling dates for every shallow, intermediate and deep wells. It also should include projected dates for future quarterly sampling. A table with this condensed, tabulated information will be useful to determine if the report present results based on complete or incomplete quarterly sampling, and when it is expected to be complete. Include in this table wells which data is used on risk calculations.

**Response 17**

*Table 10.4.4 provides a summary of the SWMU 39 groundwater investigation timeline of events (including sampling events). Also, tables 10.4.5 through 10.4.19 summarize data for each well, well pair, or well cluster. The footnotes for each of these tables detail the event in which each was sampled. Since the draft submittal of SWMUs 1, 2, and 39, all quarterly sampling has been completed and the data incorporated into the revised report. Risk and hazard map presentations for SWMU 39 groundwater present the maximum risk and hazard for each location regardless of groundwater sampling round.*

**Naval Base Charleston**  
**Response to South Carolina Department of Health and Environmental Control**  
**Comments on the Draft Zone A RFI Report**  
**September 12, 1996 Version**

**SCDHEC Comments Dated April 4, 1997**

**Johnny Tapia**

**GENERAL COMMENTS**

**Comment 1:**

The organization of Zone A RFI Report has improved in comparison to previous documents reviewed. By presenting general investigative procedures and concepts in earlier sections of the report and site-specific analysis and interpretation of data in one section, makes easier for the reviewer to follow the flow of information and reach a conclusion on a site-by-site approach. The use of colors in the maps also helps to reflect what is tabulated and gives the reviewer a better idea of the spatial distribution of contaminants across a given site.

***Response 1:***

***No response required.***

**Comment 2:**

If the organization part of the report has improved, there are still questions about justifying certain assumptions and/or the source of certain values proposed to be used for screening purposes. Assumptions should be justified in the text of the report by comparing conditions at the site against conditions required to meet in the corresponding guidance. When assuming that certain value is applicable to a specific site/area it should be shown by calculations, graphs, etc., specially if these values will be used as a screening level to eliminate contaminants from further evaluation.

***Response 2:***

***Where applicable, justification for using comparison values in relation to Zone A sites has been included in the revised report.***

**Comment 3:**

Background reference concentrations values for some inorganic constituents are under review at the moment. Once these reference concentration values are approved by the Department, they should be used in the correction of sections of this document that may be affected by the new values adopted.

**Response 3:**

*Since the review of the draft version of the report, many issues have been resolved by the Project Team, including the issue raised by this comment. The agreed upon background concentrations have been included in the appropriate sections of the revised report.*

**SPECIFIC COMMENTS:**

**Comment 4:**

On page 5-2 it is stated that (TEQ) dioxin concentrations will be screened using the value  $1 \mu\text{g}/\text{kg}$  for a worker industrial scenario. The Department has always maintained the position of comparing contaminant concentrations to values that will be protective of a residential scenario, as stated in the Bureau Assessment and Remediation criteria. A TEQ concentration that corresponds to a  $1 \text{ E-}6$  residential risk value should be used for screening purposes.

**Response 4:**

*The Dioxin cleanup level of  $1 \mu\text{g}/\text{kg}$  was provided by USEPA Region 4 in the "Review of the Final RCRA Facility Investigation Report for Zone H" (South Carolina DHEC Cover Letter Dated May 6, 1996), USEPA general comment # 3 (Attachment 1).*

**Comment 5:**

Section 5.2.10 "Background Values" includes tables 5.2, 5.3, and 5.4 with the calculated UTL reference concentrations for surface soils, subsurface soils and groundwater, respectively. A column with the RBC values should be included in the table that calculates the UTLs for surface soil. A column with the corresponding SSLs should be included in the table that calculates the UTLs for subsurface soils and finally the values of the corresponding MCLs should be included on the table where reference concentration values for groundwater are calculated. The inclusion of these values will help the reviewer to determine if proposed reference concentrations are within a reasonable range of established protective concentrations of contaminants.

**Response 5:**

*Tables 5.2, 5.3, and 5.4 have been amended to include the requested regulatory criteria.*

**Comment 6:**

Table 6.2 lists screening values used to evaluate fate and transport. The value used for Dioxin as TCDD TEQs is  $2000 \mu\text{g}/\text{kg}$  for the soil-to-groundwater transfer pathway and  $5 \mu\text{g}/\text{L}$  for groundwater screening. How these values were obtained? If these values were obtained from

some reference, it should be cited. If these values were calculated, they should be submitted for review.

**Response 6:**

*The values shown in Table 6.2 were 2,000 ng/kg and 5 pg/L. The  $K_{oc}$  and  $H'$  have been revised since the submittal of the Zone A Draft RFI which has resulted in a slightly different SSL for Dioxin.*

*The following calculation was used:*

SSL =  $C_w (K_d + (\theta_w + H'\theta_a)/P_b)$  , where:

$C_w$	=	3E-08 mg/L (MCL for 2,3,7,8-TCDD equivalent) * DAF
DAF	=	10 (assumes 30-acre site; continuous source, dilution only)
$K_d$	=	$K_{oc} * f_{oc}$
$K_{oc}$	=	2,650,000 L/kg
$f_{oc}$	=	0.002 (default)
$\theta_w$	=	0.3 (default)
$H'$	=	0.0032
$P_b$	=	1.5 kg/L (default)
$\theta_a$	=	0.13 (default)

*Therefore:*

$$\begin{aligned} \text{SSL} &= 3\text{E-}08 \text{ mg/L} * 10 (5,300 \text{ L/kg} + (0.3 + 0.0032*0.13)/1.5 \text{ kg/L}) = 0.00159 \text{ mg/kg} \\ &= 1,600 \text{ ng/kg [to 2 significant figures]} \end{aligned}$$

*The groundwater screening value of 5 pg/L was obtained from the RBC Table.*

**Comment 7:**

Section 6.2 "Fate and Transport Approach for Zone A."

On this section, on page 6-16 it is stated that generic soil screening levels will be used for comparison to concentrations in soil that will be protective of the soil-to-groundwater pathway. Although the Department agrees that site-specific analysis will produce higher soil screening levels and that some assumptions may apply, it is still expected from the Navy to compare standard assumptions from generic SSLs to the specific conditions of the site. In this section it is stated that SSLs will be chosen with a DAF=10. How has this been determined.

This section should include a table with the comparison of generic SSLs standard conditions and the conditions at the specific site, justifying the soil screening levels chosen.

**Response 7:**

*Following the Technical Subcommittee meeting on February 9, 1998, Johnny Tapia and Paul Bergstrand of SCDHEC and Ron Severson of EnSafe agreed that a DAF of 10 was appropriate for determining soil to groundwater SSLs for Zone A. Section 6.2 of the revised report provides details of the fate and transport screening process. A comparison of site conditions with the Soil Screening Guidance default conditions has been added to the revised report as Section 6.3.*

**Comment 8:**

Page 7-11 "Comparison of Site-Related Data to Background Concentrations:"

This section states, "The statistical method used to determine background concentrations and compare to site related data was approved for use in Zone A on May 12, 1995." This statement is misleading. The statistical approach used to calculate background concentrations was approved to be used in the preparation of the Zone H RFI Report as a test to see if the values obtained were realistic. To date, there are still questions about the values obtained by using this statistical approach. In fact, the review of Zones B and H RFI reports brought up some concerns about the use of the data and calculations. Until a consensus is reached on the values to be used as background reference concentrations this statistical approach should not be considered approved.

**Response 8:**

*Revised background reference values for Zone A were discussed and approved by SCDHEC during project team technical subcommittee meetings on April 7 and April 25, 1997, and in a phone call between Johnny Tapia of DHEC and Barry Doll of EnSafe on April 22, 1997. The background value for thallium in groundwater has not been finalized pending a basewide study by DHEC.*

**Comment 9:**

In Section 8.10, page 8-48:

This Department believes that the analysis of ecological Risk at Zone A has shown a low risk present for soil infaunal organisms and terrestrial wildlife species, specifically the American Robin for inorganic contaminants such as copper, lead, cadmium, and mercury. There is also a possible risk present to vegetation due to copper, lead, and zinc. These risk values, however, were calculated using maximum concentrations present at the Area of Ecological Concern A-1, therefore it is agreed that the calculated risk could have been low if mean concentrations of contaminants

would have been used in the analysis of risk. Therefore, the recommendation of no further work due to only ecological receptors in subzone A-1 is accepted. However, a question is raised according to table 8.2, in which all but two inorganic elements were considered as Ecological Contaminants of Potential Concern (ECPC). Many of them were detected at concentrations above the UTLs for Zone A and are presumed to be related to SWMU 2. Could these concentrations of inorganics affect human populations in any hypothetical scenario?

**Response 9:**

*Since the review of the draft version of the report, the Human Health Risk Assessment for SWMU 2 has been completed and reviewed (SWMUs 1, 2, and 39 submittal). This data has been incorporated into the risk assessment.*

**Comment 10:**

Section 10.1.7.1 Soil Data gaps, confirms that there is a need for completing the approved sampling in the Work Plan. Six soil borings were not collected because of radiological studies happening at that time. These samples should be collected to have a clear picture of the contamination present at the site. In addition, the existing subsurface data gaps should be filled for the sampling event that happened in 1986. Additional sampling may be required to define the nature and extent of contamination at this site.

**Response 10:**

*Since the review of the draft version of the report, the soil data gaps at SWMU 2 have been filled. Data from 16 additional hand auger locations (upper and lower interval sampling) have been incorporated into the site-specific presentation which has been reviewed (SWMUs 1, 2, and 39 submittal).*

**Comment 11:**

The Department agrees with the recommendations in section 10.1.8.

**Response 11:**

*The Navy acknowledges this statement.*

**Comment 12:**

Page 10-78 of the "Exposure Point Concentrations:" section, states that FI/FC terms were applied to the EPCs of contaminants as DDT, DDE, and DDD, as well as for Aroclor-1260 and Beryllium. There is a vague explanation on the obtention of these FI/FC terms. A small table including the parameters used for the calculation of these terms and assumptions should be

included in the report. If values or basic approach are obtained from some reference material, it should be cited in the text.

**Response 12:**

*FI/FC terms were calculated in accordance with Supplemental Guidance to RAGS, Region IV Bulletin. The text has been revised (page 10.3.38) to clarify that the FI/FC calculations are based on the frequency of detections.*

**Comment 13:**

The Department agrees with the recommendation in section 10.3.8. Once all the data are collected, the extent of the plume is defined horizontally and vertically, then Fate and Transport, Human Health Risk Assessment and Corrective Measures Study sections should be submitted, if possible, in the final version of this report.

**Response 13:**

*Since the review of the draft version of the report, these sections for SWMU 39 have been completed and reviewed (SWMUs 1, 2, and 39 submittal).*

**Comment 14:**

On page 10-237, "Frequency of Detection and Spatial Distribution" section:

This section compares the maximum detected concentration of arsenic in SWMU 42/AOC 505 with the background concentration of arsenic in Zone B. What is the purpose of making this comparison? This report is about sites in Zone A and should be compared to background concentrations in Zone A. Zone A characteristics and specific conditions are different than those of Zone B. The statement that makes the above mentioned comparison should be deleted from the report.

**Response 14:**

*The mention of the Zone B arsenic background concentration has been eliminated from the revised report.*

**Comment 15:**

Section 10.4.7 "Corrective Measures Considerations:"

The Department agrees with the COCs identified in soil and shallow groundwater for SWMU 42/AOC 505, and the recommendation to fully delineate the extent of BEQs contamination

in the southern middle portion of the combined area of SWMU 42/AOC 505. In addition the last statement of this section makes reference to SWMU 38; this statement should be corrected or deleted.

**Response 15:**

*The text has been corrected.*

**Comment 16:**

The Department agrees with the recommendation in Section 10.5.8. It is recommended to install a shallow monitoring well downgradient from SWMU 43 that will serve to collect data, as required by Department's policy, and confirm if VOCs are present in the shallow groundwater. The results of this sampling should be included in the final report.

**Response 16:**

*The well has been installed and four-quarters of analytical data have been included in Section 10.6.3 of the revised report.*

**Comment 17:**

Table 10.7.6 shows the results of grid-based inorganics detection in shallow and deep groundwater. Thallium was repeatedly detected in the same well (GDAGW03D) in the three different sampling events for deep groundwater at concentrations ranging from 17  $\mu\text{g/L}$  to 163  $\mu\text{g/L}$ , which are much higher than its MCL value of 2 $\mu\text{g/L}$ . These results show signs of possible contamination of the deep groundwater for thallium, the that specific well, and therefore cannot be used to calculate a background reference concentration. Additionally, the reference concentration was calculated and was based only on the highest detection. Why were the other sampling events not taken into consideration?

The analytical data and calculations of the reference concentration on the deep groundwater for thallium should be revised and the possibility of contamination considered.

**Response 17:**

*Thallium has been reported in numerous groundwater samples collected throughout NAVBASE at concentrations above its MCL. This issue is currently being discussed by the Project Team. As a result, a thallium background concentration for groundwater was not used in the Zone A report.*

**Comment 18:**

Section 11.6 "AOC 506" includes table 11.4 as the "Conclusion Summary." This table has been labeled as SWMU 38 Conclusion Summary. The header of this table should be corrected.

**Response 18:**

*The table has been corrected.*

**Paul Bergstrand**  
**GENERAL ISSUES:**

**Comment 1:**

There is an absence of sample of site-specific contaminant tables showing analytical detects only and contaminant maps showing separate or groups of analytical detects only in this document. These tables and contaminant maps are strongly recommended in the EPA RFI Guidance and should be included in this document. Because the RFI does not provide these items it becomes very difficult and time consuming for a reviewer to comprehend and independently confirm site conditions.

**Response 1:**

*The process by which CPSSs are reduced to COPCs was established earlier in the Comprehensive Work Plan.*

*In an environment such as NAVBASE it is impractical to define the extent of every CPSS, particularly since most of the CPSSs are not present as a result of the past site activities for which the site was sampled. Numerous compounds, particularly polyaromatic hydrocarbons, are present across NAVBASE as a result of being in an industrial area. These are often detected in samples collected during a SWMU or AOC investigation. EnSafe considers the reduction of CPSSs to COPCs through comparison to risk-based screening concentrations and upper tolerance limits to be a practical approach to identifying areas that may present unacceptable risk, and as such, be considered in the risk assessment process.*

*In order to provide reviewers with more detail regarding all organic CPSSs, a set of tables was prepared and delivered to SCDHEC listing every organic chemical detection for every soil sample collected in the Zone A RFI at that time.*

*The revised report includes, as an appendix, CPSS tables for all detections in soil and groundwater in Zone A. Also, contaminant distribution maps have been included in the nature and extent sections of the Zone A site-specific discussions for select contaminants.*

**Comment 2:**

Site maps provided do not show the boundaries of SWMUs or AOCs. In addition, important site features such as pipelines, tanks, drainage ditches are not represented.

**Response 2:**

*The RFA and the zone-specific RFI work plans included figures with approximated site boundaries. The intent of the RFI was to define site boundaries based on the results of sample*

*analyses. As discussed in previous Project Team meetings, the distribution of site-related compounds at most of the SWMUs and AOCs does not lend itself to mapping. Instead, mapping of chemical risk/hazard was proposed as a viable alternative to mapping chemical concentrations. The resulting risk/hazard contours provide the best approximation of site boundaries relative to human health or ecological risk/hazard. Where site features are considered critical to the investigation, they have been presented on the figures.*

**Comment 3:**

Sample analysis was limited in second-round samples from SWMUs, AOCs, and grid-based monitoring wells even though low levels of contaminants might have been detected. This is contradictory to EPA RFI Guidance.

**Response 3:**

*The practice of limiting analytical parameters has been the subject of previous SCDHEC comments which were resolved in previous Project Team meetings. As a result of these meetings, Section 2 of the Comprehensive Project Management Plan was revised July 30, 1996 to explicitly describe the procedure. These revisions were reviewed and approved by both EPA and SCDHEC personnel. The Zone A 60% progress meeting (February 1996) served as the forum for analyte reduction discussion. This was documented in the March 11, 1996 technical memorandum for Zones A and B – Second Round RFI Sampling.*

**Comment 4:**

At some sites, the full extent of contamination has not been defined and at other sites the source of groundwater contamination is unknown. These issues may be resolved with the review of site-specific contaminant tables.

**Response 4:**

*This comment is closely related to the concern raised in comment 1 since there appears to have been a difference in opinion of first defining what constitutes "contamination" and secondly, is it defined by concentration or risk levels.*

*The Navy was under the impression that the project team will define contamination as described in the Comprehensive RFI Work Plan. The project team has also agreed that the "full" extent of contamination does not mean sampling to non-detect levels so the real question becomes whether the site is "adequately" characterized to make CMS or no further action decisions. With the incorporation of additional data from sampling events subsequent to when these comments were received, the Navy believes the sites have been adequately characterized to make CMS decisions.*

**Comment 5:**

A detailed review and comments on this report will be provided once the general issues are addressed and resolved.

**Response 5:**

*The Navy acknowledges this statement.*

**ATTACHMENT 1**



Commissioner: Douglas E. Bryant

Board: Richard E. Jabbour, DDS, Chairman  
Robert J. Stripling, Jr., Vice Chairman  
Sandra J. Molander, Secretary

John H. Burriss  
William M. Hull, Jr., MD  
Roger Leake, Jr.  
Burnet R. Maybank, III

*Promoting Health, Protecting the Environment*

**CERTIFIED MAIL**  
**Return Receipt Requested**

May 6, 1996

Commander Phil Dalby  
Officer in Charge, Caretaker Site Office  
Naval Facilities Engineering Command, Southern Division  
Building NH-45  
Charleston Naval Base  
Charleston, SC 29408-2020

Re: Draft Zone H RCRA Facility Investigation  
(RFI) Report, Dated December 27, 1995  
Charleston Naval Base  
SC0 170 022 560

Dear Commander Dalby:

The South Carolina Department of Health and Environmental Control (Department) and the U.S. Environmental Protection Agency (EPA) have reviewed the above referenced Draft Zone H RFI Report in accordance with applicable State and Federal Regulations, and the Charleston Naval Shipyard's Hazardous Waste Permit, effective June 5, 1990. Based on this review Charleston Naval Base has not adequately fulfilled the requirements of Permit Condition IV.C.4.

The Department reiterates its commitment to cleanup contaminated sites throughout South Carolina to residential cleanup levels. Industrial cleanup levels will only be acceptable when an agreement has been reached and approved by the Department and the facility can demonstrate that appropriate and effective institutional controls can be maintained at the site.

Attached are comments provided by the U.S. Environmental Protection Agency and the Department. Within thirty (60) days upon receipt of this letter, please make the specified changes and resubmit the Report to the Department and U.S. EPA for review.

Letter dated  
May 06, 1996  
Page Two

Should you have any questions regarding this issue, please contact me at (803) 896-4179.

Sincerely,



Johnny Tapia, Environmental Engineer Associate  
Hazardous Waste Permitting Section  
Bureau of Solid & Hazardous Waste Management

Attachments

cc: Paul Bergstrand, Hydrogeology  
Rick Richter, Trident EQC  
Brian Stockmaster, SOUTHNAVFACENGCOM  
Tony Hunt, SOUTHNAVFACENGCOM  
Doyle Brittain, EPA Region IV

**ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE DRAFT  
RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION  
REPORT FOR ZONE H**

**GENERAL**

1. The groundwater sampling forms indicate a number of samples with high levels of turbidity. EPA recommends that samples having a turbidity of 50 NTU or greater be checked against those samples' metals concentrations. If the data indicate that these are correlated, it is recommended that the wells be re-sampled (re-developed if necessary) to determine the actual metals concentrations.
  
2. The human health risk assessments are greatly improved from the previous submission. This is in no small part credited to the willingness of the Contractor to work closely with EPA in "hammering out" the text and format of these risk assessments in December, 1995. The result is that procedural issues of the risk assessments have been dealt with and, thus, this review will concentrate on substantive risk and policy issues.
  
3. Cleanup Level for Dioxin (2,3,7,8-TCDD and congeners) Previously, EPA had suggested that a cleanup level of 1 ppb in soil is considered protective in a residential scenario. The basis for this statement was the peer-reviewed paper, Kimbrough RD, Falk H, Stehr P, Fries G (1984) Health Implications of 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Contamination of Residential Soil. *J. Tox. Env. Health* 14:47-93. The endpoint considered in this study was hepatocellular carcinoma. A slope factor approach was not used; rather, the study compared estimates of the lifetime average daily dose to dose-response relations from specific animal studies.

EPA now considers the slope factor approach to be more appropriate. Therefore, EPA has derived a cleanup level of 1 ppb for a worker/industrial scenario. Although this cleanup level is the same numerically as previously suggested, the derivation is considerably different.

The equation and values used are given below:

$$C_{soil} = \frac{IR \cdot AT \cdot BW}{EF \cdot ED \cdot [(CSF_{oral} \cdot CF \cdot IR_{soil}) + (CSF_{inhalation} \cdot IR_{air} \cdot 1/PEF) + (CSF_{dermal} \cdot CF \cdot SSA \cdot SAP \cdot ABS)]}$$

Assumptions for the Worker Scenario			
C <sub>soil</sub>	Concentration in Soil	mg/kg	
TR	Target Risk	(unitless)	
AT	Averaging Time	75550 days	
BW	Body Weight	70 kg	
EF	Exposure Frequency	250 day/yr	
ED	Exposure Duration	25 years	
CF	Conversion Factor	1E-06 kg/mg	
IR <sub>ing</sub>	Ingestion Rate for Soil	50 mg/day	
IR <sub>inh</sub>	Inhalation Rate	20 m <sup>3</sup> /day	
PEF	Particulate Emission Factor	6.79E+05 m <sup>3</sup> /kg	
SSA	Skin Surface Area Exposed	4300 cm <sup>2</sup>	
SAP	Skin Adherence Factor	1.0 mg/cm <sup>2</sup>	
ABS	Dermal Absorption Factor from Soil	1%	
CSF <sub>oral</sub>	Oral Cancer Slope Factor	1.5E+05 (mg/kg-day) <sup>-1</sup>	HEAST, 1995
CSF <sub>inh</sub>	Inhalation Slope Factor	1.5E+05 (mg/kg-day) <sup>-1</sup>	HEAST, 1995
CSF <sub>dermal</sub>	Dermal Cancer Slope Factor	3.0E+05 (mg/kg-day) <sup>-1</sup>	50% absorption efficiency

The dermal CSF was determined using the method in Appendix A of RAGS with the Region 4 default absorption value for SVOCs.

The SSA is considered as the hands, arms and head.

The table below provides the cleanup levels for Dioxin Toxic Equivalents (TEQs) at three levels within the acceptable risk range.

Risk Level	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>
2,3,7,8-TCDD TEQ (µg/kg or ppb)	0.014	0.14	1.4

For convenience, the value at a risk level of 1E-04 has been rounded down to 1 ppb for use as an appropriate cleanup level. None of the dioxin samples obtained in Zone H was above 1 ppb TEQ, and hence, no dioxin-specific cleanup is anticipated.

This value of 1 ppb is quite similar to that of 2.5 ppb presented in the pending Record of Decision at the Koppers site, also in Charleston, South Carolina. The cleanup level at the Koppers site is also based on a worker/industrial scenario.

In anticipation of questions raised regarding the use of the upper end of the risk range, this risk management option seems a prudent course in light of the uncertainty about dioxin exposure levels at which adverse effects occur. EPA

Region 4 has sanctioned 1E-04, the upper end of the risk range, as a risk management option at other sites in the region. The same decision is typically made by hazardous waste managers in other EPA Regions.

4. **The Use of Summaries in Chapter 9**  
 These summaries were very good for providing a precis of each SWMU or AOC. They should be repeated in the CMS, and in lieu of providing information on unacceptable risks in the residential scenario, they should indicate the estimated risks in the worker/industrial scenario. Based on the estimated risks in the worker/industrial scenario, the treatment in the CMS may be abbreviated. For example, SWMU 14, SWMU 15, AOC 670, AOC 684, SWMU 19, SWMU 20, SWMU 121, AOC 656, AOC 653, AOC 654, AOC 659, AOC 660, AOC 662, AOC 665, AOC 667/SWMU 138, and SWMU 159 need only minimal treatment in the CMS.
5. **Methods for Background Comparison**  
 The background comparison was performed according to the method previously agreed to in the Technical Memorandum dated June 8, 1995. EPA has had several conversations with the Contractor in this regard and the document has been improved in this area.
6. **The Ecological Risk Assessment (ERA) for Zone H follows the basic approach that the Contractor and EPA agreed to during a meeting in Atlanta. However, the main concern is that the ecological risk assessment does not present sufficient information to make a decision concerning the possible need for corrective action at different Areas of Concern (AOCs) or SWMUs (Solid Waste Management Units). Some of the comments given below recommend steps needed to make the ERA more useful as a decision-making tool.**
7. **A few of the comments given below address the need for a more adequate response to EPA's comments on the previous draft of the Zone H RFI Report. Most of the remaining comments pertain to the Ecological Risk Assessment (ERA), since an ERA was not included in the previous draft.**

#### SPECIFIC

1. Page 4-147, Section 4.6.1.5 - Given the operational history of SWMU 20, additional soil samples should be collected and analyzed for metals.
2. Page 9-30, Section 9.17 - The last paragraph states that:  

Due to the hydrophobic nature of dioxins, they would be expected to migrate from soil to groundwater.