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LETTER REGARDING U S NAVY RESPONSE TO REGULATOR COMMENTS ON FINAL
DRAFT REMEDIAL INVESTIGATION FEASIBILITY STUDY WORK PLAN FOR OPERABLE
UNIT 4 (OU 4) NTC ORLANDO FL
5/6/1999
HARDING LAWSON ASSOCIATES

May 6, 1999

Document No.: 2545.026

Commanding Officer
SOUTHNAVFACENGCOM
ATTN: Ms. Barbara Nwokike, Code 187300
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2155 Eagle Drive
North Charleston, SC 29406

**SUBJECT: Final Draft Remedial Investigation Report – Operable Unit 4
Response to Comments
Naval Training Center (NTC), Orlando, Florida
Contract No. N62467-89-D-0317/CTO 135**

Dear Barbara:

Enclosed please find copies of the response to comments provided by USEPA and the Florida Department of Environmental Protection (FDEP) to the Final Draft NTC Orlando OU 4 Remedial Investigation (RI) Report. USEPA also provided comments to the Draft Treatability Study Technical Memorandum No. 1, Natural Attenuation (NA) Assessment for OU 4. Because the USEPA NA comments were combined with their RI comments, we have also included a response to all NA assessment comments (both USEPA and FDEP) in this letter as well.

Some of the more important regulator comments were discussed at the April OPT meeting in Oak Ridge, TN. These included comments associated with site characterization (particularly in Lake Druid and the lake control samples) and the approach to the ecological risk assessment. We believe the enclosed responses adequately address these concerns. However, because the RI will not go final until it can be combined with a final feasibility study, there is an opportunity for USEPA and FDEP to comment further on these responses.

If you have questions or comments regarding this document, please contact me at (781) 245-6606 or John Kaiser at (407) 895-8845.

Very truly yours,

HARDING LAWSON ASSOCIATES



Mark J. Salvetti, P.E.
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Enclosure

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PROJECT REVIEW COMMENTS

**Remedial Investigation
Operable Unit 4, Study Areas 12, 13, and 14 - Area C
and Treatability Study, Technical Memorandum No. 1
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U.S. Environmental Protection Agency, Region 4 – Nancy Rodriguez

1. **A plume of groundwater contaminated with PCE and daughter products has been identified at the site. The source of contamination has been identified as the vicinity of Building 1100, which was a military dry cleaning facility for decades beginning during 1943. Additional concerns include PAH contamination reported in surface soils at some locations, and a separate plume of groundwater contaminated with antimony. Lake Druid, located approximately 350 feet west of Building 1100, is the discharge area for groundwater in this area. Water level data and PCE concentrations indicate that contamination moves downward from the source area into deeper portions of the aquifer following groundwater flow paths. Density differences between water and PCE may help drive contamination downward. Dissolved contamination rises to discharge at the shore of Lake Druid and in a tributary creek which drains the western portion of the site. The potential for residual DNAPL solvents in the deeper portions of the flow system beneath the source is not eliminated by the upward movement of groundwater. Some type of source control probably will be necessary at this site.**

Exceedances of State and Federal ARARs have been reported in soils, groundwater and surface water (RI, Tables 8-2 through 8-5). The extent of the plume contaminated with dissolved PCE and daughter products has been defined reasonably well, but Building 1100 is relatively large and a specific source has not been identified. RI Figures 2-5, 3-8 and L-3 suggest that the deep portion of the PCE plume may be south of the line of wells along the creek which flows into Lake Druid from the site. Note that the highest downgradient PCE concentrations in RI Figure L-3 are located south of the highest TCE concentrations in RI Figure L-5. This appears to have been resolved in the TS with the addition of wells south of the creek. Essentially, the extent of contamination is not well defined in the RI.

Two issues of concern are the source and extent of PAH contamination in soils and the source and extent of the antimony plume in groundwater. Antimony trends over time have not been presented. The antimony plume is said to be stable (not expanding), but no supporting data is presented. Some comments which follow address these issues.

Potential source areas were investigated during the *Focused Investigation/Source Confirmation, Building 1100 Surge Tank*, conducted by HLA (then ABB Environmental Services) in 1997. The sources of the chlorinated VOC plume were identified as periodic, accidental spills and releases associated with day-to-day laundry operations during the 35+ years of operation. Investigations have consisted of direct push soil and groundwater sampling, monitoring well installation and sampling, and passive soil gas surveys. Figure 2-4 in the Final Draft RI Report shows the suspected source area. Its location has been interpreted based on the very high concentrations (greater than 10,000 ug/l) of solvents

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detected in groundwater at the northwestern end of Building 1100. Results of the soil gas survey, which are summarized in the OU 4 RI/FS Workplan, Section 2.3, also indicated high concentrations of VOCs in soil gas near this portion of the building. The northern end of the building was also where the dry cleaning machines were located, and where PCE was stored. No evidence of any other source areas have been found during the course of the exhaustive investigations conducted at OU 4.

Although the deepest portion of the groundwater VOC plume is located west of Port Hueneme Avenue, the highest concentrations of PCE are located in the suspected source area to the east of the road. The vertical groundwater gradient carries the dissolved PCE and daughter products downward from the source area before the gradient reverses to discharge groundwater to Lake Druid. Dissolved PCE does not provide a sufficient density difference to cause a dissolved PCE plume to descend in the aquifer without the presence of a downward gradient. It should also be noted that RI Figure L-3 shows PCE concentrations in groundwater below an *elevation* of 85 feet, not 85 feet below land surface (bls). These PCE detections are actually approximately 15-35 feet bls. Figure L-3 also includes very few locations where PCE was detected, and therefore the contaminant contours drawn by the software should be used with caution. The lone detection of PCE (250 ug/l) on Figure L-3 located south of the TCE concentrations shown on Figure L-5 could be present due to varying rates of biodegradation, and also likely represents PCE from the southern VOC plume.

PAHs detected in surface soil are likely present due to the urban nature of the site rather than a contaminant release. PAHs are primarily present in areas where stormwater flows or collects. More details are included in the Response to Comment 4.

Antimony trends are discussed in the Response to Comment 7.

2. A range of hydraulic conductivity values are reported in the RI. The values from the 18 hour pumping test (RI, p.2-18) agree closely with the values determined by the USGS (p.2-26). However, the Kh values reported from the slug tests (RI, p.3-27) are an order of magnitude lower than the pumping test Kh. The lower hydraulic conductivity values from the slug tests were used in calculations presented in the RI.

The recovery from most of the slug tests was complete in less than 3 minutes (Appendix D), therefore, the results from the longer pumping test probably are more representative of the conditions in the aquifer away from the well screens and gravel packs. USEPA Guidelines for MNA (1998, p. 30) state "The investigator should use the highest valid hydraulic conductivity measured at the site during the preliminary screening because solute plumes tend to follow the path of least resistance (i.e., highest hydraulic conductivity). This will give the "worst-case" estimate of the solute migration distance over a given period of time.

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Compare this "worst-case" estimate with the rate of plume migration determined from site characterization data." The same language was present in earlier versions of the guidance document. Groundwater travel times should be estimated with a hydraulic conductivity closer to that observed during the pumping test.

The problem appears to have been resolved in the TS, which uses USGS hydraulic conductivity values.

Groundwater flow velocities for shallow (0-20 feet bls) and deep (>20 feet bls) will be recalculated using the USGS hydraulic conductivity values of 10 feet/day (0-20 feet bls) and 40 feet/day (>20 feet bls). These USGS values were computed using data from the pumping test, and are considered more reliable than the slug test results. Paragraph 3.6.3.2 will be revised to reflect these changes.

3. The RI (p.2-8) states a "production well" was located north of Area C in what is now a condo complex. Also an abandoned production well is shown on RI Figure 2-1 less than 100 feet from Building 1100 and a 500 ft deep drainage well is shown near the shore of Lake Druid approximately 600 ft SW of Building 1100. After stating that the wells exist in Section 2, the wells are not addressed further in the report. No operational history, construction details or estimates of capture zone size are provided. The current status of the well screens is not described.

If these wells remain open or are in use, they may be pathways to deeper aquifers. Groundwater flow paths and contaminant distributors under the influence of pumping or drainage wells may be different observed under current conditions.

Were the production wells screened above or below the uppermost Hawthorn Group clay? The 500 foot deep drainage well must have been open deep into the Avon Park Limestone of the Floridan Aquifer (RI Figure 3-3). Using the groundwater velocity estimates from page 3-29, which range up to 115 ft/year and are not "worst-case" estimates, if groundwater from the vicinity of Building 1100 was within the capture zone of one of these wells, contamination may have entered the wells. Did contamination flow toward the production wells or the drainage well? Did the drainage well contaminate the Floridan Aquifer? Construction details and the operation history of these wells should be provided and used to evaluate the potential for contamination in deeper aquifers.

USGS records indicate the production well located north of Area C was installed in February 1943 to supply water for the laundry facility. The well was completed to a depth of 828 feet, and was cased down to 360 feet. Aerial photographs from 1962 show no evidence of the well or the associated pump house. No abandonment records have been found.

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The production well located 75 feet south of the laundry was also installed in February 1943 to supply the laundry. This well was 655 feet deep, and was cased down to 383 feet. In December 1995, representatives from the City of Orlando purged and sampled groundwater from this well. No VOCs were detected. The well was then properly abandoned by the St. John's Water Management District. Further details will be included in the Final RI Report.

The drainage well shown on Figure 2-1 was also installed in the 1940s, presumably to regulate the Lake Druid water level. Lake overflow is now directed to Lake Rowena via a weir constructed on the western bank of the lake, and the old drainage well is not in use. A trench that once connected the well structure to the lake is now bermed. Presently, the former drainage well is covered by a square, brick enclosure. In 1997 HLA personnel probed the well using a PVC pipe, and encountered what appeared to be a concrete plug approximately 6 feet bls. This was interpreted as evidence that the drainage well had been abandoned, although no records of the abandonment have been located.

All three wells are screened below the Hawthorn Group clay, which extends to a depth of approximately 150 feet bls. Calculation of capture zone size is not necessary, as the wells are not in use. However, because the Area C production well was abandoned by the St. Johns Water Management District, and because the former drainage well also appears to be abandoned, there is little risk of site-related VOCs contaminating deep aquifers through these conduits.

It is likely that the production well formerly located north of Area C in the area now occupied by the condominium complex was also abandoned. However, if the well does exist, it would not be in use and it is located cross-gradient from the plume of chlorinated VOCs.

4. **The RI (p.5-7) states that PAHs were detected in surface soil at concentrations greater than the relevant SCGs, but goes on to say that these are not considered to be site related. One detect at an upgradient location (U4S00901) is dismissed in the text as being due to contaminated runoff in a drainage area. However two other notable occurrences U4S00601 and U4S01501 (RI Figure 5-2), with exceedances greater than at U4S00901, are not addressed in Section 5. How did contamination which is not site related get so far into the property?**

The RI (p.5-7) notes that "...many surface soil samples collected throughout SA 14 (much of which is paved) did not contain PAHs above SCGs." If many of the samples did not contain PAHs, the relatively high concentrations detected at U4S00601 and U4S01501 would seem to deserve additional evaluation and possibly additional sampling in these areas. Note that subsurface soil samples were not collected in the vicinity of U4S00601 and U4S01501 (RI Figure 5-4), and the nearest surface soil sample is at least 90 feet away from either location

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(RI Figure 5-2). Therefore, the source and extent of PAH contamination in soils have not been defined. Please include text evaluating these locations for previous activity which would explain the presence of PAHs and please evaluate the need for additional sampling to define the extent of PAH contamination

Surface soil sample U4S00601 was collected at the outlet of a culvert that discharges runoff from the OU 4 land surface. PAHs detected in this sample likely originated from anthropogenic sources. Sample U4S01501 was collected within an area that has been paved for approximately 50 years. It is possible that a small piece of asphalt was inadvertently included in the sample. Other surface soil samples collected beneath the asphalt in this area did not exhibit elevated PAH concentrations.

In any case, both locations (U4S006 and U4S015) will be excavated during Spring 1999. Each excavation will measure 10 ft x 10 ft x 2 ft, and confirmatory samples will be collected to ensure all contaminated soil is removed. No further delineation is necessary.

5. **Numerous inorganic analytes, particularly metals, were detected at concentrations above applicable standards in 37/75 unfiltered groundwater samples (RI, p.5-20). Region 4 Standard Operating Procedure (USEPA, 1996, Section 7.2.1) states a turbidity of less than 10 NTU is the "...goal for most groundwater sampling objectives...". The monitoring well development records (RI Appendix G) show that the turbidity at the end of development was often much greater than the goal of 10 NTU. The Groundwater Sampling Logs (RI Appendix H) show that turbidity at the end of the purging period often was greater than 10 NTU. The records in RI Appendix H show that purge time typically was 45 minutes to 1 hour.**

As noted in the RI (p. 5-21), samples with high turbidity sometimes result in apparently high metals concentrations. It appears that some wells have not been fully developed and are likely to continue to produce samples with high turbidity if the same sampling procedures are implemented during the next sampling event. EPA Region 4 policy is to use unfiltered sample results only for risk assessment and determining the extent of contamination. The available data suggest that there are numerous exceedances of inorganic constituents in groundwater at this site, but the turbidity of the samples makes the results suspect. Therefore, the extent of metals contamination in groundwater has not been defined.

HLA should consider revising their sampling protocol to collect samples for metals analysis only after the turbidity meets the specifications of the Region 4 Standard Operating Procedure. A goal for the next groundwater sampling event should be to collect samples with turbidity levels suitable for definition of the extent of metals contamination in

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groundwater. It may be necessary to re-develop the wells or increase purging time until samples of suitably low turbidity can be collected.

Aluminum and iron have historically been detected at relatively high concentrations in NTC, Orlando monitoring wells. Basewide background samples were collected in 1995 to provide a method of establishing the range of concentrations over which inorganic compounds naturally fluctuate. The background screening concentrations calculated for aluminum (4,067 ug/L) and iron (1,227 ug/L) in groundwater are both above their respective FDEP Groundwater Guidance Concentrations of 200 ug/L and 300 ug/L (*Background Sampling Report*, HLA, August 1995).

The RI Report will be revised to reflect the fact that of the 37 samples where iron and aluminum exceeded their respective standards, only six samples exceeded the associated background screening concentrations.

A comparison of the OU 4 RI groundwater data with turbidity measurements does indicate a possible correlation between the concentrations of aluminum and iron in groundwater and the turbidity of the sample. To some degree, aluminum and iron concentrations may reflect the entrainment of particulates in the sample. This has also been observed in groundwater collected from monitoring wells installed at other sites at NTC, Orlando. However, these results have always been naturally occurring and not indicative of groundwater contamination. This is also believed to be the case at OU 4, and resampling is not necessary.

6. Two different buildings are identified as Building 1066 on RI Figure 2-1.

Figure 2-1 will be revised to show the location of Building 1069, which was erroneously labeled as Building 1066 on the draft figure.

7. Antimony was detected in groundwater at concentrations greater than applicable standards in unfiltered samples from 4 locations (RI, p.5-21) and in 4/7 filtered samples (RI, p.5-22). In the Executive Summary (page v), antimony is said not to have migrated in the last 3 years, but no supporting data or graphs showing antimony concentrations versus time are presented in Section 5 (Nature and Extent of Contamination). The stability of the plume has not been demonstrated.

Antimony concentrations in groundwater from several OU 4 monitoring wells have been measured twice: groundwater samples were collected in April 1995 and in February 1998. Antimony concentrations detected during each sampling event are shown on Table 1-1 in the *Draft OU 4 Feasibility Study*, issued January 1999. This table, which will be included in the Final RI Report, is reproduced below:

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Well ID	Antimony Concentration ($\mu\text{g/l}$)	
	April 1995	February 1998
OLD-14-01A	2.5 U	2.5 U
OLD-14-02A	10.1 B	4.7 J
OLD-14-03A	17.6	20.7 J
OLD-14-14A	10.6 B	12.7 J
OLD-12-01A ¹	2.5 U	3.6 J

¹ OLD-12-01A is located approximately 200 feet downgradient of OLD-14-03A.

Notes: $\mu\text{g/l}$ = micrograms per liter.
U = Analyte not detected at the reporting limit.
B = Reported concentration is between the instrument detection limit and the contract required detection limit.
J = Reported concentration is an estimated quantity.

These data demonstrate that the detected concentrations of antimony have not varied significantly between 1995 and 1998. Results of the 1998 sampling event provided no indication that the antimony plume has migrated westward since 1995.

8. An "isolated occurrence" of antimony in groundwater is described in the RI (p. 7-1), but a source is not identified. The interpretation of the antimony data presented in the report is that the distribution of antimony "...appears to be more dispersed and probably not plume shaped, but possibly the result of a non-point release or a natural occurrence" (RI, p. 5-24). However, the antimony is not widely or randomly distributed through the area as would be expected from a natural occurrence or non-point release. Instead, RI Figure 5-13 shows that the distribution of antimony in groundwater can be contoured and is centered near Building 1066 and 1068. No explanation for the source of antimony is presented (RI, p. 5-34). The history of Building 1066 and 1068 are not included in the descriptions of Area Background and Conditions (RI, p. 2-4 through 2-9).

The history of Building 1066, Building 1068 and the vicinity should be examined and included in the report. Antimony concentrations in groundwater should be plotted versus time since the first observation in March, 1993 to demonstrate that the antimony plume is not expanding and support the statements that it is not migrating toward Lake Druid.

Vertical hydraulic gradients in the vicinity of the antimony plume are not apparent on RI Figure 3-9 or RI Table 3-2. From the concept model (RI Figure 2-5) and RI Figure 3-10, the dominant hydraulic gradient in Area 14 is inferred to be downward. Please evaluate whether the downgradient wells in Area 13, cited as evidence that the antimony plume is not

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migrating toward Lake Druid (RI p. 7-12), are screened at a level which will intercept flow from Area 14. It may be necessary to draw a flow net for this demonstration.

The sentence in Subsection 7.1 that refers to the detections of antimony in groundwater as "isolated occurrences" will be revised to indicate that the antimony is present as a plume in groundwater. Similarly, the description of the distribution of antimony in Paragraph 5.2.3.5 as "dispersed and probably not plume shaped" will be removed, as Figures 5-13 and L-8 suggest a definite plume shape.

Potential sources for antimony include lead-acid batteries, munitions, and flame retardants for clothing. There is no evidence that munitions were ever present at OU 4. Batteries are an unlikely source, as no lead was detected in groundwater. It is likely, however, that the Navy laundry treated recruit clothing to make it flame retardant. A review of the chemical inventory of the laundry and nearby buildings did not identify any such chemical, but this hypothesis remains the most likely. As the extent of antimony contamination is limited, identification of the source is not critical.

The wells in which antimony was detected were installed as shallow (A-interval) wells, with screens typically set at 6 to 15 ft bls. The SA 13 wells downgradient of these SA 14 wells were also installed as A-interval wells. Therefore, any migration of the antimony plume would be evident from the detection of antimony in the downgradient (SA 13) wells. At each of the following shallow, downgradient wells, antimony was not detected above the method detection limit: OLD-12-02A, OLD-12-03A, OLD-12-04A, OLD-13-27A, OLD-13-33A, and OLD-13-36A. Antimony was also not detected in a groundwater sample collected from OLD-13-06C, a deep-interval well that is downgradient of SA 14 (*BRAC Environmental Site Screening Report*, HLA, July 1996).

Antimony concentrations detected in SA 14 groundwater in 1995 and 1998 are listed above, in Response to Comment 7. There is no indication that the plume has migrated toward Lake Druid. In the *Draft OU 4 Feasibility Study*, Appendix I, the antimony plume migration rate in the vicinity of SA 14 was calculated using the USGS hydraulic conductivity value of 10 feet/day. The resulting retarded antimony flow velocity was 0.5 feet per year (assuming an antimony K_d of 13.6 ml/g). At this rate, the antimony plume would have moved only 1.5 feet toward Lake Druid between 1995 and 1998. Further, all OU 4 monitoring wells sampled for VOCs during the RI were also sampled for inorganic constituents. Antimony was only detected in the monitoring wells from SA 14, along with a trace amount in OLD-12-01A.

9. **The text in RI Section 7 does not clearly distinguish between movement of contaminant dissolved in groundwater and the movement of contaminant as a DNAPL. The TerraProbe**

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investigation (RI, p. 2-20) found some VOC concentrations in groundwater were approximately 20 percent of the solubility limit for PCE, which is strongly suggestive of DNAPL presence. The text also states that a residual source for PCE probably has migrated downward in the aquifer beneath the source area and has become immobile (RI, p. 7-4). However, the next paragraph on RI page 7-4 states that while some downward movement may occur near recharge areas, the short distance to the lake, and the strong upward gradient to the surface water discharge area most likely limits the further vertical downward spread causing contaminants to converge along streamlines of flow into the lake. It is not clear if the paragraph is referring to dissolved contamination or DNAPL.

Dissolved contamination probably does move toward the natural discharge area, but there is no conclusive evidence eliminating the possibility of downward migration of a DNAPL source. There is no evidence that DNAPL source, if it exists, will move upward to this discharge area. The high concentrations relative to the solubility of PCE indicate that a DNAPL source probably exists beneath Building 1100 and DNAPL contamination is likely to downward until it reaches a layer of low permeability, possibly the top of the Hawthorn Formation. Additional characterization of the source area probably will be necessary when a source control measure is evaluated.

The "immobile" PCE to which the first paragraph in Subsection 7.2.4 refers is DNAPL that is trapped within soil pore spaces. The second paragraph refers to dissolved-phase contaminants in groundwater. These points will be clarified in the Final RI Report.

Groundwater screening data collected using the DPT rig and an on-site GC indicate that groundwater contamination does not extend below 45 feet bls. These data are summarized in Appendix C, Table C-3 of the Final Draft RI Report. Typically, no VOCs (or trace amounts) have been detected in groundwater collected from monitoring wells screened at the top of the Hawthorn Formation (approximately 60 feet bls). There is no evidence of deep, mobile DNAPL that has migrated (or will migrate) to the top of the Hawthorn Group clay layer.

10. **Retardation factors and contaminant specific travel times between the source area and the discharge area are not presented in the RI Section 7, Fate and Transport of Contaminants. Contaminant travel times are required to evaluate the validity of statements such as "The downgradient extent of the PCE plume is generally limited by this degradation" of PCE to TCE (RI, p. 5-34). Contaminant specific degradation rates have not been presented in Section 7. These hydraulic characteristics are included in the TS. Normally they are presented in the RI as part of the site characterization.**

The RI will be revised to include retardation factors, travel times, and degradation rates.

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11. RI Figures L-2 and L-5 show PCE and TCE concentrations above and below a horizon selected at an elevation of 85 ft above msl. The RI text states that as groundwater moves downgradient, "The downgradient extent of the PCE plume is generally limited by this degradation" of PCE to TCE (RI, p. 5-34). However RI Figures L3 and L5 indicate that the downgradient extent of the groundwater plume is limited by discharge to Lake Druid rather than by degradation processes. Contaminant mass may be flushing from the groundwater flow system into the lake rather than being destroyed by degradation processes. Retardation factors, contaminant specific travel times and degradation rates are required to evaluate the fate of contamination at this site.

Some of this is addressed in the TS, however, some anomalies remain in the evaluation of MNA. Vinyl chloride detects are relatively rare in the downgradient portions of the plume. The dissolved oxygen levels in this area are low, so vinyl chloride should be persistent, yet "Ethene is present in almost all groundwater samples collected" (TS p. 3-2). Ethene is a product of reductive dechlorination of vinyl chloride, so it appears that a step in the process is being missed. Our understanding of MNA processes at this site remains incomplete. This is addressed further in the next comment.

The downgradient extent of the entire VOC plume is limited by discharge to Lake Druid, but the downgradient extent of PCE is generally limited by biodegradation. Release records for the former laundry are non-existent for most of the operational history of the facility. However, it is likely that releases of PCE have occurred since the beginning of dry cleaning operations in the late 1950's. PCE would certainly have reached Lake Druid at substantial concentrations if no degradation were occurring and limiting the downgradient extent. Figures L-3 and L-5 demonstrate that as PCE concentrations in the plume decrease, TCE concentrations increase. Although some PCE is detected near Lake Druid, the primary VOCs in groundwater are the breakdown products TCE and cis-DCE. PCE is likely not uniformly degrading due to varying biological conditions within the plume.

Vinyl chloride and ethene are biodegradation products formed when PCE, TCE and DCE undergo reductive dechlorination. In Comment 11, there is concern raised that VC was not detected although ethene was present in almost all wells sampled. This is a valid concern; however ethene was detected at very low levels, which means this concentration of ethene does not correspond to a very high concentration of original parent product (e.g., PCE, TCE).

The concentration of ethene was detected in the range of 0.009 -1.9ug/L and these data are equivalent to PCE (0.05 to 11 ug/L); TCE (0.04-8.8 ug/L); DCE (0.03-6.5 ug/L) and VC (0.02-4 ug/L). Ethene was detected at the highest concentration at well OLD-13-9A (1.9 ug/L), which also corresponded to the highest VC concentration (69 ug/L) detected in groundwater. VC was only detected in three monitoring wells during the natural attenuation

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assessment. It is likely that VC is not detected at the other locations because biodegradation is limited and any VC that was formed was not detectable.

The absence of VC could also be explained if DCE biodegradation proceeded via an oxidation pathway rather than reductive dechlorination. There is evidence that VC can be oxidized under iron reducing conditions (Bradley, P.M. and Chapelle, F.H. 1996, Environ. Sci Technol., 40:2084-2084) and this pathway has also been suggested for DCE (Bradley, P.M. and Chapelle, F.H. 1997, Environ. Sci Technol., 31:2692-2696). This means if DCE was oxidized, then VC or ethene would not be formed. However, since there was little evidence of iron reduction, based upon the absence of ferrous iron, this may not have been a significant pathway. Therefore, at locations where low levels of ethene were detected, it is likely that the VC was present at concentrations too low to be detected by analytical methods.

12. **The seasonal variability of contaminant concentrations and concentration trends with time have not been presented in either the RI or TS. The AFCEE guidelines for MNA, the now superceded Region 4 Guidelines on MNA, and the newest USEPA (1998) MNA guidelines all stress that an evaluation of MNA should rely on multiple lines of evidence. Model results and calculations must be supported by field observations. The TS (p. 3-2) notes that several of the wells have been resampled since the December, 1997 event which was the basis for the conclusions in the TS, but these data are not presented. These data should be evaluated to resolve anomalies in the MNA process at this site, to define seasonal variations in site conditions and define degradation rates based on field observations. This is particularly important because the potential for successful MNA after the implementation of source control measures may be limited because carbon sources (TOC) in the aquifer may be depleted (TS, p. 3-9).**

In December 1997, two in-situ recirculation wells began operating between the suspected PCE source area and Lake Druid. The TS data was collected prior to startup of this remedial system in order to assess NA conditions present before remediation. If MNA becomes a component of the final remedy for OU 4, it would likely be after source removal and shutdown of the recirculation wells. Further assessment of the NA process would be required at that time to confirm that MNA is a feasible alternative.

13. **If monitored natural attenuation is to be considered as a potential remedial measure, a plan to monitor the process of natural attenuation should be implemented as soon as possible. The guidelines for a monitoring plan to demonstrate the effectiveness of monitored natural attenuation, including lists of parameters to be measured in the field and laboratory, and the recommended frequency of sample events, are included in the EPA Monitored Natural Attenuation Protocol (USEPA, 1998, p. 44& p. 52). Typically, sample events should be conducted quarterly for the first year of MNA evaluation to determine seasonal changes in**

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groundwater flow direction, hydraulic gradient, water table elevation, MNA indicators and contaminant migration. Quarterly sampling should be maintained for at least one year, after which an evaluation of the observed variations in water level and water quality should be performed, and the appropriate interval for subsequent sample events should be determined. Methods for interpreting these data are provided in the references cited. If all wells are not to be sampled during these quarterly events, EPA would like to review the list of wells selected and see reasons for their selection.

MNA is not a feasible remedial measure until some form of source control is implemented. The technical memorandum was intended to evaluate the potential for natural attenuation. A monitoring plan will be a component of the design document that will be prepared describing the remedial plan for OU 4. The monitoring plan will be prepared in a manner that is consistent with guidelines described in the "Technical Evaluation Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water" (EPA/600/R-98/128).

14. HLA should follow the EPA Protocol for the evaluation of MNA (USEPA, 1998) to the extent possible. All depth to water measurements, well drilling procedures, sample collection procedures, sample analysis methods, etc., shall be performed in a manner consistent with the specifications in the EPA Region 4 Standard Operating Procedure (SOP, USEPA, 1996). Data collected during the investigation should be stored and reported to EPA in a digital format, in addition to any data presented in tables and figures included in the final report. A generic digital data format is presented in Table 1 of this letter. The format is intended to facilitate data transfer with as little transcription from paper records as possible, and therefore is negotiable on a project by project basis. Please contact Dave Jenkins (404-562-8462, jenkins.dave@epamail.epa.gov) at EPA Region 4 with questions or suggestions regarding the recommended data exchange format.

As discussed in Response to Comment 13, future evaluation of MNA will follow the current EPA Protocol to the extent possible.

All field procedures have been conducted consistent with the USEPA-approved OU 4 RI Work Plan and the USEPA-approved NTC, Orlando Project Operations Plan. Electronic data exchange of RI data is normally not provided. The requirement for such a deliverable was not indicated during USEPA's review of the OU 4 RI Work Plan. Storage and reporting of all data collected in a digital format would require considerable additional effort, and unfortunately is not in the scope of the RI program at OU 4.

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Table 1. Recommended Generic Formats for Digital Data Exchange EPA Region 4.

Four types of data should be stored in a digital format:

1. Depth to water in monitoring wells,
2. Location of monitoring wells (X-Y Coordinates),
3. Construction of monitoring wells,
4. Field and laboratory analysis results.

DEPTH TO WATER DATA

The depth to water data should include all measurements ever made in any of the area wells which are available to the consultants. These can be submitted in any of the following formats, listed in order of preference:

1. (Most Desirable) A file created by a common database program containing fields for:

UNIQUE WELL NAME
DATE OF MEASUREMENT
TIME OF MEASUREMENT
DEPTH TO WATER
COMMENTS

2. (Almost as desirable) A common spreadsheet program containing columns for:

UNIQUE WELL NAME
DATE OF MEASUREMENT
TIME OF MEASUREMENT
DEPTH TO WATER
COMMENTS

WELL CONSTRUCTION DATA AND WELL LOCATION DATA

The data necessary include:

Boring Name or Number	if not same as Well Name or Number
Well Name or Number	Same unique name as for depth to water measurements
Date Drilled	
Date Abandoned	defines valid range of well data

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Table 1 (Cont.). Recommended Generic Formats for Digital Data Exchange EPA Region 4.

Depth to Screen Top	ft	
Screen Length	ft	
Total Depth	ft	may be different from screen bottom
Ground Elev.	ft msl	
Reference Elev1	ft msl	Top PVC or measuring point elevation
Reference Elev Change Date		Date of elevation resurvey
Reference Elev2	ft msl	New measuring point elevation
X Coordinate		Easting
Y Coordinate		Northing
Screen Slot Size	mm	
Mean Grain Size	mm	in screened interval
Comments		TEXT

It would be best if the data were in a dBASE type file or spreadsheet in the format shown, but these data are only entered only once for each sample location, so the construction data could be entered manually from paper copies of the well construction records.

FIELD ANALYTICAL DATA AND LABORATORY ANALYTICAL DATA

The analytical data could be better utilized if it were available in a dBASE type file. This usually is a little more difficult than for water level or well construction data. The format requirements are somewhat flexible because some data conversion always is necessary. An ideal minimum analytical data format for EPA use would resemble the following:

Laboratory #	Lab Sample ID number
Sample Name	Common location or well name
Date	Sample Collection Date
Time	Sample Collection Time
Sample ID	Sample ID from Chain of Custody
Matrix	Water (W), Soil (S) or other as defined
Analyte	Chemical or compound name
Units	Analysis units
Concentration	as text or "<< detection limit for non-detects
Qualifiers	Analysis Qualifiers & Flags
Method	Method Description or Number
Top	Soil Sample Interval Top
Bottom	Soil Sample Interval Bottom

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References

McAllister and C.Y Chiang, 1994, A Practical Approach to Evaluating Natural Attenuation of Contaminants in Groundwater, Ground Water Monitoring and Remediation, Spring, 1994, pp. 161-173.

USEPA, 1996, Region 4, Science and Ecosystem Support Division, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May, 1996.
<http://www.epa.gov/region04/sesd/eib/eisopqam.html>

Wiedemier, T.H., M.A. Swanson, D.E. Moutoux, E.K. Gordon, J.T. Wilson, B.H. Wilson, D.H. Kampbell, P.E. Haas, R.N. Miller, J.E. Hansen, F.H. Chapelle, 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, USEPA, Office of Research and Development, Washington, D.C. 20460, EPA/600/R-98/128, September, 1998.
<http://www.epa.gov/ada/reports.html>

U.S. Environmental Protection Agency, Region 4 – Nancy Rodriguez

Human Health Risk Comments:

1. **Exposure Point Concentrations for Groundwater and Identification of wells and DPT locations - A large number of monitoring wells and DPT points provided groundwater data at this very well characterized site. Unfortunately, the description of these locations in the text (p. 8-20 and 8-36) does not match the maps. The DPT points in the text are labeled U4GO2012 for example. On figure 5-6, the DPT points are labeled U4QO41 for example. I could not make the correspondence between the text and the maps. Figure 5-14 was missing. This figure shows the northern and southern VOC plumes and is critical for review.**

Region 4 risk guidance indicates that the exposure point concentration for groundwater should be the average of the wells in the most concentrated part of the plume. Three plumes were identified here - a northern VOC plume, a southern VOC plume, and an antimony plume. I suspect that the calculation of the EPCs for groundwater gave results that were too low because too many wells were included. With the data reference and missing map problems, I could not recalculate these values.

However, risk levels for groundwater were considerably above levels of concern both for EPA and FDEP. Because remediation is likely, recalculation of the risks is somewhat of a moot exercise. Nonetheless, the RI and BRA are public documents that should characterize

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risk in an accurate and consistent manner. At the very least, I think the document should be redone to correct the well identification, map problems and to identify the sample points and the time of sampling for the wells or DPT locations used to calculate EPCs.

The text on pages 8-20 and 8-36 refers to groundwater sample identification (ID) numbers, which are closely related to the individual monitoring well IDs. Because of the large number of wells at OU 4, and the various investigations during which the wells were installed, the relationship between sample IDs and well IDs are not all obvious. However, Appendix D, Table D-3 correlates sample ID with well ID, and also provides sampling dates and averages when multiple samples were available. Also please note that no DPT data was used in the risk assessment; all groundwater data was collected from permanent monitoring wells. Figure 5-6 will be modified to indicate which wells were included in the EPC calculation for each plume.

The omission of Figure 5-14 was found shortly after the Final Draft RI Report was issued. The text was revised and a new Figure 5-14 representing the extent of the northern and southern VOC plumes was added. These errata pages were issued to the recipients of the final draft report in a letter dated October 8, 1998.

The groundwater EPCs for each plume include analytical data for the wells that had detects; wells that did not have any detected COCs were excluded from the EPC calculations, even if they were within the groundwater plume. In general, the majority of wells included in the EPC for each plume had substantially elevated concentrations of COCs; there are few wells with "low levels" of COCs relative to the total number of wells within the plumes. Therefore, it is unlikely that the EPCs would significantly change if the wells with "low levels" of COCs were excluded from the EPC calculations. Moreover, since the total receptor risks for groundwater already exceed the USEPA and FDEP risk threshold criteria, increasing the EPCs (and therefore the risks) by removing some wells from the EPC data set would not change the conclusions of the risk assessment. However, to address USEPA concerns regarding potential "dilution" of the EPC and underestimation of risks, the EPCs for the COCs contributing the greatest groundwater risks (i.e., TCE, PCE, DCE) will be revised to include only the "most contaminated" wells in each plume. The revised EPCs and associated risks will be presented and discussed in the risk assessment uncertainty section. The uncertainty discussion will emphasize that, although revising the EPCs may increase risk estimates, RGOs and the remedial objectives will not be affected.

- 2. Toxicity of Antimony - There is considerable uncertainty regarding the toxicity of antimony. The critical effects in the toxicity study on which the RfD was based include changes in blood glucose and cholesterol levels and changes in life span in rats. In the critical study, only a single dose of antimony was administered to rats. Hence, the RfD is based on a "hanging"**

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LOAEL. The considerable uncertainty in the RfD is expressed by the use of an uncertainty factor of 1000. The lack of severity of the critical effects of antimony should be considered during risk management decision.

Uncertainties associated with the derivation of the antimony RfD will be discussed in the risk assessment uncertainty and summary sections.

3. **The Occurrence of Vinyl Chloride - On page 7-7, the text suggests that VC does not form. However, VC is found in surface water and sediment in Lake Druid. It seems unlikely that there is another source of VC and the statement on page 7-7 is incorrect and should be removed.**

The text on page 7-7 will be revised to clarify that VC does not appear to form in groundwater. Instead, it appears that VC is only forming when the groundwater plume discharges through the lake sediment.

4. **Exposure Point Concentrations for Soil - The same EPCs were used for all receptors. This procedure is appropriate if the maximum detected concentration was used for the EPC. However, EPCs should be based on a given receptor's exposure unit. An exposure unit is the geographic area contacted by a receptor during the time of interest. For Superfund risk assessment, this means the area contacted by a receptor in a day. For a child, this area would be 0.25 to 0.5 acres, the size of a residential yard and should include the most contaminated soil on site. For a maintenance worker or other industrial receptor, the entire site may be considered an exposure unit. EPCs for surface soil should be recalculated based on the exposure unit concept.**

Surface soil samples at three locations (U4S00601, U4S01101, and U4S01501) are associated with levels of organic and inorganic constituents that are elevated with respect to the remainder of the site. In general, elevated COPC risks were attributable to the concentrations at these locations. These three locations are not within the same ¼ to ½ acre area and, therefore, there is not a "most contaminated" portion of the site that would more conservatively represent the EP for the residential scenario. Regardless, the soil associated with samples U4S00601, U4S01101, and U4S01501 will be removed as an interim action prior to finalizing the RI/RA. Therefore, EPCs and risks associated with surface soil will be revised to reflect the post-remediation analytical data. It is not expected that any areas of "elevated concentrations" will remain after the soil remediation. Therefore, the EPC for residential exposures will be based on the entire soil analytical data set (replacing analytical data for the excavated soils with analytical data for the confirmatory soil samples).

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5. **Page 5-5 and elsewhere. Throughout this chapter on "Nature and Extent of Contamination", on-site concentrations were compared with FDEP soil cleanup goals. This practice is inappropriate in this chapter. Nature and extent of contamination should be discussed here without consideration of risk-based levels.**

Agreed. However, FDEP has come to expect a comparison to soil cleanup goals (revised to the Soil Cleanup Target Levels) when discussing Nature and Extent.

6. **Page 5-34. Figure 5-13 is labeled as the antimony plume. The text suggests it represents the northern and southern VOC plumes.**

As discussed in Response to Comment 1, this error was found shortly after the Final Draft RI Report was issued. The text was revised and a new Figure 5-14 representing the extent of the northern and southern VOC plumes was added. These errata pages were issued to the recipients of the final draft report in a letter dated October 8, 1998.

7. **Page 6-6. EPA has withdrawn the oral slope factor for Beryllium and does not believe this metal to be carcinogenic by the oral route. Beryllium is still believed to be carcinogenic by the inhalation route. The Florida SCG for Beryllium should be recalculated considering this information. As a number close to what the recalculated SCG would be, the Region 3 RBC for Beryllium in residential soil is 160 mg/kg based on noncancer effects to a child.**

The oral slope factor for beryllium will be removed from the risk assessment. The dose-response tables and risk calculations will be revised to reflect this. The Florida Soil Cleanup Target Level (SCTL) for beryllium will be used in the COPC selection. Since the maximum detected concentration of beryllium in soil will not exceed the SCTL, beryllium will no longer be a COPC. Text, tables, and risk calculations will be revised accordingly.

8. **Page 8-8. The text states that Florida Surface Water Quality Standards (SWQS) were used for screening COPCs in surface water. Are these standards risk-based? If not, they should not be used to screen COPCs. The reason Federal MCLs are not used for screening COPCs is that they are not risk-based.**

Florida Department of Environmental Protection (FDEP) requires use of FDEP values. The lesser of the FDEP and Region IV water quality values were used for COPC selection to provide a conservative approach. The recently published Florida Soil Cleanup Target Levels for surface water will be used for COPC selection in the revised risk assessment. Text, tables, and risk calculations will be revised accordingly.

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Ecological Risk Comments:

1. **The Final Draft RI Report describes the collection and results of 20 surface soil samples. Two of these samples, Stations U4S00501 and U4S00601, are located in a drainage ditch or creek on Figure 5-1. They appear to be sediment samples and should be screened against ecotoxicity screening values for sediments. Please resolve this discrepancy.**

The samples, U4S00501 and U4S00601, were collected from a drainageway that does not provide aquatic habitat for receptors. The areas around U4S00501 and U4S00601 contain water only during storm events, when runoff is directed through the Port Hueneme Avenue culvert. U4S00601 was collected at the mouth of the Port Hueneme Avenue culvert; the culvert daylights in a grassy swale that does not support aquatic life. Surface drainage from this point is ill defined as it fans out downgradient of U4S00601. U4S00501 was collected in a downgradient forested swamp where there is a network of small drainageways, but the sample itself was located on higher ground in the vicinity of the Lake Druid shore. The exact location where U4S00501 was collected could not support aquatic habitat.

Given the nature of these areas, receptor exposures at U4S00501 and U4S00601 are more likely terrestrial. Risks to terrestrial wildlife receptors common to bottomland forested areas were evaluated. Aquatic organisms evaluated in the OU 4 ERA (e.g., fish, aquatic invertebrates, and amphibians) would not be exposed to soil at U4S00501 or U4S00601.

Some text describing the area where U4S00501 and U4S00601 were collected will be added to the ecological characterization, subsection 9.1.3.

2. **Several places in the ecological risk assessment (Pages 9-1, 9-12, and 9-13) focus too early on volatile organic compounds associated with the former dry-cleaners. Dry cleaning was only one of many activities at OU4 that may have released contaminants to the environment. For example, Study Area (SA) 12 was formerly used to store insecticides, paints, and small quantities of hazardous materials. Text describing the source of contamination and exposure pathways should be revised to add a broader description of potential waste-generating activities to maintain consistency with other parts of the document such as Section 2-3, which begins on Page 2-3. More importantly, contaminants of concern like pesticides, metals, PAHs, and PCBs should not be eliminated for not being associated with dry cleaning.**

The introduction of the ERA will be revised to discuss other sources of contamination at OU 4. However, the purpose of the problem formulation is to focus the reader on what is believed to be the exposure pathways primarily of concern at the site. Given the history of OU 4, that VOCs have been detected in groundwater at elevated concentrations (prior to the installation of the recirculation wells), and that VOCs are most mobile in the environment

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and may be reaching Lake Druid (which has been identified as the most sensitive ecological habitat downgradient of OU 4), this exposure pathway is the most critical. The Remedial Investigation for OU 4 focused on VOCs as well.

Pesticides, heavy metals, PAHs, and PCBs were not eliminated from the OU 4 ERA. Rather, these chemicals were evaluated in the ERA because they were detected in soil, surface water, and sediment. Since the concentrations of these chemicals were low, professional judgement suggested that they were not a likely threat to the environment and, therefore, were not discussed in detail in the problem formulation. However, a general discussion of the potential impacts to ecological receptors from exposure to these chemicals is provided in the problem formulation. By evaluating the potential effects to receptors via food chain modeling and direct comparisons against toxicity benchmarks, the ERA concludes that pesticides, metals, PAHs, and PCBs are (for the most part) not risk contributors. Given the low likelihood of risks to wildlife, a discussion of all these chemicals throughout the ERA would be exhaustive and unfocused.

3. **The risk assessment could be improved by strengthening the Problem Formulation. Once the screening-level ecological risk assessment identifies chemicals of potential concern, insert a brief discussion of their ecotoxicity. Assessment endpoints should relate to the expected mechanism of toxicity for the given COPC chemical or chemical class. Chemicals, such as PAHs, for example, have direct toxicity on aquatic life. Protection of herbivorous mammals or herbivorous birds is irrelevant to this site because the chemicals of concern (VOCs, pesticides, and PAHs) do not accumulate significantly in vegetation. The cotton mouse and mourning dove are not likely to be chiefly at risk. The ecological risk assessment should focus on assessment endpoints that are expected to be sensitive to exposure and effects of the particular COPCs identified in the screen.**

A general discussion of the ecotoxic effects of chemicals detected at OU 4 (including pesticides, PCBs, and metals) is provided on Pages 9-12 (third paragraph) and 9-17 (subsection 9.2.3). Assessment endpoints have been chosen to be consistent with these chemical's modes of toxicity (e.g., reproductive effects and mortality). Subsection 9.2.3 will be revised to include a general statement about the toxic effects that PAHs have in the environment.

Given the variety of chemicals detected in site media and retained as ECPCs, a variety of receptors representing different trophic guilds is appropriate for the OU 4 ERA. While it is true that herbivores are not likely to be at risk from exposure to the chemicals chiefly of concern at OU 4, this cannot be ascertained without evaluation. Therefore, herbivorous receptors were included in the ERA, in addition to insectivorous receptors (e.g., the short-tailed shrew and the American woodcock), to evaluate uptake of ECPCs via the food chain.

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4. **The ecological risk assessment is illogical. It started by stating a purpose to assess risks from chlorinated VOCs to aquatic and semi-aquatic species, however, all but one of the receptor species chosen (cotton mouse, short-tailed shrew, mourning dove, American woodcock, red fox, raccoon, and great blue heron) are terrestrial. The risk assessment correctly states that chlorinated VOCs do not accumulate in the food chain, however, much of the report is devoted to food chain modeling. The ecological risk assessment should provide a rational, scientific argument for why the chosen assessment approach was taken. The Problem Formulation step is critical to writing a scientifically-defensible risk assessment. Ultimately, scientific evidence will provide justification for risk management decisions made at the site.**

The introduction to the OU 4 ERA states two goals: (1) to evaluate potential risks to semi-aquatic and aquatic receptors from exposure to VOCs in groundwater, surface water, and sediment, and (2) to evaluate potential risks to terrestrial receptors from exposure to chemicals in soil. This statement will be further clarified to state the chemicals of concern in surface water and sediment (VOCs, PAHs, pesticides, and metals) and in soil (e.g., PAHs, pesticides, and metals).

Since VOCs were detected at very high concentrations in OU 4 groundwater, and because there is a clear VOC migration pathway from OU 4 to Lake Druid (the most sensitive downgradient habitat), it is reasonable to focus on the groundwater exposure pathway as the primary pathway of concern in the OU 4 ERA (as per the Process Document). This exposure pathway is discussed in Subsection 9.2.2, and is shown in Figure 9-3. The receptors evaluated for this pathway are listed in Tables 9-7 and 9-2, and are discussed in more detail in subsections 9.1.4 and 9.2.1.

However, it is also necessary to evaluate all pathways of concern in an ERA. As stated in the problem formulation (subsection 9.2.2 under Terrestrial and Semi-Aquatic Wildlife), pesticides, PCBs, and several metals are known to bioaccumulate via the food chain, and these chemicals were detected in OU 4 soil. Therefore, discussions regarding food chain exposures are germane to this ERA. The terrestrial and semi-aquatic receptors listed by the reviewer were used in the ERA to evaluate potential food chain exposures to contaminants detected in surface soil, surface water, and sediment (which is discussed in the problem formulation, subsection 9.2.2).

5. **After the screening-level risk assessment is complete instead of proceeding directly into the food chain modeling, discuss the magnitude, pattern, and frequency of detection of COPCs identified in the screen. Discuss how some are eliminated as having concentrations below background screening values or for being essential nutrients. Discuss which samples were taken from under the pavement or in the drainage ditch. Present this information to managers in such a way that they can make educated decisions whether or not to eliminate a**

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chemical as a COPC. Interpretation of the existing chemistry data is more important than food chain modeling and rescreening the data with a new set of ecotoxicity reference values.

The magnitude, pattern, and frequency of detection of chemicals in site media are discussed in detail in Chapter 5; therefore, the reader will be directed to this section for this information in the second paragraph of subsection 9.2 (Problem Formulation). The problem formulation will also include a brief analysis of the potential migration of chemicals from OU 4 surface soil to Lake Druid sediment, and then relate the levels found in these two media to levels detected in control samples collected in other portions of Lake Druid. This analysis will show that levels of certain chemicals (e.g., pesticides and mercury) are fairly consistent in all these areas, suggesting that low-level contamination of these bioaccumulating compounds are common throughout the area. Furthermore, the relatively low levels of exceedances in the risk characterization show that potential risks are minimal.

Section 9.3.1 (the Hazard Assessment and Selection of ECPCs) and Tables 9-3 through 9-6 discuss ECPC elimination based on background comparisons and nutrient status.

Subsection 9.3.1.1 will be revised to explain which surface soil samples were collected from under pavement, and that all surface soil samples (including those collected under pavement) were included in the ERA. This subsection will also state that because the future land use for this area is unknown, soils currently under pavement may someday be exposed.

6. **Most of the contaminants detected at elevated levels, with respect to ecotoxicity screening values, are located in the drainage ditch. The ditch discharges to Lake Druid. Chemicals detected in the ditch are not VOCs but aluminum, pesticides, and PAHs. Most upland samples are relatively clean. The ecological risk assessment should direct attention to contamination in this ditch. The assessment endpoint should highlight aquatic or semi-aquatic species that inhabit the drainage ditch. Since the gopher turtle is an endangered species that lives on parts of the NTC, it may be appropriate to use a species of turtle that lives at OU4 as an assessment endpoint. (However, toxicity reference values for turtles are generally lacking.) Another group of semi-aquatic receptor species that has close association with the sediment would make a good choice if turtles are not found at OU4. Assessment endpoints should be chosen with consideration of the location of the contamination with respect to ecological receptor groups. For example, the robin might not be expected to forage in the drainage ditch when water is present.**

As discussed in Response to Comment 1, samples U4S00501 and U4S00601 collected from the ill-defined drainageway east of Port Hueneme Avenue were not collected from aquatic habitat and, therefore, are not sediment. These locations contain water only during storm events, when runoff is directed through the Port Hueneme Avenue culvert. Therefore, truly

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aquatic receptors would not be exposed to contaminants at these locations. The receptors that may be exposed to contaminants at U4S00501 and U4S00601 would include those wildlife receptors that are common to bottomland forests (e.g., shrews, woodcocks, and possibly foxes), and that were evaluated in the ERA. Gopher tortoises would not inhabit this area due to the gradual grade (gopher tortoise burrows are typically found in sandy hillsides or banks) and because the water table is too close to the surface.

- 7. The food chain modeling missed the point. The only reason to do food chain modeling would be to address potential exposures through the food chain to chemicals that bioaccumulate like pesticides, mercury, and PCBs. However, exposures to many of the most bioaccumulative chemicals were excluded in the food chain modeling. The food chain modeling for aquatic organisms used an exposure point concentration for sediments from Lake Druid (Table 9-5), which did not consider exposure to chemicals detected in the ditch where these chemicals were detected at maximum concentration. The food chain modeling for terrestrial organisms excluded many of the chemicals detected in soils from the ditch, because BAF values were either lacking or assigned a value of zero in Table F.1-2. Therefore, the really important chemicals, that happened to be in the ditch, were missed. This is why metals (such as cadmium, mercury, and zinc) are turning up as "risk drivers" on Table 9-11 instead of pesticides and PCBs. A BAF value of 1 should be used when a value is lacking from the literature. Sediments in the drainage ditch should be considered with respect to food chain modeling for aquatic receptors.**

Bioaccumulative chemicals were included in the food chain modeling. Food chain exposures for wildlife receptors were evaluated for Aroclor-1254 (a PCB), methoxychlor (a pesticide), cadmium, lead, mercury, and selenium in soil, and for numerous pesticides, Aroclor-1254, and mercury in surface water and sediment. These chemicals have a strong tendency to bioaccumulate.

Food chain modeling for semi-aquatic receptors (e.g., the raccoon and great blue heron) appropriately used an exposure point concentration from Lake Druid, where these receptors would likely forage. Herons would not be found foraging in a bottomland forest or at the Port Hueneme Avenue culvert outfall, where the dense underbrush would restrict their mobility or limited foraging opportunities exist. While raccoons are opportunistic feeders and may be found foraging in these areas, the shrew (a smaller omnivore with a voracious appetite) is a more conservative receptor to use in the model. Food chain exposures to shrews were evaluated at these locations.

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The only BAFs that are missing in Table F.1-2 were for the following groups:

- VOCs (which the reviewer agreed do not bioaccumulate), and
- bird BAFs for PAHs, aluminum, beryllium, lead, manganese, silver, vanadium, and zinc (information for avian receptors is generally lacking for these chemicals).

Furthermore, the only BAF for which a value of "0" was assigned is the lead BAF for plants, which is supported by the literature (see explanation provided in Table 9-10).

The confusion about missing BAFs in Table F.1-2 may be due to the predominance of footnote "h", which implies that the chemical listed is not an ECPC for that receptor group. Information was not presented in Table F.1-2 for chemicals that were not selected as CPCs. Only the entries of "NA" indicate that a chemical was retained as an ECPC, but that a BAF was not available.

8. **There is a discrepancy with the surface soil data for samples *BO101* through *BO401* from the Site Screening Report. These samples were from soil borings advanced through the pavement. They are not what we typically think of as soil but may represent some other medium. The composition of major elements like aluminum, iron and magnesium is unlike that of soil. Metals concentrations collected in 1995 for the Site Screening report differ substantially from those collected in 1997 for the RI. The data from the Site Screening Report, also, have not been validated.**

Numerous surface soil samples from under pavement were included in the ERA because the future use of the site, and therefore, the presence of pavement, are unknown. To be conservative, the ERA assumed that all areas would be unpaved in the future, thus representing a larger exposure area than is currently present. This effectively increases the site foraging frequency for each receptor, which increases the likelihood of potential risks. This will be clarified in subsections 9.1.3 and 9.3.1.1, the ecological characterization and selection of surface soil ECPCs (respectively).

The composition of the elements aluminum, iron, and magnesium are consistent with soil. These samples do not represent any other type of medium. However, the aluminum values may lead to the perception that the site screening data are unusual. The concentration of aluminum in samples collected during site screening was erroneously divided by 1,000. This will be corrected in the Final RI Report.

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The site screening data were validated in 1995. These data were included in the Site Screening Report (ABB-ES, 1996), and a PARCC report was not included in the Draft RI. In 1995, the validators chose to indicate inorganic results between the IDL and the CRDL with a "B" qualifier. Inorganic RI data collected in 1997-1998 was qualified using a "J".

Some unvalidated groundwater VOC data collected for performance monitoring of the IRA was used in the risk assessment. As per USEPA, 1992d (Data Usability for Risk Assessment), data are not required to be validated for use in risk assessments. However, some level of data review must be performed to assure their usability for risk assessment. This review occurred.

9. **Page 9-1. The introduction to the ecological risk assessment should be broad at this point. The purpose of the ERA should not be restricted to evaluation of the risks posed by the presence of chlorinated VOCs. VOCs were not the only chemicals detected at OU4. VOCs in soil were detected under pavement, but not in the grassed areas where ecological receptors can be exposed. VOCs should not be the primary ecological focus in soils.**

Refer to Response to Comment 2.

10. **The pesticides at OU4 were detected at their highest levels in the drainage ditch/creek, which receives discharges from the culvert draining the area around Building 1100. The pattern of location of the pesticides at OU4 suggests a release associated with site-related activities versus historical pesticide land application, as suggested on Page 9-12.**

Building 1100, the industrial laundry and dry cleaning facility, does not have a history of pesticide manufacturing or storage. The area used for pesticide storage is located southwest of Building 1100, topographically upgradient of the drainage swale leading to the Port Hueneme Avenue outfall. Only very low concentrations of pesticides (none above screening criteria) were detected in the three soil samples (12B00401, U4S01501, and 13B00501) between the former storage area and the swale, and few pesticides detected in surface soil sample U4S01201, located in the swale itself. In addition, the few pesticides detected at U4S01201 were found at much lower concentrations than those detected at U4S00601, at the Port Hueneme Avenue outfall. This suggests that there is not a substantial pesticide migration pathway via surficial run-off between the former pesticide storage area and the culvert outfall. Nor is there any evidence of pesticide releases at OU 4.

The laundry facility is surrounded by maintained grass where pesticides were likely to have been applied in the past. However, as with U4S01201, the levels of pesticides detected in surface soil samples collected from around Building 1100 (U4S00701 through U4S01101) are also lower than those detected in U4S00601. Since there are no known point sources in

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OU 4 soil (related to historical site practices) that explain the pesticide levels observed at outfall location U4S00601, the likely explanation for the pesticides at U4S00601 is historical application at OU 4, subsequent run-off, and deposition at this location.

As explained in Response to Comment 5, a brief analysis of pesticide migration from OU 4 soil to Lake Druid sediment will be performed in the ERA.

11. **Page 9-2. Terrestrial habitats at OU4 are described starting on this page. The discussion is restricted to current land use. Please include a discussion of proposed future land use. Will the upland areas of OU4 always be industrial?**

The proposed future land use is unknown at this time. The site characterization will be revised to include future land use if this information becomes available.

12. **Chapter 7 on fate and transport needs to be expanded to include a discussion of surface water and stormwater runoff as a transport pathway. A culvert is shown on Figure 9-1. What part of OU4 does this culvert drain?**

Some discussion of runoff will be added to Chapter 7. The culvert shown on Figure 9-1 connects a drainage swale that is parallel to Port Hueneme Avenue in the grassy area to the east with the wooded area. The "creek" shown on this figure will also be revised. The creek is actually an expression of groundwater, beginning approximately 50 feet east of Lake Druid. Flow from the creek into the lake is almost imperceptible. During storm events, water discharging from the culvert spreads out in the wooded area before discharging into the creek.

13. **Page 9-17, bottom. Pesticides, PCBs, and some metals may be site-related due to the past practice of storing insecticides, transformer carcasses, and small quantities of hazardous waste at OU4. These chemicals should not be discounted in the Conceptual Site Model discussion.**

Refer to Response to Comments 2 and 10.

14. **Assessment endpoints presented in Table 9-2 are too broad and general for anything but a screening-level ecological risk assessment.**

The OU 4 ERA is a combination of a screening-level and baseline risk assessment because the remedial investigation process for this site was initiated several years ago (prior to the integration of the "Process Document" as the preferred USEPA Region IV ecological risk guidance document into the remedial investigative process at OU 4). The endpoints selected

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for the OU 4 ERA are consistent with the Process Document (USEPA, 1997), and with previous ERAs conducted at this and many other Navy facilities. To satisfy the purposes of a screening-level ERA, endpoints that are likely to have impacts at the population-level (i.e., reproduction and mortality) were selected. These endpoints are consistent with the level of detail specified by the USEPA for other Navy sites in Florida that are (or were) at the same stage of the remedial investigative process (e.g., NAS Jacksonville). To bridge the gap between screening-level and baseline evaluations, the ERA presented several hypotheses to better gauge the likelihood of impacts to both the individual and the community. Had a high likelihood of risks to ecological receptors been predicted in the ERA, then these hypotheses would be refined for a more detailed baseline risk assessment, for which site-specific data would have been collected. The assessment endpoints presented in Table 9-2 are discussed in detail in Section 9.2.3 (Identification of Endpoints) of the ecological risk assessment.

15. **Please identify what stage this ecological risk assessment is at in EPA's *Process for Designing and Conducting Ecological Risk Assessments under Superfund* (USEPA, 1997). It appears to be at a screening level, yet chemicals were screened for being essential nutrients, below background screening values, and infrequently detected analytes. The screening-level risk assessment is to be completed prior to refinement of chemicals of potential concern. Note that Steps 1 and 2 of EPA's ERA Process do not include background screening or elimination of essential nutrients. Refinement of COPCs occurs in Step 3. Please keep tables on selection of COPCs the same, but separate the discussion of chemicals exceeding screening values from the discussion of refinement of COPCs. Provide a justification in the text for any chemical that is being proposed for elimination as a COPC.**

As stated in Response to Comment 14, the OU 4 ERA is a combination of a screening-level and baseline risk assessment. Because both goals of a screening-level ERA and baseline-level ERA are accomplished together under one cover, the separation of these two phases seemed repetitive. This streamlined ERA does not eliminate any ECPCs from the evaluation that would not otherwise be eliminated by the two-step process prescribed in the Process Document (USEPA, 1997). The justification for elimination of ECPCs is provided in detail in Tables 9-3 through 9-6.

16. **The area of OU4 is defined by the extent of contamination not by the property boundaries. Page 9-18, 1st numbered paragraph, implies that only the portion of Lake Druid within the property boundaries is part of OU4. Please correct this misleading statement.**

The hypothesis was intended to focus on OU 4-related impacts to aquatic organisms. The text will be revised to state: "...aquatic receptor populations along the OU 4 groundwater discharge zone of Lake Druid."

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17. **At OU4, given the nature and pattern of the contamination detected, it is more appropriate to look at protecting aquatic species from direct exposures to contaminants than to model food chain exposures to higher-trophic level organisms that eat aquatic species.**

Direct exposures to aquatic organisms were evaluated in the ERA. These evaluations are presented in Tables 9-13 through 9-15. Furthermore, given the ECPCs that were retained in sediment, including PCBs, pesticides, and mercury, evaluation of food chain exposures to higher trophic level organisms are appropriate.

18. **In Appendix F, the table that presents BAFs distinguishes between chemicals detected in soils and chemicals detected in sediments by not providing a BAF value for aquatic receptors if a chemical was not detected in sediments. (See footnote *h* on Table F.1-2.) Sediment samples such as Station *U4SO0601* (the ditch) should be screened against Region 4's ecotoxicity screening values for sediment.**

Refer to Response to Comment 1.

19. **Table F.1-2 should include BAFs for several pesticides that were detected in soil and/or sediment. For example, DDT was detected in soil at Station *U4SO0901*, but lacks BAFs for terrestrial receptors. The same could be said of many other pesticides on Table F.1-2. When a receptor is receiving exposure through many routes, exposures routes associated with an environmental medium should not be eliminated because that chemical is not a COPC in that particular medium.**

The ERA employed the screening values recommended by USEPA Region IV to screen ECPCs. Since these values are regarded as being conservative, exposure levels below these values should not present a risk to ecological receptors. Many pesticides in surface soil were eliminated from further evaluation in the ERA during the screening process, but were retained for sediment. The appropriate pesticide BAFs have been included for aquatic organisms exposed to sediment. The inclusion of pesticide BAF information for chemicals in soil that have been eliminated as ECPCs is not warranted. Refer also to Response to Comment 7.

20. **Page 9-53. The factor of 10 conversion between the LOAEL and NOAEL is not an uncertainty factor but is derived from a study, cited in USEPA (1997), that indicated that 96 percent of chemicals had a ratio for the LOAEL to NOAEL of 5 or less, and all were less than 10.**

Comment noted. However, the fact that 96% of the chemicals have LOAEL:NOAEL ratios of 5 or less suggests that the common application of a factor of 10 is likely to be overly

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conservative, thus adding uncertainty to the evaluation. The reference to this factor of 10 as an "uncertainty factor" will be changed to "application factor", but an uncertainty will be included in section 9.5 regarding the potential overestimate of risk due to the application of this factor.

21. **The low concentrations of aluminum in surface soil (e.g., 0.0088 mg/kg) are too low to have been detected by the commonly used method for metals in 1995. The 1995 samples in Table C-1 (BO101 through BO401) might be data for another medium. The major element composition of these samples is inconsistent with what we would expect to find in soils. This data has not been validated. The "B" laboratory qualifier flags remain. It should not be used in the risk assessment unless this discrepancy can be resolved.**

As discussed in Response to Comment 8, the analytical results for aluminum were erroneously divided by 1,000. These data will be corrected, and the ERA will be revised accordingly. The site screening data were validated in 1995; the "B" qualifiers represent inorganic concentrations detected between the IDL and the CRDL.

22. **The ecological risk assessment tells us over and over that the major concern at this site is the ground water plume of VOCs that is discharging to surface water. Yet in the final analysis, risks to aquatic organisms due to exposure to VOCs are not addressed quantitatively due to lack of available toxicity reference values. This is especially true when concentrations detected in sediment are compared to NOAA effects ranges, which lack values for VOCs. Therefore, the purpose of the ERA to assess potential risks to aquatic receptors from exposures to chlorinated VOCs in ground water, which discharges to surface water, could not be adequately addressed. At the end of Step 2 of the screening-level ecological risk assessment in EPA's risk assessment guidance (USEPA, 1997) there is a scientific and management decision point with three outcomes: (1) There is adequate information to conclude that ecological risks are negligible, (2) The information is inadequate to make a decision at this point and the ecological risk assessment process will continue to Step 3, or (3) The information indicates that the potential for adverse ecological effects is real. From what is presented in the RI report, one would have to conclude that information is inadequate to make a decision at this point. The conclusion should be that information is inadequate rather than that there are no risks to aquatic receptors.**

Agreed. However, although toxicity benchmarks for chlorinated VOCs in sediment are lacking (which is acknowledged in Section 9.5, the Uncertainty Analysis), there are ample data (i.e., AWQC and effects concentrations from AQUIRE) for evaluating potential risks from exposure to chlorinated VOCs in surface water and groundwater. It is the partitioning of these chemicals from sediment to water, and the presence of these chemicals in the sediment pore water that is most toxic to aquatic life. As explained in Subsection 9.2.2, under Aquatic Receptors, the groundwater concentrations from samples collected along the

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shoreline of Lake Druid were used in the ERA to represent exposures to benthic organisms from pore water. The conclusions will be clarified accordingly.

23. **The volatile organic compounds detected in sediments of Lake Druid should be carried through into the baseline risk assessment Problem Formulation when no screening value is available. The chemical 1,1-dichloroethene was detected at a maximum concentration of 1.3 mg/kg in sediment.**

1,2-Dichloroethene (not 1,1-dichloroethene) was detected at the maximum concentration of 1.3 mg/kg in sediment, and was retained in the ERA. 1,1-Dichloroethene was detected at a concentration of 13J ug/kg in sediment, and was also retained in the ERA. Refer to Response to Comment 15. No additional refinement of the Problem Formulation is required based on the conclusions of the ERA.

24. **It is inappropriate to conclude that benthic organisms are not at risk to metals detected in sediments above screening ecotoxicity values just because these pesticides and PAHs are not considered to be site related. Dry cleaning is not the only activity that occurred at OU4. Pesticides and other hazardous materials were stored there. High concentrations of these same pesticides and PAHs were found in the drainage ditch, where a gradient of contamination leaving the site was detected.**

The text will be revised to state that although a low probability of adverse effects are possible, chemicals are not believed to be site related because PAHs, pesticides, and metals detected in the ditch are not commensurate with the levels detected in upgradient OU 4 soil (that have been impacted by site activities). The ditch samples were collected from locations that would not provide adequate habitat to support benthic organisms (Refer to Response to Comment #1).

Reference:

USEPA, 1997. *Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC, EPA 540-R-97-006.

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Florida Department of Environmental Protection – David P. Grabka

Draft Treatability Study Comments

1. **Site-specific sample collection and analysis indicate that natural attenuation is not sufficient by itself to obtain groundwater cleanup criteria in a reasonable time. The Navy proposes as an alternative site-specific risk-based target levels to be presented in the subsequent OU 4 RFI report. If it is not technically feasible to cleanup the contaminated aquifer in a reasonable time and the risk-based target levels exceed the State primary MCLs, the Navy will need to obtain a waiver from Chapter 62-520.410(1), Florida Administration Code.**

Remedial alternatives have been evaluated in the *Draft OU 4 Feasibility Study*, issued in late January 1999. It is expected that some form of deed restriction limiting groundwater use will be required. Implementation of the deed restriction and any necessary reclassification of groundwater will be executed in cooperation with FDEP and the Orlando Partnering Team.

2. **A containment strategy should be investigated if there is a completed exposure pathway between groundwater and surface water that can pose a potential risk to receptors, human or otherwise. A containment strategy may be applicable if source removal and contaminant reduction strategies are not feasible.**

The current OU 4 interim remedial action (IRA) consists of two recirculation wells between the source area and Lake Druid. The IRA intercepts and treats the portion of the groundwater plume with the highest VOC concentrations, and then discharges the treated water to continue the migration to Lake Druid. This system is essentially providing containment for groundwater with the highest VOC concentrations.

The *Draft OU 4 Feasibility Study* was issued in late January 1999. An evaluation of various remedial alternatives, including containment, can be found in that document.

3. **Dilution factors, reduction factors, compound half-lives, and other contaminant fate and transport factors are assumed in the analysis. The report's conclusions and recommendations, as appropriate as they may be, would be even more defensible if the source or rationale for these assumptions were presented.**

Assumptions and sources for fate and transport factors used in this evaluation are included in Appendix C, "Fate and Transport Modeling". The text of the document and Appendix C will be revised to better reference the derivation of these parameters.

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RI Report Comments

1. **Figure 2-1 on page 2-5 shows two wells located in Area "C", an abandoned production well and a drainage well. These wells are not described adequately in the text. Specifications on these wells and their history should be provided in Chapter 3.**

The production well located 75 feet south of the laundry was installed in February 1943 to supply the laundry. This well was 655 feet deep, and was cased down to 383 feet. In December 1995, representatives from the City of Orlando purged and sampled groundwater from this well. No VOCs were detected. The well was then properly abandoned by the St. John's Water Management District.

The drainage well shown on Figure 2-1 was also installed in the 1940s, presumably to regulate the Lake Druid water level. Lake overflow is now directed to Lake Rowena via a weir constructed on the western bank of the lake, and the old drainage well is not in use. A trench that once connected the well structure to the lake is now bermed. Presently, the former drainage well is covered by a square, brick enclosure. In 1997 HLA personnel probed the well using a PVC pipe, and encountered what appeared to be a concrete plug approximately 6 feet bls. This was interpreted as evidence that the drainage well had been abandoned, although no records of the abandonment have been located.

Further details will be included in Chapter 3.

2. **A well survey should be conducted in the vicinity (1/4 to 1/2 mile) of OU4. Well locations should be shown on a figure and specifications of the wells, including their history, should be provided in a table.**

According to City of Orlando records, no permitted irrigation or domestic wells are present within the vicinity of OU 4. Similarly, there are no production wells within 1/2 mile of OU 4. These details will be included in the Final RI Report.

3. **Chapter 4 should be expanded to include a summarization of samples that failed holding times, matrix spike duplicates, field and laboratory blanks, laboratory duplicates, etc. This could be a summary of the PARCC Report in Appendix J. Also, a discussion of data qualifiers and overall quality and usefulness of the data should be included in this section. Finally, a discussion of contaminants detected in laboratory and field blanks should be included to determine which contaminants may be excluded on that basis.**

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A brief discussion of the data quality will be added to Chapter 4. The details will remain in the PARCC report in Appendix J. In general, the brevity of Chapter 4 was due to overall data quality that was suitable for characterizing the nature and extent of contamination at OU 4. No specific problems were identified that may have caused the rejection of critical data.

4. Possible sources of antimony should be discussed in Section 5.1.

As discussed in Response to EPA Comment 8, potential sources for antimony include lead-acid batteries, munitions, and flame retardants for clothing. There is no evidence that munitions were ever present at OU 4. Batteries are an unlikely source, as no lead was detected in groundwater. It is likely, however, that the Navy laundry treated recruit clothing to make it flame retardant. A review of the chemical inventory of the laundry and nearby buildings did not identify any such chemical, but this hypothesis remains the most likely. This discussion will be added to Chapter 5.

5. The Remedial Investigation Report repeatedly references the Florida Soil Cleanup Goals (FDEP, 1985). These numbers are obsolete. The Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, Florida Administrative Code, should be used as these are the latest risk-based cleanup levels.

As recommended, the draft final RI Report will be revised to incorporate the use of SCTLs.

6. The residential SCTL for beryllium is 120 mg/kg. The increase in this number from the previous SCG may drop this contaminant as a chemical of concern in soil.

Comment noted. The residential SCTL will be used in the COPC selection. The change in the screening value will cause beryllium to be eliminated as a COPC.

7. A table should be included in Chapter 4 listing the contaminants detected in the DPT groundwater sampling and the depths at which the samples were taken.

Chapter 4 addresses data management, and is not an appropriate place for a reference to DPT groundwater data. This information, including sample depths, has been provided in Appendix C, Tables C-3 and C-4. As discussed below, sample depths will also be added to Figure 5-6.

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8. **Figure 5-6 does not indicate at what depths the contaminants were detected in the chemboxes.**

Figure 5-6 will be revised to show the depth intervals sampled during the DPT screening program.

9. **In Section 5.2.3.5, it is stated that antimony is dispersed and probably not plume shaped, possibly the result of a non-point source release or a natural occurrence. This statement is not supported by the analytical data.**

The description of the distribution of antimony in Paragraph 5.2.3.5 as "dispersed and probably not plume shaped" will be revised, as Figures 5-13 and L-8 suggest a definite plume shape.

10. **The chembox for sample U4D010 on figure 5-11 incorrectly has cadmium at a concentration of 7,080 mg/kg. That is the concentration of calcium. The correct concentration (average) is .39 mg/kg.**

Figure 5-11 will be revised to list the correct average concentration of cadmium detected in sample U4D010, 0.39 mg/kg.

11. **Sediment sample U4D050 and surface water sample U4W050 cannot be considered as true control samples as volatile organic halocarbon (VOH) contaminants associated with the site were detected. A control sample would need to be obtained from an area of the lake not impacted by the site.**

Chlorinated VOCs were detected at low concentrations in the surface water and sediment control samples. Cis-1,2-DCE was present in the surface water control sample, 1,2-DCE (total) was detected in the sediment control sample, and PCE and TCE were detected in both the surface water and sediment control samples.

While these VOCs are potentially site-related, the low concentrations at which they were detected are well below applicable surface water and sediment criteria. For example, PCE was present in the surface water control sample at a concentration of 2 ug/L, which is below the Florida Class III Surface Water Quality Standard (SWQS) of 8.85 ug/L for PCE. The detected TCE concentration in the surface water control sample, 18 ug/L, is well below the SWQS of 80.7 ug/L. There is no Class III SWQS for cis-1,2-DCE, which was detected in the control at a concentration of 14 ug/L.

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Similarly, the chlorinated VOCs detected in the sediment control sample are consistent with the sediment concentrations detected in surface water. It is likely that the control location is close to where the southern edge of the southern VOC plume discharges to Lake Druid.

While these VOCs were detected in the control samples, the low concentrations at which they are present should not preclude the control samples from consideration as a qualitative screening tool. The primary purpose of the control samples was to provide non-VOC and inorganic data for Lake Druid away from the area where the majority of the VOCs are located. Lake Druid is an urban lake, and receives a tremendous volume of stormwater from the surrounding urban neighborhood. City of Orlando records indicate that the 19 acre Lake Druid receives runoff from a surrounding 152 acre drainage basin. There is no evidence to suggest that the presence of inorganic or PAH contamination (for example) in the lake is related to site activities.

12. **It is stated on page 7-8 that migration of the volatile organic halocarbon (VOH) plume beyond the near shore of Lake Druid likely does not occur. This has not been verified by actual sample collection and analysis. Surface water sample U4W019, further from the shoreline and directly out from sample U4W010, had appreciable amounts of VOHs. A sediment sample taken at that location also had appreciable amounts of VOHs. Furthermore, "control" samples U4D050 and U4W050, collected from an area not believed to be impacted by the VOH plume, also had detected VOHs. It is possible that contaminants are migrating from groundwater to sediment and surface water further from the shoreline than is predicted in the report.**

VOC concentrations in surface water and sediment were delineated during the 1996 Focused Field Investigation (FFI). Figures 2-6 and 2-7 in the OU 4 RI/FS Work Plan (ABB-ES, 1997) summarize total VOC concentrations in Lake Druid surface water and sediment. The majority of this data was generated using an onsite GC, with an appropriate QA/QC program that included confirmatory analyses at an offsite fixed laboratory. These figures will be added to the OU 4 RI Report.

The objective of the Lake Druid surface water and sediment sampling program, as defined in the approved RI Work Plan for OU 4, was to obtain current, validated, CLP-quality data to support the human health and ecological risk assessments. Further delineation of the VOC contamination in Lake Druid beyond that conducted in during the FFI was not necessary.

As discussed in Response to Comment 11, the presence of low levels of VOCs in the Lake Druid control samples should not preclude their consideration as a qualitative screening tool. It is likely that the control location is close to where the southern edge of the southern VOC plume discharges to Lake Druid.

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13. **Section 8.3.1 discusses the demographics and land usage around the Main Base. This discussion should focus on demographics and land usage around Area C.**

Demography and land use in the vicinity of Area C are discussed in Subsection 3.7, and will be restated in Paragraph 8.3.1.

14. **The extent of contaminants in surface water and sediments does not appear to have been adequately characterized. The lateral extent of VOHs has not been determined. Also, only two sample locations were analyzed for full TAL/TCL, one location being where the "control" samples U4D050/U4W050 were collected. Because the "control" samples appear to have been impacted by site contaminants (see comment 12), the rationale for not addressing contaminants other than VOHs because they were detected in the "control" sample at similar concentrations is not valid.**

As discussed in Response to Comment 12, the intent of the RI sampling program for Lake Druid was not to delineate the extent of VOH contamination, because that had been adequately completed during the FFI. The full suite samples were collected at the request of USEPA. It was expected that anthropogenic contaminants would be detected in the lake (such as PAHs and pesticides) because of the volume of stormwater flowing into the lake from the surrounding neighborhood. There is no evidence that these compounds would have discharged to the lake from OU 4. Anticipating the results of the full suite sampling, the control location was added to demonstrate that anthropogenic compounds were present in the lake away from the majority of the VOC contamination. This approach was discussed and approved by the Orlando Partnering Team (OPT). The presence of low concentrations of VOCs in the control are irrelevant, as inorganics, SVOCs, pesticides, etc. present in the control are unrelated to the VOC release. None of the non-VOC organic compounds present in the control have been detected in OU 4 groundwater. Overland migration of contaminants from OU 4 to Lake Druid is not supported by surface soil data and/or site topography. Also see the Response to USEPA Ecological Risk Assessment Comment 10 for a further discussion of overland contaminant migration.

University of Florida – Christopher J. Saranko and Stephen M. Roberts

Human Health Risk Assessment Comments

1. **Section 8.2.1.2 Risk Based Screening**

1A. **On page 8-6, HLA identifies Florida Soil Cleanup Goals (SCGs) and EPA Region III risk-based concentrations (RBCs) for residential soil as the source of screening levels for**

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contaminants in surface soil. The SCGs were cited from a September 27, 1995 FDEP Technical Guidance document. However, since the distribution of the 1995 tables, guidance from the USEPA has resulted in the modification of the equations and formulas used to derive health-based soil cleanup target levels. As a result, the soil cleanup target levels have changed somewhat. More current soil cleanup target levels for contaminants at this site can be found in Chapter 62-785, F.A.C. Although these cleanup levels were developed for the Brownfield program, the methodology used to develop the numbers is broadly applicable to other sites. As a matter of practice, soil screening levels should be the lower of the Region III RBCs for residential soils, Florida Soil Cleanup Target Levels (SCTLs) based on residential exposure, or Florida SCTLs based on leachability. In this case, two additional chemicals, aldrin and heptachlor, should be included as COPCs in the surface soil. Beryllium, however, can be removed from the COPC list (Table 8-2).

The risk assessment will be revised to use the Soil Cleanup Target Levels per Chapter 62-785, Florida Administrative Code. COPC screening tables and associated text and risk calculations will be revised accordingly. However, the leaching-based SCTLs will not be used for COPC selection. Leaching of soil constituents to groundwater is a concern related to source area characterization and contaminant fate and transport. To address this concern, soil data were compared to leaching-based screening values in Section 5. Soil constituents selected as COPCs for the risk assessment based on leaching potential (rather than direct contact risks) would pose de minimus risks and, therefore, would not measurably increase the calculated risks.

1B. On page 8-7, HLA identifies Florida Surface Water Quality Standards (SWQs) as a source of screening levels for surface water. While most of the SWQs are cited correctly, no value for aluminum is cited. The Florida SWQ for aluminum is 13 ug/L. Using this screening value, aluminum should be included as a surface water COPC.

The value for aluminum is for Class II surface water; Lake Druid surface water is Class III. There is no FDEP aluminum screening value for Class III surface water. Regardless, the FDEP surface water values will be replaced with the FDEP SCTLs in the revised risk assessment.

1C. In Table 8-1 (Essential Nutrient Screening Concentrations for Surface Soil, Subsurface Soil, Groundwater, Surface Water, and Sediment), the groundwater screening concentration developed for sodium is listed as 396,022 ug/L. The Florida primary standard for sodium in groundwater (160,000 ug/L) should be listed instead. This standard was correctly used in the COPC screening process (Table 8-5) so it is unclear how the value reported in this Table 8-1 was used.

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The FDEP primary standard for sodium in groundwater was used as the screening value for COPC selection. A footnote will be added to the essential nutrient screening table (Table 8-1) to indicate that the FDEP primary standard, not the essential nutrient screening value, was used for COPC selection.

2. **Figure 8-1 Complete Exposure Pathways for Human Receptors**

Figure 8-1 on page 8-33 illustrates complete exposure pathways for human receptors at OU4. Ingestion of groundwater is not considered a complete exposure pathway for future occupational workers, and dermal contact with groundwater is not considered a complete exposure pathway for future residents. If the area is developed for residential or commercial use, groundwater may be used as a potable water source for residences as well as industry. In addition, in the residential scenario, if groundwater is used as potable water, then dermal exposure could also be a complete exposure pathway.

The risk assessment evaluated the exposure pathways presented in the workplan (residential ingestion and inhalation) that was agreed upon by the Orlando Partnering Team, including USEPA and FDEP. The residential scenario was evaluated as the most conservative potential exposure pathway and, therefore, is protective of commercial workers as well. The only circumstances where evaluation of commercial groundwater use might provide valuable information would be if the remedial objectives for groundwater were other than compliance with MCLs. Since the remedial objectives for the groundwater at OU 4 are compliance with MCLs (which are protective for unrestricted use of the water), evaluation of commercial groundwater use does not contribute necessary information to the risk characterization. Dermal exposure to groundwater contributes exposures that are insignificant compared to ingestion and inhalation exposures. For example, the adult resident cancer and non-cancer risks for dermal contact exposures to TCE in water (based on exposure 0.2 hours per day – equal to the length of time spent showering) would be more than one order of magnitude lower than the ingestion risks, and nearly one order of magnitude lower than the inhalation risks. Therefore, quantification of dermal exposures would not measurably change the risk estimates for potential exposures to groundwater.

3. **Section 8.3.3 Quantification of Exposures**

3A. Chemical-Related Variable HLA states on page 8-36 that the EPC for groundwater “is the arithmetic mean concentration of wells within the groundwater plume.” EPCs for groundwater are shown in Table 8-10 for the northern VOC plume, in Table 8-11 for the southern VOC plume, and in Table 8-12 for the antimony plume. The EPCs in these tables appear to be arithmetic mean of all samples within the respective plumes, calculated using one-half the reporting limit for nondetects. This is contrary to Region IV guidance, which

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allows for the use of the arithmetic mean for groundwater only in the "highly concentrated area of the plume." Including marginally contaminated samples, (and, in this case, one-half the reporting limit for nondetects) has the potential to inappropriately lower the EPC. Risk calculations for exposure to groundwater at this site may therefore be substantially lower than those calculated according to the recommended methodology. HLA should determine which of the samples are representative of the most highly contaminated areas of the respective plumes and recalculate the EPCs accordingly.

The groundwater EPCs for each plume include analytical data for the wells that had detects; wells that did not have any detected COCs were excluded from the EPC calculations, even if they were within the groundwater plume. In general, the majority of wells included in the EPC for each plume had substantially elevated concentrations of COCs; there are few wells with "low levels" of COCs relative to the total number of wells within the plumes. Therefore, it is unlikely that the EPCs would significantly change if the wells with "low levels" of COCs were excluded from the EPC calculations. Moreover, since the total receptor risks for groundwater already exceed the USEPA and FDEP risk threshold criteria, increasing the EPCs (and therefore the risks) by removing some wells from the EPC data set would not change the conclusions of the risk assessment. However, to address USEPA concerns regarding potential "dilution" of the EPC and underestimation of risks, the EPCs for the COCs contributing the greatest groundwater risks (i.e., TCE, PCE, DCE) will be revised to include only the "most contaminated" wells in each plume. The revised EPCs and associated risks will be presented and discussed in the risk assessment uncertainty section. The uncertainty discussion will emphasize that, although revising the EPCs may increase risk estimates, RGOs and the remedial objectives will not be affected.

3B. Population-Related Variables HLA discusses population-related variables on page 8-45 and parameters describing potentially exposed receptors are presented in Appendix E-4. Tables E-4-1 and E-4-13 present exposure parameters for the RME and central tendency resident adult and child, respectively, exposed to surface soil. The equation variables and units for dermal intake should be consistent with guidance in RAGS. However, the dermal surface area used by HLA for a child age 1-6 is 766 cm²-year/kg. The derivation of this value is shown in Appendix E-7 (Table E-7.1); one-fourth of the total surface areas for males ages 1-6 are divided by average body weights of males and females of the same age. These values are then summed from age 1-6 to produce an age-weighted surface area. The intake equation already accounts for body weight, and cannot be used with a weight-adjusted surface area. Therefore, the child surface area should be the average of the surface area available for contact for males and females ages 1-6. The average area available for dermal contact preferred by FDEP is to assume the exposure of the hands, one-half the arms and one-half the legs. It is not unreasonable, given the climate in Florida, that a receptor would wear shorts and a short-sleeve shirt most of the year. Using data in the

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Exposure Factors Handbook (1997) this value for children ages 1-6 is derived as 1869 cm². Age-weighted surface areas are also used in equations for the adolescent trespasser/recreational user. These should be adjusted to reflect the average surface area of the trespasser/recreator (in cm²) available for contact.

The dermal intake equation used to evaluate exposures to children and adolescents does not take into account body weight (see risk calculations spreadsheets in Appendix E-6). Therefore, use of the age- and weight-normalized surface area value is appropriate. USEPA Region IV risk assessment guidance refers to the USEPA dermal exposure guidance (USEPA, 1992) for quantification of dermal exposures. The methods used to quantify dermal exposures for the OU 4 HHRA are consistent with this guidance. With respect to the dermal contact area used in the risk assessment, the risk assessment incorporated the assumption that 25% of the body surface area would be exposed to soils. This assumption is consistent with USEPA dermal exposure assessment guidance (USEPA, 1992; USEPA, 1997). The FDEP body surface area assumptions for soil contact (½ area of arms, ½ area of legs, and area of hands) correspond to a value equal to 25.4% of the total body surface area. This value is consistent with the surface area value of 25% that was used in the risk characterization. Using a value of 25.4% would not change the results of the risk characterization. Therefore, no revisions to the risk characterization are proposed.

3C. Assessment-Related Variable On Page 8-45 and in Table E-4-3, equation variables are given for the RME site maintenance worker exposed to surface soil. The exposure frequency is listed as 30 days/year, with the source listed as 'assumption.' Some justification for this, such as a review of records and employee duties, should be given.

Table E-4-4 presents equation variables for the excavation worker exposed to surface soil. The exposure frequency is 30 days/year and the exposure duration is one year. As we have expressed to FDEP previously, we are concerned that risks for carcinogens calculated using standard procedures, but based on very short or intermittent exposures, such as the excavation worker presented here, may be invalid. Therefore, risk based on non-cancer health effects should be performed for the excavation worker, and the higher of the two risks should be presented in the risk characterization portion of the RI. Additionally, when considering non-carcinogenic effects for the excavation worker scenario, an AT of 42 days (30 consecutive working days plus weekends) should be used. HLA uses an AT of 1 year, corresponding to the improbable situation in which a construction worker visits the site only 1 out of every 12 days over the course of a year.

Because NTC Orlando is closing, the site maintenance worker exposure scenario is a hypothetical scenario; therefore, a records search or review of employee duties is not feasible. HLA believes that the exposure parameters used for the site maintenance worker are

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appropriate and reasonable assumptions given the forthcoming base closure, and the possible land reuse of this area. The exposure frequency for the excavation worker should be 5 days per week (equivalent to 250 work-days per 365 calendar-day year). The exposure duration should be one month (30 days). The tables, text, and risk calculations will be revised accordingly.

3D. Inhalation of Particulates from Soil HLA discusses the inhalation of contaminated soil on page 8-47 and the equations describing intake from inhalation of contaminated soil are given in the tables of Appendix E-4. HLA only considers inhalation of particulate matter, neglecting inhalation of contaminants volatilizing from soil. Considering the volatile COPCs in surface soil, it is appropriate to omit this exposure pathway. The CA term in the inhalation intake equations should be adjusted to account for volatilization as follows:

$$CA = C \times CF (1/PEF + 1/VF)$$

The derivation of the volatilization factor (VF) can be found in the USEPA's *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95/128, 1996)

Possible inhalation exposures to volatiles in soil will be evaluated. The volatilization factor will be derived in accordance with the USEPA Soil Screening Guidance (USEPA, 1996). Tables, text, and risk calculations will be revised accordingly.

3E. Inhalation of Vapors while Showering On page 8-48 and in Appendix E-8, HLA cites a shower model by Foster and Chrostowski (1987) which they use to characterize inhalation exposure of future residential receptors to volatile chemicals present in the groundwater. The only reference provided for the Foster and Chrostowski model is a presentation at the 1987 annual meeting of the APCA. If a shower volatilization model is to be used, we would prefer the use of a model that has undergone more extensive peer review. It should be noted that Region IV guidance states that it should be assumed that showering exposure is equivalent to exposure from ingestion of two liters of contaminated water per day. Using this assumption would result in a greater inhalation exposure to VOCs in the northern, southern and antimony groundwater plumes. This results in cancer risks of 1E-3 rather than 2E-5 for the northern plume; 3E-5 rather than 1E-6 for the southern plume; and 2E-6 rather than 7E-8 for the antimony plume.

The Foster and Chrostowski shower model (1987) is the exposure model most commonly used in risk assessment for evaluating possible inhalation exposures to VOCs during water spraying/dispersion activities. Although USEPA Region IV guidance suggests using the oral exposure risks for VOCs to estimate the inhalation exposure risks for VOCs, use of the shower model provides an exposure estimate that is associated with less uncertainty.

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Moreover, because the health risks associated with possible ingestion exposures exceed FDEP risk criteria, and because the groundwater remedial objectives are to reduce groundwater concentrations to meet MCLs, any increases in total receptor risks will not affect the conclusions of the risk assessment. Nevertheless, total receptors risk estimates that are based on the Region IV approach (i.e., doubling the ingestion risks for VOCs to estimate inhalation risks) will be presented and discussed in the risk assessment uncertainty section.

4. Section 8.4.2 Dose-Response Assessment

4A. Beginning on page 8-49, HLA discusses the dose-response assessment for COPCs at OU4 and Appendix E-11 presents the toxicity factors for COPCs. However, within section 8.4.2, several references are made to toxicity information located in "Appendix E-8." These references are incorrect and should be changed to read "Appendix E-11."

The text in Section 8.4.2 will be corrected to refer to Appendix E-11, where appropriate.

4B. Inhalation slope factors and reference doses were taken primarily from HEAST. If no inhalation slope factor (or unit risk) or reference dose (or RfC) was available, one was not extrapolated and apparently no inhalation risk or hazard was calculated for those chemicals. To account for risks via this pathway HLA should extrapolate inhalation toxicity values. Alternatively, in the section on site-specific uncertainties, HLA should provide a more thorough, quantitative treatment of the potential underestimates of risk and hazard resulting from the lack of inhalation toxicity data.

USEPA does not approve nor recommend using oral dose-response values as surrogates for COPCs that do not have published inhalation dose-response values. Therefore, the suggested change will not be made to the risk assessment. However, even if oral dose-response values were used as surrogates to evaluate inhalation risks, the total receptor risk estimates for surface soil and subsurface soil would not substantially increase. This is because the COPC intakes received via inhalation exposures are three to five orders of magnitude lower than the ingestion and dermal intakes. Moreover, even if inhalation intakes were equal to ingestion intakes, the HIs for surface soil and subsurface soil would not exceed one (i.e., doubling the ingestion HIs to account for absent inhalation dose-response data would not result in HIs above 1). For groundwater, even if non-cancer inhalation risks were equal to ingestion risks, the HIs would still be greater than one. Therefore, the conclusions of the risk assessment would not change.

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5. Section 8.7 Remedial Goal Options

On page 8-96, HLA illustrates the calculation of RGOs for COPCs at OU4. The calculated RGOs are given in Table 8-19. When using the type ratio method for the calculation of RGOs, Region IV guidance states that "it is important to include all significant pathways and routes of exposure." Since HLA has omitted several potentially important pathways and routes of exposure, as outlined above (e.g., the omission of the dermal pathway for exposure to groundwater and the omission of inhalation of VOCs from the soil), the RGOs for some chemicals may be inappropriate. It should be noted that the RGOs for some chemicals fall below the FDEP SCTLs. In these cases, it would probably not be necessary to cleanup to levels below the SCTLs.

Human Health Risk Assessment Summary

Risks calculated by HLA at OU4 are above FDEP target risk levels for both current and future land use for soils and surface water. Since no groundwater is currently being used at OU4 there are no risks to current users from this exposure medium. However, contaminated groundwater presents the greatest risk to future industrial or residential receptors at OU4. HLA has done a good job of characterizing the extent of the contamination at OU4, yet due to the omission and/or appropriate characterization of several potentially important pathways of exposure, the risks to all receptors at OU4 may be underestimated.

FDEP has cited three situations where risks may have been underestimated for some exposure media. However, for the reasons provided below, HLA does not believe that the magnitude of underestimation and/or the affect on the results and conclusions of the risk assessment are significant enough to justify revising the risk assessment or revising the RGOs.

- Quantification of inhalation risks for COPCs that lack published inhalation dose-response values: As demonstrated in the Response to Comment 10, even if the inhalation risks for surface soil and subsurface soil were assumed to be equal to the ingestion risks, the total non-cancer risks would not exceed a HI of 1. Therefore, the conclusions of the risk assessment would not change. In addition, since no RGOs were developed based on non-cancer risks, RGOs would not change. If non-cancer inhalation risks for groundwater were assumed to be equal to ingestion risks (Response to Comments 9 and 10), HIs would still exceed 1 and, therefore, the conclusions of the risk assessment would not change. Moreover, if non-cancer risks were doubled (due to the assumption that inhalation risks were equal to ingestion risks), and risk-based groundwater RGOs were subsequently divided in half, the risk-based RGOs would still be higher than the FDEP groundwater SCTLs and/or MCLs. Since the SCTLs and MCLs are the remedial

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objectives for groundwater, changing (i.e., reducing) the risk-based RGOs would not change the groundwater remedial objectives.

- Quantification of inhalation exposures to volatile COPCs in soil: As discussed in the Response to Comment 8, possible inhalation exposures to COPCs that may volatilize from soil will be quantified. The additional risks associated with this exposure pathway are not anticipated to measurably change the total receptor risks.
- Quantification of dermal exposures/risks to groundwater: As demonstrated in the Response to Comment 4, the additional risks posed by dermal contact with groundwater would not add measurable risk to the total receptor risk estimates. Therefore, evaluating this pathway does not provide a value-added attribute to the risk assessment.

Ecological Risk Assessment Comments

Specific Comments

1. On page 9-24 HLA cites the Dutch Soil Criteria "A" presented in Beyer (1990) as the source for soil ecological screening levels. Table 9-3 lists these values for chemicals detected at OU4. There have been changes in the Dutch Soil Cleanup Levels since the Beyer publication. The new Dutch list can be found on the Internet at www.ContaminatedLAND.co.uk. In the future, HLA should use this updated list as the source for its soil ecological screening values.

Comment noted. Future ERAs will use the new Dutch Soil Criteria.

2. Table 9-5 presents the selection of ecological chemicals of potential concern (ECPCs) in Sediment at OU4. For sediment, HLA screened contaminant concentrations against Region IV sediment screening criteria. As a matter of practice, sediment screening values should be the lower of Region IV sediment screening criteria or FDEP's sediment quality assessment guidelines (SQAGs). When the SQAGs are applied to the sampling data from OU4, gamma-BHC (lindane) and silver should be included as sediment ECPCs.

The CPC selection process for sediment did not utilize the FDEP's sediment quality assessment guidelines (SQAGs) as these guidelines are marine-based and, therefore, not applicable for screening ECPCs in freshwater systems.

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3. **Table 9-9 (page 9-45), describes the equations used to estimate contaminant exposures to the representative wildlife species. A reference should be provided for these equations.**

The equations used to model contaminant exposures to representative wildlife species were developed by Harding Lawson Associates. The equations are based on the principals and procedures prescribed in the guidance documents listed in the ERA introduction. Further clarification will be provided in the Final RI Report.

4. **In Table 9-9, the equation for total exposure related to surface soil is shown along with a similar equation for total exposure related to surface water and sediment. In these equations, the variable "site foraging factor" (SFF) is defined as the site area (in acres) divided by the home range of a predator (in acres). For some predators, the SFF is much less than 1. This is contrary to guidance from *Ecological Risk Assessment Guidance for Superfund* which states that in screening level risk assessments, area use factors should be assumed to be 1 (100%). Thus, for this screening level ERA, HLA should change their SFF accordingly.**

Refer to response to USEPA Comment 15. The OU4 ERA is a combination of a screening-level and baseline ERA. In this streamlined approach, the duplication of ERA processes was eliminated. The incorporation of a calculated SFF more accurately represents the percentage of time a receptor would likely use a contaminated area, thus eliminating the conservative assumption that all receptors would spend all their time at the site. Being that the small mammals with home ranges less than the site area are typically the most sensitive receptors in the model, the risk estimates for these receptors would not change.

General Comments

1. **HLA did a poor job of characterizing the levels of contaminants in the Lake Druid surface water and sediment. Few samples were taken, and only one of each was analyzed for contaminants other than VOCs. A sampling plan that better characterized the distribution of all contaminants in the Lake Druid surface water and sediment on the area of OU4 should have been prepared. As is, the data for analytes such as inorganics, pesticides, and SVOCs are not very helpful.**

The objective of the Lake Druid surface water and sediment sampling program, as defined in the approved RI Work Plan for OU 4, was to obtain data needed to complete the risk assessment. The intent was not to fully delineate VOCs as part of the RI. The OU 4 Work Plan had originally proposed analyzing samples for VOCs only. At the request of the USEPA, the Navy agreed to analyze the sample collected at the mouth of the OU 4 drainage

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area for the full suite of analyses. This approach was agreed upon by all members of the OPT. The OU 4 Work Plan includes the number of samples and types of analyses, which are commensurate with historic use, migration of site contaminants, and exposure potential at the site.

VOC concentrations in surface water and sediment were delineated during the 1996 Focused Field Investigation (FFI). Figures 2-6 and 2-7 in the OU 4 RI/FS Work Plan (HLA, 1997) summarize total VOC concentrations in Lake Druid surface water and sediment.

2. **The finding by HLA that site-related VOCs pose little risk to ecological receptors seems justified. However, the dismissal of other ECPCs is troubling. Several inorganic ECPCs, including mercury, exceeded the RTVs for particular receptors. In these cases, the risks to the receptors were dismissed because the ECPCs were deemed not to be "site-related." Whether due to site-related activities or not, several ECPCs may present a risk to ecological receptors at OU4 and should undergo a more extensive evaluation.**

The ERA, which is based on multiple conservative assumptions, concluded that risk estimates for these chemicals were low. Risks were predicted for small granivorous and omnivorous mammals, however the magnitude of risks are low and, therefore, would not likely result in adverse population-level effects. An extensive evaluation of chemicals that show no evidence of migration from OU 4 is not warranted; particularly since there is no basis as per the ERA conclusions.