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LETTER REGARDING U S NAVY RESPONSES TO REGULATOR COMMENTS ON DRAFT
REMEDIAL INVESTIGATION FEASIBILITY STUDY WORK PLAN FOR OPERABLE UNIT 4
(OU 4) NTC ORLANDO FL
10/22/1997
ABB ENVIRONMENTAL



03.01.04.0004

1D 00108

2545-010

October 22, 1997

Commanding Officer
Southern Division, Naval Facilities Engineering Command
ATTN: Ms. Barbara Nwokike, Code 1873
P.O. Box 190010
2155 Eagle Drive
North Charleston, SC 29419-9010

**SUBJECT: Operable Unit 4
RI/FS Workplan Response to Comments
Naval Training Center, Orlando, Florida
Contract No. N62467-89-D-0317/135**

Dear Barbara:

Enclosed are the responses to FDEP and USEPA comments on the Draft OU4 RI/FS Workplan. The responses to the EPA comments were discussed at the September OPT meeting in Orlando. The FDEP comments were received via email the following week.

These responses have been incorporated into the document, and will be included in the Final workplan scheduled to be shipped on October 30.

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

Very truly yours,

ABB ENVIRONMENTAL SERVICES, INC.

Mark J. Salvetti, P.E.
Task Order Manager

cc: W. Hansel (SDIV) D. Dangerfield (SDIV)
J. Mitchell (FDEP) N. Rodriguez (USEPA)
G. Whipple (NTC Orlando) R. Cohose (BEI)
S. McCoy (Brown & Root) J. Kaiser (ABB-ES)
File

ABB Environmental Services Inc.

PROJECT REVIEW COMMENTS

**Operable Unit 4
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Florida Department of Environmental Protection (FDEP) - John Mitchell

1. **On page 2-15 (2nd par.) it states there are no published surface water quality standards for cis-DCE or VC. The standard is they must meet minimum criteria, which in this case is the detection limit.**

It is our understanding that the minimum criteria for vinyl chloride is the detection limit, based primarily on its carcinogenic properties [Florida Chapter 62-302.500(1)(e)]. However, cis-1,2-DCE is not a suspected carcinogen. The OU4 IRA Conceptual Design established the MCL (70 ug/l) as the performance standard for cis-1,2-DCE in groundwater discharging to Lake Druid from the recirculation well system.

The workplan will be revised to state that VC concentrations in Lake Druid exceeded minimum criteria, as specified in Florida Chapter 62-302.500. The workplan will also state that cis-1,2-DCE was detected in surface water at concentrations exceeding the MCL, and that the MCL is being used as the performance standard for cis-1,2-DCE in the OU4 IRA.

2. **Last Paragraph, page 2-23, change northwest to northeast**

Northwest will be changed to northeast.

3. **Page 3-10 (third bullet on page), see comment No. 1.**

See response to Comment No. 1.

4. **Page 3-14 (2nd full paragraph), no matter the current conditions at the site, the groundwater is still classified as G-II and is therefore potentially potable and must be considered as such. It is also usable for irrigation.**

Agreed that the surficial aquifer is **potentially** potable and may also be used for irrigation. Therefore, the last sentence of the referenced paragraph will be omitted.

FDEP's comment is noted. Future potential potable water use will be considered in the human health risk assessment. Based on this addition of a worst case groundwater exposure scenario, a specific consideration of groundwater for irrigation will not be evaluated. A modeled estimate of the risks from inhalation of volatiles in groundwater while irrigating (watering private lawns) is not considered necessary, because the risk to future potential residents from ingestion of and inhalation (volatiles only) while showering with groundwater represents a worst case estimate. Additionally, if it is necessary to restrict the groundwater usage at the site, the deed restriction will be written to prohibit

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potable groundwater use as well as private irrigation. Therefore, the estimate of risks to hypothetical potable water users is adequate to fully characterize the risks from the shallow groundwater.

5. **Page 3-21, The 2nd paragraph states the CPCs are organic at the site. Antimony is also a CPC at the eastern portion of the site.**

The first sentence in the referenced paragraph will be changed to read the following: "Based on previous investigations, the CPCs at OU 4 are mostly organic compounds, namely chlorinated solvents, with the exception of the antimony found at SA 14."

6. **Figure 4-1. I suggest a microwell be installed near the SE corner of Building 1066.**

The document will be changed to read "five microwells installed at SA 14" and Figure 4-1 will be changed with the addition of one microwell.

7. **Figure 4-2. I suggest additional surface soil samples be taken in SA 14, and an additional sample be taken in SA 12 midway between wells OLD12-01A and 13A.**

Surface soil samples were collected at SAs 12 and 14 during site screening activities. These samples were collected at each of the monitoring well locations with no compounds or analytes being detected above screening criteria for surface soil. We believe the surface soil sampling results from site screening are adequate to characterize SA14. However, at SA 12 the spread of samples does indicate a possible gap in the results, therefore an additional sample will be added in the area requested.

8. **Page 4-13 (1st paragraph) indicates a 6-foot screen for the microwell. They should be 9 feet.**

Document will be changed and 9 foot screens will be used.

9. **Page 6-2 (last bullet), shows potential exposure from irrigation. This is a G-11 aquifer and must be evaluated for potable use.**

FDEP's comment is noted. Future potential potable water use will be considered in the human health risk assessment. A revision will be made to the last bullet on page 6-2, the revised bullet will read "potential future area residents - incidental ingestion of and dermal contact with surface soils, surface water, and sediment, as well as incidental ingestion and inhalation while showering (volatiles only) while using the surficial groundwater as a potable water supply."

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10. **Page 6-3 (1st par.), DEP is not opposed to ABB running Central Tendency, but the state only accepts RME; not CT.**

The FDEP's position on Central Tendency (CT) risk assessments is noted. ABB would like to perform and provide all risk management tools warranted by the Orlando OU4 site to enable the Navy and regulators to make informed remediation decisions. ABB feels that both the Reasonable Maximum Exposure (RME) and the CT are useful risk management tools -- providing risk managers with an estimate of the *risk range* to current or potential future receptors. Additionally, if the risk assessment results warrant additional evaluation, a probabilistic risk assessment may be performed. This probabilistic risk assessment would use appropriate exposure parameter estimates to further define the risks to specific percentages of the population. This risk management tool would aid in the determination of remediation levels that are protective of the receptor population and yet are still technologically and economically feasible. By providing a means to determine the percentage of the population protected at a specific risk levels, a probabilistic risk assessment can provide the basis for a regulatory cost-benefit analysis.

11. **Page 6-7: It states that ERA Assessment and Measurement Endpoints will be listed in the ERA and examples are provided. These endpoints must be determined now to determine what and if any toxicity tests will need to be performed as part of the RI. The first 2 bullet examples are acceptable as assessment endpoints. However the 3rd bullet is too general. It should be growth and survival of benthic macroinvertebrates and fish. The use of literature derived measurement endpoints may or may not be adequate. We may need to perform actual laboratory or in situ bio-assays/toxicity tests.**

With respect to assessment and measurement endpoint selection, please see the response to USEPA Comment #7.

The Navy anticipates that laboratory or in-situ bioassay/toxicity tests will not be necessary during the RI. Maximum VOC concentrations detected in surface water of Lake Druid (approximately 1 ppm) during the FFI are 2 to 3 times lower than chronic Federal Ambient Water Quality Criteria (AWQC) for freshwater species. Based on comparison of available surface water data with AWQC, toxicity to freshwater aquatic species is not expected. Available FFI sediment data from Lake Druid show that elevated VOC concentrations (10 ppm) are localized in the area of the creek's mouth. However, log K_{ow} values, which measure a chemical's tendency to partition to lipid materials (including tissue) for VOCs are generally very low (< 3.5). According to Suter (1993), analytes with log K_{ows} less than 3.5 are unlikely to accumulate in animal tissue. In addition, bioavailability of VOCs in sediment is not a concern because these analytes do not absorb to the organic matrix.

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The Navy acknowledges that the ERA may conclude the potential for localized risks to aquatic receptors; however, it is unlikely that site specific toxicity testing would provide any additional information due to the fate and transport mechanisms of VOCs in the aquatic environment.

12. **Page 6-9: Selection of ERA EPCs should also use Florida Surface Water Quality Standards and Federal Ambient Water Quality Criteria.**

Ecological COPCs in surface water will be selected by comparing maximum detected concentrations with USEPA Region IV surface water screening criteria (USEPA, 1995). These values were obtained from Water Quality Criteria documents and represent the chronic ambient water quality criteria values for the protection of aquatic life. The AWQC are intended to protect 95% of the species, 95% of the time. The AWQC values also form the basis of the Florida Surface Water Quality Standards; therefore, the USEPA Region IV surface water screening criteria are appropriate for selecting ecological COPCs.

13. **Page 6-13: Again, literature derived measurements may be adequate, but the possible need for toxicity testing (terrestrial and aquatic) may be necessary.**

Please refer to FDEP Comment #11.

14. **Tables A-1 and A-2 (pages A-1 - A-3) surface and subsurface soil also need to be screened against the states leachability SCGs which should be included in the tables.**

The only compounds detected in soil and also present in groundwater above Florida criteria are PCE and TCE. The leachability SCGs only apply to these compounds, and are included in the tables throughout Appendix A where appropriate.

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U.S. Environmental Protection Agency (USEPA) - Nancy Rodriguez

- 1a. **Technical Approach - Section 4.4.2, page 4-14.** A fine sand cap is not necessary if the bentonite seal is allowed to cure properly. If concerns still exist about supporting the grout column, it is recommended that a pure bentonite grout be used.

During well installation the bentonite seals have consistently been allowed to cure properly. The use of the fine sand cap provides a simple and inexpensive method (as compared to a pure bentonite grout seal) to further guard against grout intrusion. This practice is consistent with the guidance included in *Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells* (EPA/600/4-89/034, March 1991).

- 1b. **Technical Approach - Section 4.4.3, Page 4-15.** The use of Teflon-wrapped rubber stopper for the vacuum jug/peristaltic pump purge and sampling is discouraged. Suitable caps for this purpose are available commercially.

Also, the inlet of the tubing should be set to the top of the water column, as specified in the *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)*, May 1, 1995.

The rubber stopper wrapped with a Teflon swatch has been used without incident for sometime for all groundwater sampling efforts at NTC Orlando. Groundwater does not normally come into contact with the rubber stopper itself. We believe that this method has no effect on the analytical results, and request that the use of the Teflon-wrapped stopper continue.

Monitoring wells at NTC Orlando have always been purged and sampled using a low-flow technique. In addition to reducing the turbidity in the samples, low-flow also minimizes the volume of purge water (IDW) generated. Placing the intake within the screened interval allows collection of a representative groundwater sample by only purging and sampling the well in the vicinity of the intake. The completion of the purge step is indicated when well parameters (temperature, pH, conductivity, dissolved oxygen, and turbidity) have stabilized. These techniques (including the placing of the pump intake within the screened section) are consistent with the document *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (EPA/540/S-95/504).

This low-flow technique has produced consistent and reproducible results at NTC Orlando. We believe groundwater sampling should continue using the established techniques, in order to allow confident comparisons of monitoring well data collected during different sampling events.

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- 1c. **Technical Approach - Section 4.4.3, Page 4-15.** An unfiltered sample should also be collected for metals analysis.

All groundwater samples collected for metal analysis will be unfiltered. Filtered and unfiltered samples will be collected only where metals are CPCs (SA 14). The document will be corrected to clarify this.

- 1d. **Technical Approach - Section 4.7, page 4-19.** The "deionized, carbon-filtered" water described in this section must meet the criteria for organic-free water described in the EISOPQAM.

The document will be changed to indicate the deionized carbon filtered water meets the criteria in the EISOPQAM.

2. **Exclusion of groundwater from the future residential scenario in the proposed risk assessment.** - It is not appropriate to neglect the assessment of risk due to domestic use of groundwater. However, just because the risk is evaluated, cleanup to residential standards is not an inevitability. In this regard, the National Contingency Plan (40 CFR 300) states:

Groundwater that is not an actual or potential source of drinking water may not require remediation to a 10^{-4} to 10^{-6} level (except when necessary to address environmental concerns or allow for other beneficial uses).

To provide consistency between this risk assessment and others, the risk of domestic use of groundwater including ingestion and inhalation of volatiles during showering will have to be evaluated.

Future potential potable water use - both ingestion and inhalation of volatiles while showering - will be considered in the human health risk assessment as a worst case hypothetical future use scenario.

3. **Proposed probabilistic risk assessment for groundwater.** - From the measured concentrations of VOCs in groundwater at the site, cleanup to MCLs or risk standards based on an RME residential scenario may be technically infeasible. Hence, to obtain both an idea of potential current risks associated with various cleanup attainment levels, EPA proposes that a probabilistic risk assessment be performed for domestic use of groundwater. Recent agency policy regarding probabilistic risk assessment can be found on the Worldwide Web at <http://www.epa.gov/ordntrnt/ORD/spc/probcovr.htm>.

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A lengthy discussion of uncertainty was presented in the work plan. There is already a comparatively large data set for groundwater - 28 monitoring wells and some direct push data. Twenty five additional samples are proposed for the RI sampling (Table 4-1). VOC concentrations in groundwater are variable, demonstrated by the concentration in well OLD-13-7A changing from 680 ppb PCE to 19,000 ppb PCE between two sampling rounds. Region 4 EPA will be happy to consult with ABB-ES to determine a quantitative measure of the variability of concentrations of VOCs in groundwater and the uncertainty surrounding this estimate of variability.

If the additional groundwater samples upon which the RI is based are taken after the recirculation wells are operating, it may not be advisable to incorporate them into a new data set with existing data obtained prior to the operation of the recirculation wells. These 25 new samples should be taken before the recirculation wells are put into operation. A baseline risk assessment is an evaluation of risk under a given set of conditions, in essence, a snapshot of conditions at a point in time, changing those conditions will negate the use of previously obtained data.

Again, the use of probabilistic techniques will allow the determination of the percent of the population protected at a given risk level of the concentration of VOCs in groundwater that cleanup is able to attain. It can also provide "bang for the buck" type considerations such as percent of the population protected versus cleanup cost.

As noted in Response to FDEP Comment No. 10, a probabilistic risk assessment may be performed if the risk assessment results warrant additional evaluation. This probabilistic risk assessment would use appropriate exposure parameter estimates to further define the risks to specific percentages of the population. This risk management tool would aid in the determination of remediation levels that are protective of the receptor population and yet are still technologically and economically feasible.

4. **Discussion of Interim Response.** The solvent plume presently discharging to Lake Druid will be intercepted with two recirculation wells. Water will be extracted from the upper part of these wells, treated within the well and returned to the aquifer at depth via the same well. ABB-ES has studied this interim measure in depth, and a corresponding in depth discussion should be part of this work plan and certainly part of the RI when it is submitted.

Rather than redoing the work plan, a technical memo discussing the recirculation wells should be submitted for addition to the administrative record.

The administrative record currently includes two documents detailing the selection and design of the recirculation well system. These are the OU 4 Focused Feasibility Study

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(ABB-ES, May 1997) and the OU4 IRA Conceptual Design and Performance Specification (ABB-ES, May 1997). Additional documents discussing the performance of the recirculation wells will be added to the administrative record after the system begins operation.

5. **Exposure Assumptions.** The work plan claims that fish ingestion will not be a significant pathway. EPA agrees but believes that this pathway should be addressed qualitatively in the risk assessment. Effort should be expended to determine the extent of use of Lake Druid by nearby residents and this information incorporated into the document.

The Navy believes that ingestion of fish is not a significant pathway/risk to residents or recreational fisherman or fish consumers based on two considerations: 1) Site specific information that qualitatively assesses the extent of use of Lake Druid by residents has been previously collected. It is believed that fish from Lake Druid are not frequently consumed, and 2) even if fish were consumed with some frequency, it is unlikely that the volatile contamination in Lake Druid would pose a significant threat because volatile organics are not expected to bioaccumulate in fish. VOCs with log K_{ow} s less than 3.5 are not likely to bioaccumulate in animal and fish tissue (Suter, 1993). The VOCs of concern at this site have log K_{ow} s less than 3.5 and are therefore not expected to bioaccumulate; therefore, ingestion of the fish (with VOC concentrations comparable to ambient surface water concentrations) would not pose a greater risk than ingestion of the surface water. ABB proposes to evaluate ingestion of and dermal contact with the surface water at Lake Druid. Therefore, potential risk from VOC contamination in the surface water pathway should be adequately addressed. ABB will present the supporting log K_{ow} and bioaccumulation argument and the extent of use data in the risk assessment as a qualitative evaluation of the risk from ingestion of fish.

Further, the operation of the recirculation wells is expected to reduce the concentrations of VOCs in the lake to below surface water standards. As the recirculation wells (or some other future remedial alternative) will be in place as long as they are required to control migration of VOCs into the lake, this exposure pathway is not expected to continue to exist.

Reference: Suter, Glen, W., 1993, "Ecological Risk Assessment," Lewis Publishers: Chelsea, Michigan.

Revision to the last bullet on page 6-2.

- potential future area residents - incidental ingestion of and dermal contact with surface soils, surface water, and sediment, as well as incidental ingestion and inhalation while

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showering (volatiles only) while using the surficial groundwater as a potable water supply."

6. **Soil Sampling.** Figure 4-2 shows both old and proposed soil sampling locations. The density of soil samples should be reflective of a receptor's movements about his/her exposure unit. the lack of samples in the wooded area bordered by Port Hueneme Avenue and Detroit Avenue is notable. This lack will geographically bias the risk assessment towards the northern part of OU 4. At least two soil samples should be obtained from this area, and the exposure point concentration for soil should be determined using an area weighted approach based on the specific receptor.

The four surface soil sampling locations in the woods at OU 4 will be repositioned to reflect a better spread of sampling locations (north to south) across the wooded area.

7. **Ecological Risk Assessment.** Even though chemical-specific toxicity data do not exist for some taxa, a qualitative assessment of risk should be included if these taxa are involved in an assessment endpoint. In addition, assessment endpoints should be as specific as possible. For example, "reduction in reproductive success in wildlife populations" is too vague an endpoint.

Chlorinated VOCs are generally associated with depressed central nervous system (CNS) activity, or narcosis. However, very few studies conducted on ecological receptors have specifically measured these endpoints. Chlorinated VOCs have been shown to adversely affect survival, growth, and reproduction in fish and aquatic invertebrates. Therefore, one of the specific objectives of the risk assessment is to determine if concentrations of VOCs in Lake Druid are likely to cause a significant decline in receptor populations, either by causing direct mortality or by reducing the abundance of receptors within a population. The receptors will include small mouth bass populations and benthic invertebrate populations that serve as food source for fish.

Food chain exposures for higher trophic level ecological receptors are unlikely to occur because VOCs normally do not accumulate in animal tissue. The log K_{ow} values, which measure a chemical's tendency to partition to lipid materials (including tissue) for VOCs are generally very low (< 3.5). According to Suter (1993), analytes with log K_{ows} less than 3.5 are unlikely to accumulate in animal tissue. Consequently, higher trophic transfer and food chain exposures to carnivorous and pisciverous wildlife will not be evaluated, unless contaminants that bioaccumulate are detected during the RI.

The assessment and measurement endpoints for the ecological risk assessment (ERA) will be revised into a table format that presents specific assessment and measurement endpoints, as well as endpoint species, ecological chemicals of potential concern (COPCs), and decision

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points for each selected endpoint. The decision point represents a level at which potential risks will be further characterized. Inclusion of the endpoint species, COPCs, and decision points in the selection of assessment and measurement endpoints will focus the direction and design of the ERA. Risks will be evaluated for all endpoint species associated with a particular assessment endpoint. If chemical-specific toxicity data is not available for some taxa, data from the closest related species will be used to evaluate risks.

The assessment and measurement endpoint summary table for OU 4 is presented below.

| Assessment Endpoint | Endpoint Species | Ecological COPCs | Measurement Endpoint | Decision Point |
|----------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Survival of terrestrial soil invertebrate populations | Earthworms | Chlorinated VOCs | Literature-reported invertebrate Reference Toxicity Values (RTVs) | Exceedance of RTV by study area surface soil concentrations |
| Reduction in small mouth bass populations | Small mouth bass | Chlorinated VOCs | Aquatic toxicity data specific to bass species. | Exceedance of aquatic toxicity benchmarks by contaminant concentrations measured in surface water and groundwater discharging to Lake Druid. |
| Reduction in the biomass of benthic invertebrate populations that represent a food source for fish | Freshwater benthic macroinvertebrates | Chlorinated VOCs | Freshwater invertebrate aquatic toxicity data (i.e., sediment benchmark values) | Exceedance of sediment benchmark values by contaminant concentrations measured in the sediment of Lake Druid. |

8. **EPCs for Ecological Risk Assessment.** The work plan claims that average concentrations at the site represent typical site concentration and should be used as "average EPCs." The 95% UCL on the mean is used as a protective surrogate for the mean given the uncertainties associated with providing from a set of environmental soil samples an estimate of the average soil concentration to which a receptor is exposed. Therefore, the 95% UCL is considered representative of the true mean concentration to which a receptor

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is exposed. The use of the average concentration from the set of environmental samples ignores these often significant uncertainties.

The text will be revised to state that Reasonable Maximum Exposure (RME) scenarios will be evaluated. If the risks resulting from the RME scenarios exceed the decision point criteria, then a Central Tendency (CT) exposure scenario will be evaluated. The CT exposure concentration will be represented by the mean of all samples. The Navy believes, however, that it is not appropriate to use the 95% UCL as representative of the true mean concentration to which a receptor is exposed. According to USEPA (1992), the 95% UCL should be considered in the determination of the *maximum* EPC (i.e., the RME scenario) when the sample size is greater than ten. In this case, the maximum EPC would be equal to the lesser of the maximum detected concentration and 95% UCL calculated on the log-transformed arithmetic mean.

USEPA. Office of Solid Waste and Emergency Response. 1992. *Supplemental Guidance to RAGS: Calculating the Concentration Term*. Publication 9285.7-081. Washington, D.C. (May).

9. VOC Analysis only for surface water and sediment at Lake Druid. The letter to Ms. Barbara Nwokike indicates that surface water and sediment samples will be analyzed for VOCs only. Region 4 suggests that 20% of the samples in each medium receive a full analytical suite to ensure that all hazardous chemicals are detected. This has been past practice in Region 4. If the May 1996 FFI performed full scan analyses on the surface water and sediment, these need not be repeated. If not, the Orlando Partnering Team should be aware that a variance with Region 4 practice exists.

Two surface water/sediment pairs will be collected for full suite analysis. One pair will be collected from the lake area where concentrations of chlorinated VOCs are present. The second surface water/sediment pair will be collected from a Navy-owned portion of the lake near (but beyond) the area of known VOC contamination. This second sample will serve as a control, and aid in the evaluation and interpretation of the results from the sample collected within the VOC-contaminated area.

10. Investigation-Derived Waste Management. - Section 7.2, page 7-3. Development water must be contained, tested, and properly disposed. Potentially contaminated borehole cuttings must be containerized until disposal to prevent extensive contact with uncontaminated surface soils.

As indicated in Sections 7.4 and 7.5 water generated as IDW during the field exercise will be stored in a bulk polyethylene-type container and tested prior to disposal. Soils

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generated as cuttings during drilling will be transported directly to roll-offs from the drilling site limiting any contact with surface soil.

11. **Feasibility Study.** - **Table 9-1, page 9-6.** The description for phytoremediation is confusing. Please be more specific.

Phytoremediation - is the use of vegetation for the *in-situ* treatment of contaminated soils and groundwater. Researchers from USEPA's National Exposure Research Lab in Athens, GA have already found evidence of chlorinated VOC degradation in the lake due to aquatic plants. Athens will continue to study OU4 to evaluate the potential for enhancing the existing phytoremediation as an aid in the final remedy for OU4.

Table 9-1 is only intended to provide brief descriptions of potential technologies. A more complete evaluation of phytoremediation will be included in the OU4 Feasibility Study.