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EMAIL REGARDING REGULATORY REVIEW AND COMMENTS TO DRAFT FINAL REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 2 (OU 2) AT MCCOY ANNEX LANDFILL WITH ATTACHMENT NTC ORLANDO FL
1/28/2001
TETRA TECH

OU 2

McCoy, Steven

From: McCoy, Steven
Sent: Monday, January 08, 2001 3:53 PM
To: 'Nancy Rodriguez (San Juan)'; 'Dave Grabka'
Subject: OU 2 RI Report Responses

Nancy & Dave,
Sorry for the delay but attached are the responses to the comments on the RI Report. I don't think there's anything too controversial but give me a call if you want to discuss any of these items. We're just now starting on the final report so now would be a good time. Nancy, please confirm that you've received this since I'm never quite sure where you are (Dave, are you?)! Thanks,
Steve

Draft Final RI responses.doc

RESPONSE TO COMMENTS – DRAFT FINAL RI REPORT
OPERABLE UNIT 2, NTC ORLANDO

Ref.: Tetra Tech NUS, *Remedial Investigation Report for Operable Unit 2, McCoy Annex Landfill, Naval Training Center, Orlando, Florida,* Contract No. N62467-94-D-0888, March 2000.

FDEP COMMENTS (April 24, 2000)

Ref.: University of Florida, Letter from Stephen M. Roberts, Ph.D., to Ligia Mora-Applegate (Bureau of Waste Cleanup, FDEP), April 24, 2000.

Comment:
The human health portion of the risk assessment appears to be reasonably well done. Risks from site contaminants associated with future residential use of the property are likely to be unacceptable to FDEP, necessitating some form of institutional controls absent additional remediation. Arsenic and carcinogenic PAHs combine to pose an excess cancer risk modestly above 10^{-6} for the current and future maintenance worker, although we note that neither the carcinogenic PAH (in the form of benzo(a)pyrene equivalents) or arsenic concentrations exceed their individual respective FDEP SCTLs based on industrial/commercial land use. Risks to the "recreator" (golfer) were within limits usually acceptable to FDEP. Exposure to bis(2-ethylhexyl)phthalate in sediment and surface water was calculated to result in excess cancer risks greater than 10^{-6}. Some of the exposure assumptions used to derive this risk estimate were very conservative (e.g., an exposure frequency of 100 days/year) while other assumptions were rather un-conservative (e.g., an incidental ingestion rate of 5 mg/day).

Response:
As discussed in our response to comments from the University of FL on 4/21/99, the use of 50 mg/day instead of 5 mg/day for sediment ingestion rate would not change the results of the risk assessment. The calculated carcinogenic risk and HQ to the site maintenance worker from sediment was 1.2 x 10^{-8} and 5.5 x 10^{-3}, respectively. In addition, if we use 50 mg/day sediment ingestion rate, we believe it would be appropriate to lower the fraction ingested to a value less than one because the canals contain water at times and exposure to sediments is reduced when sediments are under water.

Comment:
Human exposure to sediment exposure is difficult to evaluate, since there are really no good data on the subject. We are aware that U.S. EPA Region 4 currently does not recommend quantitative risk estimates for sediment exposure in human health risk assessment.

Response:

The sediments are often, but not always, covered by surface water. Sediment exposure was therefore included in the HHRA, but it does not add appreciably to the calculated risk.

Comment:

There are a few technical aspects of the human health risk assessment that merit comment. When an inhalation toxicity value was missing in IRIS for a chemical, no attempt was made to evaluate risk from inhalation exposure. This was the case for a number of chemicals, notably including trichloroethene and 1,1,2,2-tetrachloroethane. For volatile chemicals such as these in soils. the inhalation route is dominant, and failure to include this route in the quantitative assessment can result in substantial underestimation of risk. While it does not seem to have made much difference at this particular site (the concentrations of these VOCs in soils were rather small), we usually recommend that route-to-route extrapolation be used to develop inhalation toxicity values.

Response:

The chemicals trichloroethene and 1,1,2,2-tetrachloroethane were not detected in soils at OU 2. Volatiles that were detected were screened against the FDEP residential Soil Cleanup Target Levels from Chapter 62-777, F.A.C.

Comment:

- *In Section 7.3.1 Region 4 Screening Levels,* TTN indicates that the lowest value of surface soil screening levels from several sources [Friday, 1998; Beyer 1990; ORNL (Efroymson et al., 1997); the Netherlands (MHSP&E, 1994)] was used for the selection of chemicals of potential concern. The Dutch Soil Cleanup Levels used by TTN are out of date. Risks from many contaminants may be substantially underestimated if the updated values are not employed. For example, the Dutch Intervention value of 4000 µg/kg is presented for dieldrin. The optimum value from the updated Dutch list is 0.5 µg/kg.

Response:

The new screening values will be compared with those used previously. For those that have changed, the associated contaminant will be re-evaluated. If any new screening values result in a change in the list of COPCs, the risk associated with those contaminants will be recalculated.

Comment:

- TTN uses Region 4 Recommended Ecological Screening Values for soil to screen for COPCs at OU2. TTN states that screening values for alpha-chlordane and gamma-chlordane are not available.

Values for both chemicals are, in fact, included in Region 4 guidance (0.0025 and 0.00005 mg/kg for alpha- and gamma-chlordane, respectively). This is addressed again (pages 7-72, 76, 79) when alpha and gamma-chlordane contamination at the site is dismissed because screening values are not available.

Response:

There are concentrations of alpha- and gamma-chlordane in soil at OU 2 which exceed the Region 4 screening values. The risk associated with those contaminants will be evaluated.

Comment:

- In estimating chemical intake from food ingestion, TTN reported on page 7-23 that input parameters were obtained front USEPA's Wildlife Exposure Factors Handbook (WEFH, 1993). Values of some of the inputs presented on Table 7-4 (page 7-25) do not match the values in the WEFH. For example, a body weight of 0.021 kg for deer mice was used as a surrogate for the Cotton mouse instead of using the numbers (28-51 g) reported for this species in deriving a mean body weight. Assuming a mean body weight of 0.0395 kg the revised food ingestion rate for the Cotton Mouse would be 0.0048 kg/day rather than 0.0029 kg/day presented in Table 7-4. The former number is more conservative and should be used in the risk equation. Also, the food ingestion rates for other species including the Great Blue Heron, American Woodcock and the Red Fox do not match the values presented in Table 7-4.

Response:

The input parameters in Table 7-4 will be checked and revised as necessary for consistency with the WEFH. The food ingestion rates presented in the WEFH are in units of grams of food consumed per gram of body weight per day, while the food ingestion rates used in the ERA were in units of kilograms of food consumed per day. When the food ingestion rates presented in the WEFH are multiplied by the body weights used in the ERA, the proper food ingestion rates and units presented in Table 7-4 are generated. Table 7-4 will be revised to reference the source of these parameters.

FDEP COMMENTS (September 8, 2000)

Ref: Letter from David P. Grabka (FDEP) to Wayne Hansel (Southern Division, NAVFACENGCOM), RE: "Draft Remedial Investigation Report for Operable Unit 2, McCoy Annex Landfill, McCoy Annex, Naval Training Center, Orlando, Florida", September 8, 2000.

Comment:

(1) I cannot reconcile the acreages that are specified in Sections 1.2 and 1.3. Section 1.2 has the McCoy Annex property as situated on 877 acres. Section 1.3 has the McCoy Annex landfill situated on 1114 acres.

Response:

The McCoy Annex landfill (OU 2) is located on 114 acres. The error will be corrected.

Comment:

(2) In section 5.2.3 on page 5-51, it is reported that the dioxin octa-chlorodibenzodioxin (OCDD) was detected at a concentration of 18 µg/kg (13 µg/kg in the duplicate), below its screening criteria, in the only sample analyzed for dioxins. These reported concentrations are well above the screening criteria for OCDD and if correct would require further delineation of the extent of dioxin concentrations at the landfill. However, OCDD was reported at .18 µg/kg (.13 µg/kg in the duplicate) in Table 5-2A. I believe these are the correct concentrations, which should be verified.

Response:

The correct concentrations for OCDD are 0.18 µg/kg and 0.13 µg/kg in the duplicate.

Comment:

(3) The Total Petroleum Hydrocarbon groundwater analytical results in Table 5-3C are mistakenly reported in units of µg/L, while the same results in Appendix B are in units of mg/L. This same error occurs in section 5.3.1.5 on page 5-101.

Response:

The error will be corrected.

(4) On page 5-174, the FDEP primary groundwater standard for radium (226 and 228 combined) is 5 µg/L, not 15 µg/L. It is assumed that the screening criteria mentioned in the paragraph is the primary standard. A check needs to be made that groundwater did not exceed this criterion.

Response:
The text will be revised to reflect the correct radium standard of 5 pCi/L. The only sample analyzed for radium did not exceed the standard.

Comment:

(5) I do not think it appropriate to disregard Phase III monitoring well data from the risk calculations for groundwater based on the fact that turbidity in these wells could not be reduced below 150 NTU. Several measures were used during Phase III sampling to specifically reduce turbidity. The measures included microflow purging, additional well development and the installing of prepacked microwells inside the wells. For those wells where turbidity could not be reduced, the turbid water is considered to be representative of groundwater conditions at the well location. Because of this, there is the likelihood that people could be exposed to the inorganic contaminants detected in the turbid wells should a supply well be located in the vicinity.

Response:
We consider it very unlikely that people would drink, or use for any purpose, water with turbidity in this range; therefore, no complete pathway would exist. However, for completeness the human health risk will be re-evaluated using the data set that includes the turbid wells and those results will be presented in the uncertainty section.

Comment:

(6) In section 6.3.2, Identification of Potential Receptors and Exposure Pathways, the most probable future use of the property should be considered and emphasized in determining future potential receptors and exposure pathways. The anticipated future use of the area is located on the City of Orlando's web page at:

http://www.ci.orlando.fl.us/departments/planning_and_development/ntcpbog.html

The proposed reuse of the southern wooded portion of the landfill area will consist of soccer fields, softball/ baseball diamonds, a picnic area and recreational trails. Exposure of off-site residents or visitors to surface soils would be expected to be a completed exposure pathway as the sports complex will not be restricted solely to recreational golfers.

Response:

The recreational exposure scenario for the southern portion of OU 2 (Area 2/3) will be modified to reflect the proposed land use described in the comment. The recreational golfer will still be the valid receptor for the northern portion, Area 1.

Comment:

(7) USEPA Region 4 has issued a paper, "Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders", dated June 23, 2000. Recommended ecological screening values for soil, freshwater surface water and sediments may be found in Attachments 2, 3 and 5 to this guidance memorandum. These screening values are the latest known to have been recommended by EPA Region 4 and should be used in the ecological risk assessment. Please disregard if these screening values have not changed from previous EPA Region 4 guidance.

Response:

The new screening values will be compared with those used previously. For those that have changed, the associated contaminant will be re-evaluated. If any new screening values result in a change in the list of COPCs, the risk associated with those contaminants will be recalculated.

Comment:

(8) In sections 7.11 and 7.12, the overall ecological risks for the site are summarized, conclusions are presented, and a qualitative assessment of the Phase III data is discussed. Some important issues have been left out of the discussion in light of the only pervasive risks tentatively identified. It is stated that groundwater discharge to the canals is the most probable source of elevated metals concentrations in the canals. These canals are correctly identified as being marginal to poor aquatic habitats due to their configuration, intermittent flow and because they are periodically dredged. However, no mention of the surface water body, Lake Gillooly, to which these canals discharge is made in this section. Lake Gillooly could contain desirable habitat that may be affected by the surface water discharge of contaminants identified in the canals. The surface water and sediment analytical results from downgradient sample point SW021/SD021 and Lake Gillooly sample point SW022/SD022 from the various sampling rounds should be discussed in either this section of the RI or in the contaminant fate and transport section as to whether additional ecological study or remedial action based on ecological risk concerns to Lake Gillooly are warranted.

Response:

Additional discussion of the Phase II surface water/sediment sample collected in Lake Gillooly will be provided. This will include evaluation of the detection limits and water hardness influences on selected inorganic screening levels. Further evaluation of the canal samples immediately upgradient of Lake Gillooly, including sample SW/SD021, and potential impacts on Lake Gillooly will also be presented. Additional sampling in Lake Gillooly is not planned at this time.

Comment:

(9) Hazard quotients greater than 1.0 were calculated using maximum detected concentrations for every species for which food chain modelling was conducted. Using average chemical concentrations and LOAELs in the food chain modelling still predicted adverse impacts to several species. It is stated that on the whole, most of the terrestrial risks are driven by hot-spots of contamination, primarily in one or two adjacent samples. Figures of the site should be provided showing where those hot-spots are located and which contaminants in which media are contributing to the ecological risks to which species.

Response:

The figures referred to in the comment will be provided.

(10) "Northern" should be changed to "central" in section 7.6.2.4.

Response:

The text will be revised as described in the comment.

(11) Human health and ecological risks from exposure to radioactive contaminants should be discussed. While it has been shown through isotopic analysis that the isotopes detected are consistent with naturally occurring isotopes, it has not been shown that the levels detected are similar to those detected in the Orlando area. It has been hypothesized that landfill processes may have caused the radioactive isotopes to have become soluble in groundwater and mobile. While the presumptive remedy for this site would include groundwater restrictions, because groundwater at the site is discharging to the canals and ultimately to Lake Gillooly, there is a potential risk that radioactive isotopes mobilized by landfill processes have been concentrated in Lake Gillooly.

Response:

The radionuclides present in the environmental media will be more fully discussed in the text of the baseline risk assessment. The discussion will include a comparison with the levels present in the general Orlando area.

USEPA REGION IV COMMENTS (September 15, 2000)

Ref: Email from Nancy Rodriguez (USEPA Region IV) to Steven McCoy (TtNUS), Subject: "OU2", September 15, 2000.

Risk Assessment Comment:

Risks from Benzo(a)Pyrene in Surface Water. EPA has suggested in previous correspondence that sufficient uncertainty surrounded the calculation of risk from B(a)P from the dermal pathway and that this pathway should be discussed qualitatively only. Nonetheless, risks from benzo(a)pyrene in surface water is, we believe, a gross overestimate of risk. It is recommended to remove this calculation from the risk assessment and that the issue be discussed as a qualitative uncertainty.

Response:
We agree that the dermal pathway evaluation for B(a)P grossly overestimates the risk. The pathway will be removed from the quantitative evaluation and discussed qualitatively.

Technical Comment No. 1:

Over all this report appears to be a thorough site characterization effort. What remains to be seen is what is done with these data in the FS. Because PCE, TCE, and fuels contamination have been detected in groundwater, I would recommend that the monitoring program be evaluated to verify that sufficient data for an evaluation of natural attenuation is being collected. As described later in this memo, the apparent increases in iron and manganese in groundwater should not be viewed only as a problem to be remediated. These increases may indicate that natural attenuation is performing well at this site. If this is true, remediation efforts must be careful not to upset this balance. Additional data may be necessary to make this determination. If so, the acquisition should begin as soon as possible to minimize delays in the FS process.

Also, the report notes that the 1998 Phase II groundwater data has been superceded by the 1999 Phase III groundwater data. The application of low flow sampling procedures in Phase III greatly reduced the turbidity of samples from the monitoring wells. The average turbidity for 48 samples obtained in Phase II was 897 NTU. The average turbidity for 40 samples obtained in Phase III was 10 NTU. Samples from 6 wells remained turbid despite special efforts during sampling. The report states "*...the widespread reductions in chemical concentrations and in the frequency of exceedances of the screening criteria observed in the Phase III data, across all analytical fractions, is attributed primarily to the reduction in groundwater sample turbidity.*" (p5-154). Future sampling events must utilize similar care and techniques

so that sample results are comparable from event to event, and so that bad data doesn't create the appearance of an intermittent source of contamination.

Response:

Natural attenuation sampling will be performed at OU 2 as part of the Feasibility Study. Iron and manganese concentrations will be evaluated during analysis of the natural attenuation data. All future groundwater sampling at OU 2 will be performed using low-flow techniques.

Technical Comment No. 2:

Section 5.3.2.3 (p.5-135) suggests that the reduction in VOC concentration in the 7 wells sampled during Phase III (1999) may be due to a reduction in turbidity in the samples when compared to the Phase II (1998) results. Any reduction in VOC concentrations is good news. While turbidity may have caused apparent elevated VOC concentrations, in the long run, it may be important to determine whether some or all of the reduction in VOCs may be due to natural attenuation processes. Chlorinated solvents have been detected in groundwater monitoring wells (Table 5-3H), and indicators of natural attenuation have been observed (see next comment). Future groundwater monitoring events should include analyses appropriate for evaluation of natural attenuation.

Response:

Natural attenuation sampling will be performed at OU 2 as part of the Feasibility Study.

Technical Comment No. 3:

Section 5.3.2.8 (p.5-143) suggests that iron and manganese may have been released from the former landfill or that changes in the groundwater chemistry due to the landfill may be responsible for the increases observed groundwater samples relative to background locations. Numerous exceedances of background concentrations, Screening Criteria and Secondary MCLs are noted in the report (Table 5-3I), but it isn't clear at this time, what might be done about the concentrations of these elements in groundwater. Their presence in groundwater has been characterized appropriately in this RI report. Remedial options will be evaluated in the FS. For future investigations, it is important to note that both of these elements may be indicators that natural attenuation processes are working beneath the landfill. Their presence in elevated concentrations may be good news as indicators of reductive dechlorination occurring somewhere in the landfill.

Response:

Natural attenuation sampling will be performed at OU 2 as part of the Feasibility Study. Iron and manganese concentrations will be evaluated during analysis of the natural attenuation data.

Technical Comment No. 4:

Typically, monitoring wells have not been installed into waste away from the margins of the landfill. Because the margins of the landfill are almost identical to the groundwater discharge areas at the canals, some of the data commonly acquired for evaluation of natural attenuation processes is not available now and may not be available in the future. However, it may be important to determine whether some or all of the increase in iron and manganese is due to natural attenuation processes before any measures which might reduce the iron and manganese concentrations are implemented. If the increases are due to attenuation of solvents, the evaluation of remedial measures must consider the possibility of inhibiting the natural attenuation process when mitigating iron and manganese concentrations. Remediation of iron and manganese should not enhance the potential migration of chlorinated solvents or other contaminants.

Response:

Natural attenuation sampling will be performed at OU 2 as part of the Feasibility Study. Iron and manganese concentrations will be evaluated during analysis of the natural attenuation data (prior to implementation of any remedial measures). Evaluation of remediation alternatives will focus on the entire system; an alternative will not be selected to remediate iron and manganese in a way that will enhance migration of chlorinated solvents or other contaminants.

USEPA REGION IV COMMENTS (October 30, 2000)

Ref: Letter from Nancy Rodriguez (USEPA Region 4) to Steven McCoy (TtNUS), Subject: "Risk Review Comments for Ecological Aspects of the Revision 1 Remedial Investigation Report for OU2 McCoy Annex Landfill, Naval Training Center, Orlando, Florida", November 8, 2000.

General Comments:

1. There is very little description provided of the interim removal actions. Details are provided in the human health section of the report versus in a main section. Plans regarding cover thickening or future land use are not described. This information is necessary to interpret potential risks.

Response:
Additional description of the interim removal actions will be incorporated into the Risk Management Activities section of the ecological risk assessment.

2. The report is incomplete. Phase III data must be incorporated into the analysis of the ecological risk assessment. The interpretation of Phase III data must be incorporated into the conclusions. Currently, Tables 7-12A and B, which are presented after the conclusions, present a summary of the combined Phase I, II, and III data. The presentation does not facilitate a comparison with previous results, which were presented by north, central, and south sections.

Response:
The Phase III data and related discussion will be moved into the existing risk assessment discussion, prior to the uncertainty analysis, summary, and conclusions. The Phase III surface water and sediment data will be analyzed by north, central, and south section. Tables 7-12A and 7-12B will be modified to reflect the screening table format presented in Section 7.6. In addition, a Step 3A table similar to those presented in Section 7.7 will be provided for Phase III sediment data, which will contrast Phase I/II data with Phase III data.

3. Section 7.12 indicates that a qualitative analysis was provided for the Phase III data. The qualitative analysis is only good to an order of magnitude. It may be important for risk managers to know that a constituent is 10 times greater than background. However, the qualitative discussion presents comparisons to background and screening values as much as 9 times higher as within the same order of magnitude. For example, the qualitative analysis of aluminum in surface water indicated site concentrations of the same order of magnitude as background

concentrations. However, the maximum concentration of aluminum at the site was 15,300 ug/L in Phase III at SW018, which was 8.7 times higher than the 2-times-average background screening value of 1,753 ug/L. The hazard quotient for mean lead in surface water was indicated to be only slightly greater than 1. However, lead in surface water had a maximum hazard quotient of 9.4 in the central section (SW001) and a maximum hazard quotient of 5.5 in the south section (SW018). The level of precision in the qualitative analysis is insufficient to allow interpretation of the risks.

Response:
The screening tables described in the response to comment #1 will present a quantitative assessment of risk, which should provide the level of precision requested by EPA.

4. Missing is the proper interpretation of the six upgradient stations, which were added to Phase III to evaluate potential upstream sources. The proper comparison is the maximum detected site concentration versus twice the average background concentration, as specified in Region 4's Supplemental Guidance. Http://www.epa.gov/region4/wastepgs/oftecser/otsguid.htm

Response:
The revised analysis of the Phase III data will present comparisons of two times the average concentrations of chemicals in Phase III upgradient samples to maximum concentrations of chemicals in samples collected at OU 2. Any qualitative comparisons of this nature will be used as part of the weight-of-evidence in determining potential risks to aquatic receptors in the canal. However, it should be noted that the upgradient data were collected to determine chemical inputs into the canal from upgradient sources. That is, the upgradient areas are likely impacted from sources of chemicals upgradient of OU2. Therefore, the upgradient data represent "reference" data, as opposed to "background" data.

5. The risk assessment makes a statement that metals and other constituents are not accumulating in sediments, however, sediments are routinely dredged. Elevated metals in surface water might be capable of accumulating in sediments in the absence of dredging. The relatively low concentrations of constituents in sediments do not negate the potential risks of surface water contamination to ecological receptors in the canals and downstream habitats.

Response:
Indeed, several surface water inorganics appear to be elevated independent of sediment concentrations. Nonetheless, it should be noted that inorganics are generally not elevated in the golf course pond sediments, which are not routinely dredged. Additional discussion of the concentrations of inorganics in pond sediments will be added to the text.

6. Routine dredging of the canals is not provided as a possible reason for relatively low concentrations of constituents in sediments. There is no discussion of whether dredging will continue into the future. Since sediments appear to have been subject to routine dredging throughout the study, it is unclear whether such dredging is necessary to prevent buildup of contaminant levels. If dredging does play a role in maintaining relatively low levels of constituents in sediments, it is uncertain whether this management activity is sufficient. Concentrations of several constituents increased in the central section in Phase III. Aluminum and iron, for which no screening values are available in sediments, approximately doubled in SD001. Copper, lead and zinc in SD001 increased from having hazard quotients below 1 to having hazard quotients slightly greater than 1. DDE increased in Phase III at SD005 from a hazard quotient of 1.1 to 2.5. Phase III sediment data, collected to measure the difference made by dredging the eastern canal, received little if any interpretation.

Response:

As discussed in response to General Comment No. 2, additional quantitative analysis and related discussion of Phase III sediment data will be provided. It should be noted again that inorganics are generally not elevated in the golf course pond sediments, which are not routinely dredged. Also, the frequency of dredging of the canal sediments is unknown.

7. Although the canal might not provide significant habitat for ecological receptors, OU2 contains several wetlands and ponds that could potentially also intercept contaminated ground water. Limited sampling has been provided for these habitat areas. Potential impacts to wetlands and other habitat areas has not been assessed.

Response:

Surface water and sediment samples were collected throughout the golf course pond system, which contains most of the wetlands present on OU2. As discussed in response to General Comment No. 5, additional discussion of the sediment data from the golf course ponds and their related wetlands will be added to the text.

8. Several metals in surface water were elevated above State standards at multiple stations throughout the site. Additional downgradient sampling should be undertaken for constituents exceeding State standards that are associated with the landfill. A Phase II surface water sample from Lake Gillooly (SW022) contained zinc at levels above State standards. Also several nondetected metals had detection limits which exceeded State standards: aluminum, beryllium, chromium, lead, mercury, and silver. Concentrations in Phase II of aluminum, chromium, copper, lead, and zinc were highest in a sample 300 feet north of Lake Gillooly.

Response:
Additional discussion of the Phase II surface water/sediment sample collected in Lake Gillooly will be provided, which will include analysis of the detection limits and water hardness influences on selected inorganic screening levels. Further analysis of the canal samples immediately upgradient of Lake Gillooly, including sample SW/SD021, will also be presented. However, additional sampling in Lake Gillooly is not planned at this time.

9. Phase III surface water data may not be comparable to Phases I and II because it was collected during baseflow conditions, as indicated by the report. The Phase I and II samples were collected after rainfall events. The concentrations in the canal may reflect antecedent conditions, being elevated a few days after a rainfall when shallow ground water discharges are at their peak. It may be misleading to substitute the Phase III data for earlier data due to differences in antecedent conditions, which cause the data to be incomparable. There is no reason to anticipate that conditions at the site have improved substantially with respect to metals in surface water.

Response:
Discussion regarding the physical and climatological conditions present prior to each phase of sampling will be added to the text.

10. The response to Ecological General Comment 4 stated that an interim removal action has been completed to address soil contamination in the southern section of OU2. An interim removal action involving excavation of soils in the vicinity of S103 was discussed for the northern section. No interim removal action has been presented for the southern section. Discrepancy with response to comments should be addressed.

Response:
An interim removal action involving excavation of limited soils in the southern section of OU2 has been conducted. Also, a soil cover has been placed on another portion of the southern section of OU2.

Additional discussion of these actions and their impacts on potential ecological risks will be provided in the text.

11. Some of the highest concentrations of constituents in soil were detected in samples S02 and S04 in the southern section. The concentration of benzo(a)pyrene at S04 is 6.32 mg/kg compared to 2.62 mg/kg at S91 and 2.36 at S103, where interim removal was conducted for protection of human health. Concentrations at S04 are not only nearly three times as high as interim removal soils, but they occur in the vicinity of Hole #5 and several ponds and canals that may be attractive to both humans and wildlife. Models of average exposure may underestimate exposures in this area.

Response:
Additional discussion of interim remedial actions in the vicinity of samples S02 and S04 will be provided. As discussed in Section 7.7.3, potential risks are acknowledged from PAHs in the specific areas described in the comment.

12. The brief qualitative discussion of Phase III data provided inadequate explanation for the selection of lead, mercury and zinc as chemicals of concern in surface water. It is unclear why the report summarizes that aquatic risks are present for lead, mercury, and zinc, versus other constituents. Constituents exceeding screening values and background in surface water are summarized below.

Metals Above Background and Screening Values in Surface water		
Section	**Phases I & II**	**Phase III**
Northern	Aluminum, chromium, iron, lead, mercury, zinc	Zinc
Central	Aluminum, copper, iron, lead, zinc	Aluminum, copper, iron, lead
Southern	Aluminum, chromium, iron, lead, mercury, zinc	Aluminum, chromium, iron, lead

Response:
As discussed in response to General Comment No. 2, a quantitative analysis of Phase III surface water will be conducted. COPCs for the Phase III data will be generated, which will be compared to COPCs from Phase I/II.

13. A more complete analysis of Phase III ground-water data and its interaction with surface water may be warranted given the uncertainties associated with this exposure pathway. Ground water concentrations in Phase III appear to have declined. A question has been raised regarding association of certain metals in ground water with particulates. A detailed analysis of ground water and surface water interactions may be needed to support OU2 decision making.

Response:
A discussion regarding the interaction of groundwater and surface water will be added to the Fate and Transport section.

14. Toxicity profiles for the constituents of potential concern were not included in the report. If correct toxicity information cannot be provided, at least inaccurate or misleading information must be removed. The statement that manganese is an essential nutrient on Page 7-70 should be removed. The term essential nutrient has a certain connotation in risk assessment and for this purpose includes the following metals: magnesium, sodium, potassium, and calcium. Vanadium cannot be considered to be nontoxic in the environment. The toxicity of vanadium will depend on the form in soil or sediment. It has been identified with a hazard quotient greater than 1 in the food chain models for small mammals.

Response:
The statement that manganese is an essential nutrient was made in error, and was a reference to magnesium. The statement will be removed. Although vanadium cannot be considered completely toxicologically inert, the vanadium data for OU 2 and supporting toxicological information suggest that this compound is not causing acute potential risks at the site, and vanadium is not known to bioaccumulate or biomagnify. Additional toxicological data will be provided to support the assessment of the potential risk from vanadium.

Specific Comments:

1. *Executive Summary, Page ES-6, Lines 4-6.* The executive summary presents risks to terrestrial wildlife from soil contamination as associated with hot spots, primarily in one or two adjacent samples. This description of the contaminant distribution is inaccurate. The contamination in the southern section is found in soil samples S02 and S04, which are not adjacent. An alternative interpretation is that the entire northwestern edge of Area 3 is subject to conditions of unacceptable risk. Better justification is required for a decision not to address hot spot contamination.

Response:

Although S02 and S04 are not directly adjacent, they are still located relatively close to one another. This area comprises only a small portion of the southern section of OU2. However, potential risks from PAHs are present in this area regardless of its size. The intention of the statement in the Executive Summary was not to indicate that hotspot contamination would not be addressed, but rather to indicate that PAH contamination is not a widespread problem encompassing the entire OU. We will revise this portion of the Executive Summary for accuracy and clarity.

2. *Executive Summary, Page ES-6, Lines 9-10.* The executive summary states that there are risks to terrestrial receptors due to PAHs in the southern section. The summary suggests that the interim removal of soils at S103 and S91 will reduce risk in the southern section. The area removed was part of the northern section of OU2 and is on the eastern side. The effect of this action on the receptors of the southern part of OU2 on the western side near Area 3 is unclear. The ecological risk assessment divided OU2 into the three sections due to habitat differences and corresponding differences in receptors. Action taken at S103 might not protect ecological receptors on the opposite side of OU2.

Response:

The interim remedial actions (removal of soil at the S91 and S103 sample locations, and placement of additional soil cover primarily in Area 3) have reduced the risk from PAHs. This portion of the Executive Summary will be revised for accuracy and clarity.

3. *Figure 7.1, Conceptual Site Model - OU2.* The shading on Figure 7.1 needs to be included or the figure caption reference to the shading removed.

Response:

The caption that references figure shading will be removed.

4. *Section 7.2.2., Major Chemical Sources and Migration Pathways, Page 7-8.* The section does not explain differential transport mechanisms of various types of constituents. Include a comparative discussion of the relative contributions to the canals from surface soils versus ground water discharge for SVOCs, pesticides, and inorganics. For example, explain how PAHs are adsorbed to soils and thus can be transported to sediments by erosion. This type of discussion is most effective when there is a separate paragraph for each class of compound. Include in the discussion whether the constituent class tends to accumulate into the tissues of organisms. Include a general discussion of ecotoxicity by class of chemical, emphasizing the connection between physical-chemical properties and exposure to the assessment endpoints.

Response:

A discussion of ecotoxicities by class of chemical was not provided in this section due to the voluminous assortment of chemicals and chemical classes detected in OU2 media. It is also understood that Region 4 has recently requested that the amount of presentation and analysis in Steps 1 and 2 be kept to a minimum. As such, ecotoxicity of COPCs present after the screening was presented in Step 3A discussion on a chemical-specific basis, as necessary.

5. *Section 7.3.2, Toxicity Reference Values, Page 7-15, Line 6.* Correct spelling of separate.

Response:

The spelling will be corrected.

6. *Section 7.6.1.1, Northern Section Surface Water, Page 7-28, Line 1.* Remove iron from list of COPCs without Region 4 screening values.

Response:

Iron will be removed from the list of COPCs without Region 4 screening levels.

7. *Section 7.7.1, Northern Section, Pages 7-68 through 7-72.* According to the response to comments on the draft report (Ecological Specific Comment 16), a discussion was to be added of the connection between PAHs detected in surface water and elevated PAHs in surface soil in the Hole 7 area. The text has not been modified as agreed in the response to comments.

Response:

Additional discussion as described in the comment was presented in the first paragraph on page 7-72. However, additional text will be added.

8. *Section 7.12, Assessment of Phase III Data, Page 7-96, Line 4.* An EPA screening value and State standard is available for iron in surface water, and it is exceeded by Phase III data.'

Response:

Iron will be removed from the list of chemicals without surface water Region 4 screening levels.

9. *Section 7.12, Assessment of Phase III Data, Page 7-96, Lines 1 through 4.* The appropriate comparison for the screening assessment is the maximum detected concentration, not the average.

Response:

As presented on page 7-93, the maximum concentrations were used first as the basis for comparisons to Region 4 screening levels. The average concentrations were used only as a secondary analysis to reduce the conservatism inherent in the use of maximum concentrations. This discussion will be presented after the screening in Step 3A fashion (as described in response to general comment number 2), which will be a more appropriate place for the use of average concentration comparisons to screening levels.

10. *Section 7.7.1, Page 7-70.* Better justification is needed for elimination of vanadium. A general statement that vanadium and other chemicals lacking screening values are non-toxic is insufficient. Hazard quotients greater than 1 for vanadium were predicted for small mammals in food chain analysis. This comment points to the need for toxicity profiles for chemicals of potential concern as in General Comment 14.

Response:

As stated in response to general comment 14, although vanadium cannot be considered completely toxicologically inert, the vanadium data for OU 2 and supporting toxicological information suggest that this compound is not causing acute potential risks at the site, and vanadium is not known to bioaccumulate or biomagnify. Additional toxicological data will be provided to support the assessment of the potential risk from vanadium. Typically we provide toxicity profiles after Step 3A, when a focused list of COPCs may be developed for use in a baseline ERA. Because the analyses in a baseline ERA are specifically linked to the toxicity of those COPCs, providing that information at that point appears to be most appropriate. Toxicity profiles were not presented for OU 2 because it did not appear that a baseline ERA was necessary. If any further re-evaluation of the OU 2 ERA indicates that COPCs remain after Step 3A that should be carried over into a baseline ERA, toxicity profiles for those COPCs will be provided.