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U S NAVY RESPONSE TO ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
COMMENTS ON FINAL REMEDIAL INVESTIGATION REPORT SITE 21 NSTC GREAT  
LAKES IL  
3/28/2012  
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**RESPONSES TO ILLINOIS ENVIRONMENTAL PROTECTION AGENCY COMMENTS  
DATED FEBRUARY 2 AND MARCH 28, 2012  
FINAL REMEDIAL INVESTIGATION REPORT FOR SITE 21  
NAVAL STATION GREAT LAKES**

Illinois EPA originally provided comments on the Revised Draft Site Inspection Report for Site 21 on July 5, 2012. Tetra Tech provided responses to comments (RTCs) on November 16, 2011. The original RTCs are attached at the end of this RTC document. Illinois EPA provided additional comments to Tetra Tech's RTCs on February 2, 2012 and March 28, 2012. The responses below address Illinois EPA's two most recent rounds of comments. The report was subsequently modified from a Site Inspection Report to a Remedial Investigation Report.

- 1) **IL EPA Responses to Comments 1-4** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 2) **IL EPA Response to Comment 5** (February 2, 2012) – The response provided does not apply to the original comment which addressed a table in Section 4.3.3.

**Response:** Original comment 5 is related to the request for additional investigation in the Northwest corner of Site 21. This concern is addressed in the response to IL EPA Comment 4 (original comment 7) below. Original IL EPA comments 2, 3, and 4 related to tables in Section 4.3.3 and those were adequately addressed (refer to IL EPA comment 1 above). Therefore, no additional changes are required.

- 3) **IL EPA Response to Comment 6** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 4) **IL EPA Response to Comment 7** (February 2, 2012) – The response found earlier in the submittal as well as here, discusses soil contaminant levels in the SB-01 and SB-02 area from the northwest corner of the site, but leaves out SB-03. SB-03 was the location with the highest PAH concentrations in the subsurface soil. While those values were similar to the surface soil sample from SB-21, they were significantly higher, more than an order of magnitude, than the remaining soil samples on this site. The Agency was willing to overlook the surface soil sample at SB-21 due to the potential for that sample to have bits of the asphalt covering within the sample which could bias the PAH results high. The SB-03 location is not covered by asphalt and the contamination is at a greater depth. This combined with that location being the site of the former incinerator leads the Agency to believe further investigation is warranted. In addition, the response mentions a single groundwater detection of pentachlorophenol. However, Figure 4-16 also identifies 2 VOCs as showing an exceedance in MW01, tetrachloroethylene being one of them.

The purpose of an RI is to determine the nature and extent of contamination. Therefore, the State believes there are identified exceedances at this location that need to have their extent delineated. A proper risk assessment cannot be completed until this has been completed. The discussion in the response of a feasibility study and potential remedial alternatives is premature.

**Response:** A site visit was conducted with IL EPA and NAVFAC to determine if additional investigation was warranted in the northwest corner of Site 21. It was agreed that the RI Report

could be finalized without any additional investigation activities being conducted under the current RI. It was also agreed that any additional investigation, if warranted, would be conducted and documented in a separate letter report to IL EPA. Factors potentially affecting additional investigation activities are buried underground utilities and Navy property boundary (collecting samples beyond Navy owned property).

- 5) **IL EPA Response to Comments 8 and 9** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 6) **IL EPA Response to Comment 10** (February 2, 2012) – This comment identified two numeric errors in Table 4-4. The response indicates the errors have been corrected, but no revisions were made in the redline-strikeout version of the report. The original comment also requested justification for using a summary soil pH value for determining TACO pH-specific soil criteria. The source of the summary value was specified, but no justification provided. Normally, use of a single IDW composite sample for determining site-wide pH is unacceptable. Its use in this case must be properly justified.

**Response:** A composite soil IDW sample was collected because it would be most representative of site-wide pH conditions. A composite soil sample has typically been collected at other sites on the facility for the purpose of determining a representative site-wide pH. This method is an efficient way to provide a representative pH value without collecting excessive samples. If IL EPA feels additional pH samples should have been collected, it is suggested that this be addressed in the DQO process of future site assessments.

- 7) **IL EPA Response to Comments 11-17** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 8) **IL EPA Response to Comment 18** (February 2, 2012) – The response is acceptable, but the revision does not match the response. The revised text is still acceptable, though.

**Response:** The revision was corrected to match the originally provided response. The last sentence in Section 5.6.2.2 now states, "In addition, for manganese in surface soil the maximum detection is 2,420 mg/kg in a data set with a mean of 590 mg/kg and 95 percent UCL of 770 mg/kg. This possible outline may represent a hot spot."

- 9) **IL EPA Response to Comments 19 and 20** (February 2, 2012) – The response is acceptable.

**Response:** No response required.

- 10) **IL EPA Response to Comment 21** (February 2, 2012) – To begin, the response twice references the risk assessment work plan and states that the referenced information was presented therein. However, this investigation began as a Site Inspection, and as such, the Sampling and Analysis Plan did not even address risk assessment. To what work plan are you referring?

Professional judgment assumptions for which there are no defaults should be discussed in detail and defended.

**IL EPA Response to Comment 21** (March 28, 2012) – Response is Insufficient. Revised Uncertainty Section text could not be located.

**Response:** ILEPA is correct that this investigation began as a Site Inspection, so the Work Plan from Site 9, which was being investigated simultaneously and already accepted by ILEAP, was used for this Site also. This is the Work Plan that was being referenced in the response.

All exposure parameters, including those of professional judgment, are presented and discussed in Section 5.4.5 of the HHRA and uncertainty associated with exposure parameter selection is discussed in Section 5.7.3.3. We feel this is sufficient and no further changes are required.

- 11) **IL EPA Response to Comments 21 and 22** (February 2, 2012) – Agency comments numbered 21 and 22 detailed nearly 40 requests for corrections to the cancer and non-cancer tables of oral and dermal toxicity values (Tables 5-11 and 5-12). Some requested corrections would result in higher calculated hazards and risks while others would result in lower hazards and risks. The exact impact on calculated hazards and risks can only be determined by recalculation using corrected toxicity values.

The response acknowledges errors, but rather than revising the calculations, the authors elect to use a narrative to broadly qualify the anticipated differences. This response tends to diminish the worth of the human health risk assessment. The heaping of additional uncertainty onto an already assumption-laden estimate of potential harm from contaminants reduces its value. Furthermore, the narrative is weak. While it accurately reports the over- or under-estimation of hazards and risks resulting from the challenged toxicity values, it fails to communicate the impact of the revised hazards to the overall risks for the respective receptors.

The subject response also proposes, for future assessments, that the toxicity values be agreed upon before the assessment's risk and hazards are calculated. This is an excellent suggestion. Illinois EPA would welcome the opportunity to be involved at the outset of risk evaluations. The addition and revision of toxicity values is frequent and risk assessors must be diligent to maintain the most current measures. It is almost never acceptable to use toxicity values from a previous assessment; each value should be confirmed prior to its use.

**IL EPA Response to Comments 21 and 22** (March 28, 2012) – Response is Insufficient. Revised Uncertainty Section narrative was not provided. Tables G-1 and G-2 were provided which identify differences and assign "more/less" protection indicators. However, other revised tables are also provided which show changes to the IEPA recommended values. Either revise or defend original.

**Response:** IEPA's proposed subchronic oral reference doses, the proposed Tier 3 subchronic RfC, and IEPA's recommended Tier 3 subchronic toxicity values are the same as the chronic RfDs or higher than those used in the Site 21 risk assessment for antimony, barium, iron, naphthalene, 2,3,7,8-TCDD, Aroclor 1260, benzene, tetrachloroethylene, benzene, chromium VI, cobalt, and vanadium. Therefore there is no change or the risks calculated for the construction worker are more conservative in the Site 21 risk assessment than if these RfDs and RfCs are applied for these COPCs.

Only a few of IEPA's proposed toxicity values are more conservative than those used in the Site 21 risk assessment. These include the chronic oral RfD for manganese (0.023 mg/kg-day rather than the value of 0.047 mg/kg-day used in the Site 21 risk assessment) and the subchronic oral RfD for aluminum (1 mg/kg-day vs. 2 mg/kg-day used in the risk assessment). Neither of these COPCs for the oral ingestion pathway were risk-drivers; therefore, changing the oral toxicity values of manganese and aluminum does not change the overall risk summary.

Therefore, the HIs for ingestion and dermal for the construction worker are the same or very similar when the IEPA toxicity values are applied compared to the summed HIs in the Site 21 risk assessment.

In their original comment, IEPA proposed a number of toxicity criteria, primarily subchronic RfD from Tier 3 toxicity resources (per USEPA, 2003). Upon analyzing all of IEPA suggested toxicity values, we were able to recalculate and determine their impact on the calculated hazards, which we presented to IEPA in Tables G-1 and G-2. However, Tables G-1 and G-2 that were

referenced were inadvertently omitted and will be provided with this response. Since it has been agreed upon that before any future risk assessments are calculated, the toxicity values will be reviewed and agreed upon by ILEPA and there are no substantive changes in the overall risk characterization nor risk decision-making if the alternative IEPA values are used, no further changes will be made to the Site 21 HHRA.

- 12) **IL EPA Response to Comment 23** – Response acceptable.

**Response:** No response required.

- 13) **IL EPA Response to Comment 24** (February 2, 2012) – Part of the response asserts that the source of two requested cancer URFs is the California EPA. The California EPA is a Tier 3 toxicity value source and should be used in the absence of higher tier values.

**IL EPA Response to Comment 24** (March 28, 2012) – Response is Insufficient. Entries in Table G-2 were not provided nor were revised tables provided.

**Response:** Pentachlorophenol is a COPC only for groundwater, and the inhalation pathway is not relevant for pentachlorophenol in water (that is, it is not considered to be a volatile organic compound). Therefore, the suggested Tier 3 inhalation URF for pentachlorophenol is not relevant to the Site 21 risk assessment. With regard to  $\delta$ -hexachlorocyclohexane (Delta-HCH), this is a COPC for groundwater only. Therefore inhalation toxicity criteria are not needed for this non-volatile constituent in groundwater.

No change to the Site 21 risk assessment is required.

- 14) **IL EPA Response to Comment 25** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 15) **IL EPA Response to Comment 26** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 16) **IL EPA Response to Comment 27** (February 2, 2012) – Illinois EPA continues to disagree with the recommendation provided. The Agency suggests further delineation of the northwest corner contamination.

**Response:** See response to Comment #4.

- 17) **IL EPA Response to Comment 28** (February 2, 2012) – Response noted. However, the raw data should be footnoted to explain the discrepancy between the “relinquished” time and the “received by” time.

**Response:** A notes page with a footnote explaining the discrepancy was added to Appendix B. The footnote states: “The “Relinquished By” time and “Received By” time for each sample is one hour apart. The reason for this time discrepancy is in the computer program, eData, that was used to collect the laboratory data. The computer running the eData program was in Eastern Time Zone and the data was collected in Central Time Zone. There is a one hour difference between these time zones. Therefore, when the user entered the relinquished time based upon their watch in Central time, the computer immediately assigned the received by time one hour earlier in Eastern time.”

- 18) **IL EPA Response to Comments 29-32** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 19) **IL EPA Response to Comment 33** (February 2, 2012) – The Agency acknowledges that our original comment was poorly worded. The responder’s confusion is understandable. The original comment should have stated ingestion and dermal “reference doses” not “values”. Specifically, in Table 7-14, the ingestion reference doses for δ-HCCH, arsenic, and cadmium do not agree with Table 5-11 values. In the dermal portion, the reference doses for δ-HCCH, arsenic, and cadmium do not agree. Regarding Table 7-14a, reference doses for the same chemicals and routes also do not agree. Curiously, in Table 7-14a, the ingestion and dermal reference doses for manganese do agree with our suggested correction for inclusion of an additional uncertainty factor although this suggestion was rejected in the response to Comment 22.

**IL EPA Response to Comment 33** (March 28, 2012) – Response is Insufficient. Regarding Table 7-14, the dermal reference dose (RfD) adjustment for cadmium was revised. It should not have been. The oral absorption efficiency for cadmium is 0.025%. It is inappropriate to use a water absorption factor for the soil dermal absorption adjustment. Regarding Table 7-14a, no revised table was provided.

**Response:** The comment is correct that the wrong RfD values were pasted into Tables 7-14 and 7-14a for δ-HCCH, arsenic, and cadmium, the adult residential scenario with groundwater. Upon further review, it was discovered that the analogous child residential groundwater (Tables 7-19 and 7-19a) had the same RfD errors. In response to this comment, the correct oral and dermal-applied RfDs (from Table 5-11) have been applied in revised Tables 7-14, 7-14a, 7-19, and 7-19a. Also, for consistency’s sake with the rest of the risk assessment, the RfD of 0.047 mg/kg-day for manganese was applied to the CTE scenarios. The resulting summed HIs for RME (Table 7-14, 7-19) and CTE (Table 7-14a, 7-19a) do not change the risk conclusions for groundwater. The revised adult RME HI is the same (7), and the revised CTE HI is still greater than 1 (original CTE HI of 5 vs. revised CTE HI of 3). The revised child RME and CTE HI values are all well above an HI of 1, as were the original RME and CTE HI values. Therefore, groundwater would not be recommended for use as drinking water without treatment based on the residential non-cancer risk scenario.

Tables 5-15a and 5-16a, which summarize the receptor and pathway specific risks and noncancer HIs, were also revised based upon the above changes.

- 20) **IL EPA Response to Comments 34-37** (February 2, 2012) – Response acceptable.

**Response:** No response required.

- 21) **IL EPA Response to Comment 38** (February 2, 2012) – See previous comments regarding additional delineation of the extent of contamination.

**Response:** See response to Comment #4.

- 22) **IL EPA General Comment** (February 2, 2012) – Although the revised report is now titled a Remedial Investigation, the vast majority of the text still refers to it as a Site Inspection. Please determine which is correct and revise the report accordingly.

**Response:** The investigation started out as a Site Inspection but was converted to a Remedial Investigation. The text has been updated to reference a Remedial Investigation.

- 23) **IL EPA General Comment** (February 2, 2012) – It is noted that throughout the entire revised report, save Section 4.7, when referencing the screening values, the wording has been changed from “minimum regulatory screening values” to “minimum screening values”. The word “regulatory” has been removed. Please provide an explanation for this change.

**Response:** The word regulatory was removed from the majority, save Section 4.7, of the report to prevent confusion with the screening values that are used in the HHRA (Section 5.0). Some values used in the HHRA are risk based numbers that are not “regulatory”. NAVFAC decided that it would be easier to refer to all the tables as “minimum screening values” and only reference “regulatory” in the summary section (Section 4.7).

**RESPONSES TO ILLINOIS ENVIRONMENTAL PROTECTION AGENCY COMMENTS**  
**DATED JULY 5, 2011**  
**REVISED DRAFT SITE INSPECTION REPORT FOR SITE 21**  
**NAVAL STATION GREAT LAKES**

1) **Executive Summary** - In Section E.8, only the results of the comparison of the analytical results to Illinois EPA's screening values are presented. This section should also discuss the comparison to the minimum regulatory screening criteria, as identified in the Sampling and Analysis Plan.

**Response:** *Section E.8 has been rewritten to be more concise. The following discussion added to Section E.8 and Section 4.7 SUMMARY:*

*"The initial comparison of the soil results to the minimum regulatory screening criteria (Section 4.3) identified many exceedances. Exceedances of inorganics in surface soils were widespread throughout the site. However, most inorganics were detected at concentrations an order of magnitude or higher than the minimum regulatory screening values in surface soil samples collected slightly southwest of Building 1517.*

*Arsenic, barium, cadmium, cobalt, copper, iron, lead, manganese, and mercury concentrations detected over minimum regulatory screening values were widespread in subsurface soils throughout the site. However, the highest concentration of inorganics were detected at the following four sample locations: NTC21-SB-04 (4 to 6 ft bgs) located in the northeast corner of the site, NTC21-SB-12 (2 to 4 ft bgs) located near the northeast corner of Building 1517, NTC21-SB-19 (2 to 4 ft bgs) located near the southwest corner of Building 1517, and NTC21-SB-15 (2 to 4 ft bgs) located near the northwest corner of Building 1517.*

*The minimum regulatory screening criteria in many cases are the "soil to groundwater" criteria provided by TACO or USEPA. However, when the soil results are compared to the TACO Residential and Industrial Ingestion and Inhalation screening criteria, there are only a handful of exceedances as described in Sections 4.4.1 and 4.4.2 and shown on Figure 4-17."*

2) **Section 4.3.1** - The table for inorganics omits aluminum and vanadium. They were included in the prior version of this submittal.

**Response:** *The TACO and non-TACO Class I soil to groundwater criteria were removed from the screening table because they are designed to be compared to results from extraction procedures,*

*TCLP or SPLP. Extraction procedures were not used to obtain soil concentrations. As a result aluminum and vanadium were removed from the table because their maximum concentrations did not exceed the remaining minimum screening criteria.*

**3) Section 4.3.2** - The table for inorganics omits several compounds (aluminum, chromium, vanadium) that were included in the prior version of this submittal.

**Response:** *The TACO and non-TACO Class I soil to groundwater criteria were removed from the screening table because they are designed to be compared to results from extraction procedures, TCLP or SPLP. Extraction procedures were not used to obtain soil concentrations. As a result aluminum, chromium, and vanadium were removed from the table because their maximum concentrations did not exceed the remaining minimum screening criteria.*

**4) Section 4.3.2** - There were two subsurface soil samples labeled as exceedances for tetrachloroethene (PCE). The sample located just west of Building 1517 is the more worrisome as it also had an exceedance in the surface soil. Given its location very near an entrance to the building, one must wonder if it is the result of a small spill or from improper disposal (dumping). If from improper disposal, then is this location the extent of the contamination or is it on the edge of a larger area with possibly higher concentrations of PCE? The State would suggest the collection of a few more samples (both soil and groundwater) in the vicinity of sample NTC21 SB-19-S0-0204 to determine the actual extent of contamination. The other PCE location might be addressed via the hot spot removal suggested below for the northwest corner of the site.

**Response:** *Tetra Tech and the Navy believe that additional sampling and testing are not warranted at this time. There are several reasons for this belief. First off, minimum screening levels used for PCE are extremely conservative. Exceedances are based on a comparison with USEPA ORNL Risk-Based SSLs of 0.049 ug/kg. Tetra Tech collected surface soil and subsurface soil samples from twenty-two (22) soil borings at the Site. Of the 22 surface soil samples, there was a single detection of PCE at a concentration of 1.4 ug/kg at NTC21 SB-19-SO-0204. In the subsurface there were only two detections, with the maximum concentration (18 ug/kg) of PCE encountered at NTC21 SB-19-SO-0204. By comparison the TACO cleanup goal for soils based on Class I Soil to Groundwater is 60 ug/kg. Additionally, PCE concentrations in soil are several orders of magnitude below the TACO residential screening values for direct contact scenarios involving inhalation and ingestion. Those values are 11,000 ug/kg and 12,000 ug/kg, respectively.*

*Risk calculations summarized in Section 5.0 shows PCE in soil does not pose a significant cancer risk (greater than  $1 \times 10^{-6}$ ) under both current and future use scenarios. Also, the area above the*

*samples of concern is paved. The pavement provides protection against immediate contact under the current use scenario.*

*It is understood that Illinois EPA is concerned that the sample at NTC21-SB-19-SO-0204 may represent the edge of a more significant source of PCE contamination. However, it is anticipated that any significant spill would have resulted in impacts to groundwater. Additionally, the groundwater sample from monitoring well NTC21-MW05, which is approximately 180 feet down-gradient of NTC21-SB-19, had no detection of PCE. The only PCE detected in groundwater was at monitoring well NTC21-MW01. The concentration at that location was 0.85 ug/L, which is below TACO and MCL screening criteria which are both 5 ug/L.*

5) **Section 4.4** - Given the number of exceedances detected in the northwest corner of the site for soil and groundwater and that it is the former location of the incinerator, additional investigation is needed to fully delineate the extent of contamination there. This could be accomplished during a subsequent round of sampling or possibly as confirmation for a hot spot removal. The latter would be risky, though, without knowing the full extent of contamination in advance.

**Response:** *Tetra Tech and NAVFAC have taken a detailed look at the contamination in the northwest corner of the property. The only significant difference between the SB-01 and SB-02 area and the rest of the Site appears to be the depth of the contamination in the area around SB-02, where PAH exceedances of TACO criteria extend deeper (4 to 6 ft bgs) than in other areas. PAH concentrations in the area are certainly elevated, but do not represent the highest concentrations at the site. As such, Tetra Tech and NAVFAC do not see the area as a "hot spot."*

*Other miscellaneous detections in this area of the site were reevaluated and not found to be significant or not significantly different than contamination observed in other areas of the site:*

- a. *VOCs in Surface and Subsurface Soils– In the northwest corner, benzene was seen at 1.1 ug/kg in surface soil at SB-01, and PCE was seen at 3.3ug/kg in subsurface soil at SB-02. These concentrations are not significant and, when compared with groundwater data, do not seem to be correlated to a significant source. In addition, low-level benzene detections were also seen elsewhere in surface soil at the Site.*
- b. *SVOCs in Surface and Subsurface Soils – As noted above, PAH contamination in the northwest corner of the property may be deeper than in other areas, but the concentrations are not inconsistent with the rest of the Site.*
- c. *Metals in Surface and Subsurface Soils – Metals in soil across the site exceed screening criteria, However, they are not inconsistent with the rest of the Site.*
- d. *Groundwater –*

- There was a single detection of pentachlorophenol (7.8 ug/L at MW01 in the northwest corner of the site). However, pentachlorophenol was not encountered above laboratory detection limits in site soils and was not seen in other site wells. Therefore, it is believed to be a localized groundwater issue, and its detection at MW01 does not warrant a "hot spot" soil removal action.
- Manganese was elevated in site soils and in several of the site wells. This is a site-wide issue and not specific to the NW corner of the site.

6) **Section 4.4** - This section compares site soil and groundwater concentrations to Illinois EPA's Tiered Approach to Corrective Action Objectives (TACO) objectives. The title specifies two receptors, residential and industrial. Since the construction worker receptor can yield lower, more conservative screening values, the construction worker receptor should also be included in this comparison.

**Response:** The Non-TACO Ingestion Soil Remediation Objectives (Construction Worker) and Non-TACO Inhalation Soil Remediation Objectives (Construction Worker) have been added as a screening value (See Table 4-4).

The following text and table has been added to Section 4.4.1 Surface Soil Results Comparison:

Mercury

Mercury exceeded the Construction Worker Inhalation screening value of 0.1 mg/kg at seven locations at Site 21, as shown on the following table:

Sample Location	Depth (ft bgs)	Result (ug/kg)	Description of Sample Location
NTC21-SB-03	0 to 1	0.144J	Located in the northwest corner of the site, which is the former location of the incinerator.
NTC21-SB-09	0 to 1	0.495	Located near the northeast corner of Building 1518.
NTC21-SB-10	0 to 1	8.98	Located in the southeast corner of the site.
NTC21-SB-12	0 to 1	0.585	Located in the northeast corner of Building 1517.
NTC21-SB-13	0 to 1	0.106	Located on the northeast corner of Building 1517.
NTC21-SB-21	0 to 1	1.07	Located south of Building 1517.

NTC21- SB-22	0 to 1	0.233J	Located south of Building 1517.
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7) **Section 4.4** - Given the number of exceedances detected in the northwest corner of the site for soil and groundwater and that it is the former location of the incinerator, additional investigation is needed to fully delineate the extent of contamination there. This could be accomplished during a subsequent round of sampling or possibly as confirmation for a hot spot removal. The latter would be risky, though, without knowing the full extent of contamination in advance.

**Response:** *As stated in the response to Comment 4, Tetra Tech and the Navy believe that additional sampling and testing are not warranted at this time. It is recommended that in lieu of additional sampling and testing at this time, that a Focused Feasibility Study (FFS) be performed. Although alternative solutions to mitigate risks may be identified and considered as part of the FFS, the primary alternatives to be considered include:*

- *Use of LUCs to control access of construction activities to impacted soils and groundwater;*
- *Use of LUCs to limit future land use and restrict residential uses;*
- *Use of barriers to control access and exposure pathways of construction workers to impacted soils and groundwater; and,*
- *Revaluation of the site upon decommissioning and prior to any change in industrial or residential use.*

8) **Table 4-4** - The subject table begins a series of tables presenting screening values for contaminants in groundwater and soil. The Illinois EPA non-TACO screening criteria have since been updated and revised tables were placed on the internet on March 14, 2011. The most current toxicological and screening values available should be used whenever possible.

**Response:** *Table 4-4 has now been updated with The Illinois EPA non-TACO screening criteria have from March 14, 2011.*

9) **Table 4-4** - The TACO background-based objective for arsenic is relevant and should be included in the screening criteria.

**Response:** *Table 4-4 has now been updated with the TACO background-based objective for arsenic.*

10) **Table 4-4** - Several comments were developed for the "TACO Class I Soil to Groundwater" screening values for inorganics.

- Provide the justification for selection of the pH 7.75 to 8.74 range. Because soil pH is variable, sample-specific pH is typically required when using pH-specific objectives. Generalization of site soil pH must be justified.
  - A value should be entered for Mercury,
  - The entry for nickel cannot be confirmed.

**Response:** *The values for nickel and mercury have been updated. A pH value of 7.86 was obtained from pH analysis of a composite IDW soil sample, as indicated in the notes on Table 4-6.*

11) **Table 4-6** - On pages 2 of 4 and 4 of 4, the source for the chromium screening value should be "TACO". The screening criterion for nickel of 8 mg/kg is from TACO but is incorrect per the previous comment for Table 4-4.

**Response:** *Nickel and chromium screening criterion have now been updated.*

12) **Table 4-7** - Please explain the basis and use of the "Overall Average" entries. Assuming these entries include non-detect results; explain how these results were included, e.g., full DL, 112 DL, etc.

**Response:** *The BaP equivalent calculations were performed using the full non-detect value. The overall average and standard deviation from the FOD table were calculated using ½ the non-detect value.*

13) **Table 4-9** - Entries for iron on this table are incorrect. The entries in the non-TACO column should be changed to "NC".

**Response:** *Table 4-9 - Entries for iron the non-TACO column has been changed to "NC".*

14) **Section 5.3.2** – There is no discussion of lead as a COPC even through there are exceedances of screening criteria in the surface soil. This should be discussed here much like it is in Section 5.4.5.3.

**Response:** *In response to this comment, the text of Section 5.4.5.3 will be deleted from Section 5.4.5 and inserted to Section 5.3.2 just before the heading "Background Surface Soil Sections."*

15) **Section 5.4.4** – The third bullet in the first paragraph specifies the use of USEPA ProUCL for statistical summaries. The version used is obsolete. ProUCL version 4.1.00 became available in May 2010 and should be used. The provisions in ProUCL for treatment of non-detect results are critical for proper evaluation of the data. One-half the detection limit is not recommended. The ProUCL example provided in Appendix G includes no non-detect values thus we were unable to confirm proper use of the software. Please provide an example of a data set that includes non-detects.

**Response:** *The version of ProUCL that was used for statistical calculations is version 4.00.05 (dated 2010), and it has the same modules for managing non-detected results as does version 4.1.00. Therefore, it is not an obsolete version of ProUCL, and statistics for datasets that had non-detected results were calculated correctly. Detected and non-detected results in a dataset were coded into ProUCL with a binary code (“U” = “0”; detected values are coded “1”). The value for a non-detected result is the instrument detection limit of the specific sample. ProUCL 4.00.05 estimates the distribution of nondetected results based on the distribution of detected results.*

*The ProUCL version will be clarified in the text of Section 5.4.4 and the reference will be revised to attribute the correct version that was used, 4.00.05.*

16) **Section 5.4.5.1** – The definition for non-cancer averaging time in the equation for dermal contact with soil should not be converted to hours. The assumption is that steady state is achieved for each dermal event and the full ABS can be applied.

**Response:** *The definition of AT for non-carcinogens will be edited from “ED x 8760 hours” to “ED x 365 days/year. No change to risk calculations is necessary as the AT in days was applied in the calculations.*

17) **Section 5.4.5.1** – The section regarding the inhalation of contaminants from soil contains three equations. The second calculates contaminant concentrations, i.e., exposure levels. Units for this value are milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ).

**Response:** *The first equation of the older methodology that incorporates inhalation rate and body weight will be removed. The second equation will be modified as the comment indicates – “Exposure Level” =  $\text{mg}/\text{m}^3$ .*

18) **Section 5.6.2.2** – Illinois EPA cannot agree to identify the highest manganese surface soil detection as an outlier. It appears more likely a hot spot than an outlier.

**Response:** *In response to this comment, the last sentence of paragraph 3 of Section 5.6.2.2 will be modified from "In addition, for manganese in surface soil maximum detection is 2,420 mg/kg, which is an apparent outlier in a data set with a mean of 590 mg/kg and 95 percent UCL of 770 mg/kg." to "In addition, for manganese in surface soil maximum detection is 2,420 mg/kg, which is an apparent outlier in a data set with a mean of 590 mg/kg and 95 percent UCL of 770 mg/kg. This possible outlier may represent a hot spot."*

19) **Section 5.8.2** – The target risk range reported here for the TACO Tier 3 evaluations is conditional. This statement should be clarified to include the stipulation that the specific requirements of 35 IAC 742.915 (i) must be met for risk levels greater than one-in-a-million to be acceptable.

**Response:** *The following sentence will be added to the end of the Section 5.8.2 paragraph: "With a Tier 3 Evaluation, the risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  may be acceptable if the specific requirements of 35 IAC 742.915 (i) are also met." A statement about the 35 IAC 742.915 (i) requirements will also be added to the end of the first paragraph of Section 5.6.1.*

20) **Table 5-9** – The Csoil for lead should be the arithmetic mean.

**Response:** *Lead is not carried through the quantitative risk assessment given the low concentrations in soil. No change is needed.*

21) The exposure duration (ED) for the occupational/maintenance worker receptor is reported here as nine years. USEPA's guidance document "Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposures" (1993) suggests a default ED of five years and averaging time of 1825 days for this receptor. Please explain the differences between the report and the guidance document.

**Response:** *It should be noted that the CTE occupational ED of 9 years was presented in the Work Plan. However, the 1993 guidance document was a draft document and has apparently been superseded by later guidance, such as USEPA Exposure Factors Handbook (1997). Table 15-176 of USEPA (1997) provides a central tendency exposure duration for occupational receptors of 6.6 years. The 9 year exposure duration that was used in the risk assessment for the occupational receptors is somewhat more conservative than the more recent guidance. This will be discussed in*

*the uncertainty section, and no change is proposed to the risk assessment calculations for Site 21. Future risk assessments will use the USEPA 1997 CTE exposure duration of 7 years (i.e., 6.6 years from Table 15-176 rounded to 7) for occupational receptors.*

Please explain the four hour exposure time (ET) for dust and volatiles from soil by the CTE occupational/maintenance and construction workers. Inhalation of fugitive dusts and volatiles from soil is a passive exposure. These exposures are controlled by meteorological conditions, physical properties of the chemicals and soil, and soil contaminant concentrations. The only reasonable justification for the ET to be halved is if the central tendency receptor spends one-half day at the site. If this is the underlying assumption, it should be stated and justified.

**Response:** *The Risk Assessment Work Plan indicated that professional judgment would be applied for some CTE values for which there are no defaults. The justification for attributing one-half day for the inhalation pathway is that it is reasonable for typical occupational workers at the Navy base to spend less than all day outside, even if they perform maintenance duties.*

**General Response to chemical-specific toxicity criteria comments:** *Many of Illinois EPA's chemical-specific toxicity criteria comments represent clarifications of the chemical-specific Tier 3 toxicity criteria sources (e.g., PPRTV and ATSDR) that Illinois EPA recommends. By and large, changing these toxicity values will have little impact on risk characterization summaries and certainly not on remedial decision-making. Therefore, the level of effort required to quantitatively revise the Site 21 Risk Assessment to address these comments is not warranted. Rather, we generally propose to address the differences in the Illinois EPA recommended toxicity values qualitatively in the uncertainty section of the Site 21 risk assessment.*

*For future risk assessments, we suggest the following procedure: After COPCs are identified for a risk assessment but prior to commencing with risk calculations, the Navy will provide Illinois EPA with the proposed toxicity criteria (chronic and subchronic oral RfD and inhalation RfC; oral cancer slope factors; and inhalation unit risks). We will request that Illinois EPA provide concurrence on these values, or recommend alternative values before further preparation of the risk assessment is made.*

**Chemical-specific comments and responses:**

- **Manganese:** Change chronic oral reference dose (RfD) to 0.02 mg/kg-d. The Integrated Risk Information System (IRIS) documentation states that up to 5 mg/day of manganese is obtained from the diet; thus, half of the intake must be subtracted from the acceptable dose.

**Response:** This approach is not explicitly described in the IRIS for manganese; therefore, we do not propose to change the risk calculations of the Site 21 Risk Assessment based on this comment. However, we recognize that the User Guide to the USEPA Regional Screening Levels does prescribe subtracting the daily dietary contribution of manganese from the RfD ( $0.14 \text{ mg/kg-day}/2 = 0.07 \text{ mg/kg-day}$ ), and then adjusting the new RfD for nondietary exposures by the modifying factor of 3 ( $0.07 \text{ mg/kg-day}/3 = 0.024 \text{ mg/kg-day}$ ). Therefore, we agree to discuss this in the uncertainty section of the Site 21 report, and in future risk assessments to change the chronic oral RfD (and subchronic per “manganese RfDs” comment above) for manganese to  $0.02 \text{ mg/kg-day}$ .

- **Vanadium:** Change chronic RfD to  $0.00007 \text{ mg/kg}$  (SIC). This is a Provisional Peer Reviewed Toxicity Value (PPRTV) available for elemental vanadium and vanadium compounds other than vanadium pentoxide. Documentation can be found at: [http://hhpprtv.ornl.gov/quickview/pprtv\\_papers.php](http://hhpprtv.ornl.gov/quickview/pprtv_papers.php).

**Response:** It should be noted that one of the key differences between PPRTV values and IRIS values is the opportunity for public review and comment of draft IRIS values before they are finalized. No such unsolicited review is included for PPRTV values. Our review of the provisional toxicity criteria document referenced here shows that there is low confidence in the key study (Boscolo et al., 1994, which is also a subchronic study rather than chronic study) and therefore low confidence in the provisional subchronic and chronic RfDs. There is an uncertainty factor (UF) of 3000 applied to the No Observed Adverse Effects Level (NOAEL) to yield the very low provisional chronic RfD of  $0.00007 \text{ mg/kg-day}$ . The toxic effect (kidney cellular changes) was observed only in male rats, and this may be a gender/species-specific toxic effect and is common for male rats.

Recently the USEPA RSL guidance (May 2011) proposed the following approach to calculating a RfD for vanadium compounds other than pentoxide. According to the User Guide Section 5.4, “the oral RfD toxicity value for Vanadium, used in this website, is derived from the IRIS oral RfD for Vanadium Pentoxide by factoring out the molecular weight (MW) of the oxide ion. Vanadium Pentoxide (V2O5) has a molecular weight of 181.88. The two atoms of Vanadium contribute 56% of the MW. Vanadium Pentoxide’s oral RfD of  $9\text{E-}03$  multiplied by 56% gives a Vanadium oral RfD of  $5.04\text{E-}03$ .” We propose no change in the risk calculations of Site 21, but will discuss in the uncertainty section the potential impact on the risk assessment conclusions if  $0.005 \text{ mg/kg-day}$  were applied as the oral RfD for vanadium. In future risk assessments, we propose to use the oral RfD of  $0.005 \text{ mg/kg-day}$  for vanadium.

**General Response to Illinois EPA recommended subchronic RfD values:** For the following COPCs, Illinois EPA's proposed subchronic RfDs are the same as the chronic RfDs that were used in the Site 21 risk assessment: antimony, barium, and iron. Therefore there is no change in the risk assessment result for subchronic scenarios (i.e., the construction scenario) for these COPCs.

For a number of other COPCs, Illinois EPA's recommended Tier 3 subchronic toxicity values are higher than those used in the Site 21 risk assessment (e.g., naphthalene, 2,3,7,8-TCDD, Aroclor 1260, benzene, tetrachloroethylene, chromium VI, and cobalt). Therefore, the risks calculated for the construction worker are more conservative in the Site 21 risk assessment than if these subchronic RfD are applied. This will be discussed in the uncertainty section.

With regard to the Illinois EPA's comments on the subchronic RfDs for manganese and vanadium, please refer to the chronic RfD discussion above. These differences in professional judgment will be explained in the uncertainty section as well.

Finally, we disagree on the Illinois EPA recommendations for subchronic RfD for cadmium, delta HCH, and pentachlorophenol because these are lower (more conservative) than the respective chronic RfD. Therefore, for these COPCs, we propose to maintain the use of the chronic RfD for the subchronic scenario.

**Responses to specific remaining subcomments of #22:**

- Aluminum: Correct RfDs to 1.0 mg/kg-day.

**Response:** Illinois EPA is correct that a more recent ATSDR subchronic RfD of 1.0 mg/kg-day (ATSDR 2008) can replace the older referenced value (2.0 mg/kg-day per ATSDR, 1999) that was used in the Site 21 risk assessment. This change in subchronic RfD will be addressed in the uncertainty section of the Site 21 risk assessment, but will be applied in future risk assessments as appropriate.

- Arsenic: We cannot verify the PPRTV RfDs from October 2005. Alternative is HEAST 1997 (3.0E-03 mg/kg-day)

**Response:** The subchronic RfD is found in USEPA Region 8 (2002)"Derivation of Acute and Subchronic RfD for Inorganic Arsenic," which is a more recent and more thoroughly documented resource than USEPA HEAST. This paper has been included with this Response to Comments document. The reference in Table 6-9 will be changed to this Tier 3 source.

22) Table 5-12 – Several errors were noted in the subject table of non-cancer inhalation toxicity values. The footnote for “ORNL” cites to the May 2010 issue of their screening levels. The ORNL tables have been revised three times since May. It is incumbent upon the petitioner to use the most current toxicological values.

**General Responses to the following Illinois EPA comments**

o Illinois EPA comments on conversion of RfC to inhalation RfD:

*RfCs were used in the risk assessment in consistency with USEPA (2009) guidance. We agree that it is not necessary to present the conversion of RfC to inhalation RfD in Table 5-12, and therefore the columns showing the RfD and units have been removed from this table. The following specific comments are addressed by this general response:*

- Naphthalene: Conversion to an inhalation RfD is improper.
- Mercury: Correct the inhalation RfD conversion based on the above comment.
- Vanadium: Conversion to an inhalation RfD is improper.

o Illinois EPA comments recommending presenting chronic values as subchronic values when the latter are not explicitly available:

*Rather than presenting chronic RfC values under the “Subchronic” heading of Table 5-12, a footnote will be added to explain that chronic values were used as surrogate values for subchronic RfC if the latter are not available. The #22 subcomments regarding the presentation of chronic values for subchronic for following chemicals are addressed by this general response:*

- Naphthalene
- TCDD
- Tetrachloroethylene
- Aluminum
- Arsenic
- Cadmium
- Manganese
- Mercury

o Illinois EPA recommended subchronic RfC greater than Site 21 risk assessment values. *For a number of other COPCs, the proposed Tier 3 subchronic RfC are higher than those used in the Site 21 risk assessment (e.g., benzene, chromium VI, cobalt, and vanadium). Therefore, the risks calculated for the construction worker are more conservative in the Site 21 risk assessment than if these subchronic RfC are applied. This will be discussed in the uncertainty section. In future risk assessments, the Illinois EPA recommended subchronic RfC will be proposed if appropriate.*

**Responses to specific remaining subcomments of #22:**

- Mercury: The chronic reference concentration (RfC) to 0.0003 mg/m<sup>3</sup> if mercury vapors being evaluated, IRIS. (SIC) Mercury inhalation is evaluated later in the report. This is only necessary if elemental mercury is a contaminant of concern.

**Response:** While there is no indication that elemental mercury is a contaminant of concern at Site 21, Illinois EPA directed that risk-based screening values for elemental mercury be conservatively applied in the risk assessment to identify whether mercury is carried through as a COPC in the risk assessment. Because the soil results for mercury are not expected to be elemental mercury, the RfC presented in Table 5-12 (3.0E-05 mg/m<sup>3</sup>) is a value for “mercuric chloride and other mercury salts” from the RSL table. The source is the USEPA Tier 3 resource – California EPA. Therefore, we propose to make no change to the RfC for mercury.

**23) Table 5-13** – The preferred oral cancer slope for TCDD is 1.3E+05 (mg/kg-day)<sup>-1</sup> from California EPA.

**Response:** It does not seem appropriate to use a California-specific toxicity value for a Site in another state when, as in this case, a USEPA toxicity value is available. Therefore, we propose to leave this unchanged in the risk assessment of Site 21.

**24) Table 5-14** – The conversions of unit risk values to inhalation cancer slope factors are inappropriate for all but two chemicals (TCDD and TCE). Chemicals are not eligible for conversion when they induce tumors at the point of impact with the body. Furthermore, we observe that inhalation slope factors are not used in the Appendix G calculations of risk. Both the inhalation RfD conversion's column and the unit's column are unnecessary.

**Response:** The inhalation CSFs and their units columns have been removed from Table 5-14.

The inhalation unit risk value presented here for vanadium is actually for vanadium pentoxide. Vanadium metal and other vanadium compounds are not carcinogenic. The analytical results should be examined to determine which form of vanadium is present.

**Response:** There is no process knowledge or historical waste disposal information to support that vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) is a predominant form of vanadium detected in soil samples. Therefore, we propose to discuss the conservatism of including vanadium in the inhalation risk

*calculations of the Site 21 risk assessment. In future Naval Station Great Lakes risk assessments, toxicity values for vanadium and compounds other than vanadium pentoxide will be used.*

Please explain the absence of entries for pentachlorophenol and  $\delta$ -hexachlorocyclohexane. Both have cancer URF values available from CalEPA.

**Response:** *It should be noted that the CalEPA URFs for pentachlorophenol and  $\delta$ -hexachlorocyclohexane have been derived by California's Office of Environmental Health Hazard Assessment (OEHHA) specifically for application to California Proposition 65. Discussion of the uncertainty of these values and the impact on the risk summaries if these values were included will be added to the text of the report.*

**25) Table 5-17A and B** – The subject tables present screening assessment values from several sources. The inorganic constituent values presented in the “TACO Migration to Groundwater – Class I” column are incorrect. The TACO values are meant to be compared to soil extraction results. The screening criteria, in units of mg/L, cannot be compared to site soil concentrations in units of mg/kg.

**Response:** *The “TACO Migration to Groundwater – Class I” screening values that are based on leachate results in units of mg/L will be removed from Tables 5-17A and B.*

**26) Section 6.1** - As in the Executive Summary, only the results of the comparison of the analytical results to Illinois EPA's screening values for ingestion and inhalation are presented. This section should also discuss the comparison to the minimum regulatory screening criteria, as identified in the Sampling and Analysis Plan.

**Response:** *Discussion has been added to the Executive Summary and Section 6.1.*

**27) Section 6.3** - Obviously this section needs to be completed. The Agency would suggest further delineation of the northwest corner contamination and consideration of one or two "hot spot" removals to reduce the apparent human health risks at this site.

**Response:** *The following recommendations have been added to Section 6.3:*

*Based on the results of the RI it is recommended that a Focused Feasibility Study be performed for Site 21. Alternatives to be considered in order to mitigate risk should include:*

- Use of LUCs to control access of construction activities to impacted soils and groundwater;
- Use of LUCs to limit future land use and restrict residential uses;
- Use of barriers to control access and exposure pathways of construction workers to impacted soils and groundwater; and,
- Revaluation of the site upon decommissioning and prior to any change in industrial or residential use.

Alternative solutions to mitigate risks may be identified and considered during preparation of the FFS.

**28) Appendix B-10** - On the provided chain-of-custody forms, there is consistently a one hour difference between the time the samples were relinquished and their receipt by the shipper. Please explain the time gap.

**Response:** *The chain of custody was generated using E-Data. The relinquished time and the time received by the shipper should be identical. The time discrepancy occurred because the time was logged in Illinois (Central time) and when the form was completed with the shipper received time, the laptop with E-Data was in Pennsylvania (Eastern Time).*

**29) Appendix G, Calculation of Ambient Air Concentration Tables** – Unnumbered tables following Tables 4.2, 4.2a, 4.4, and 4.4a show calculations of the volatilization factor for the construction worker receptor. They define the exposure interval (T) as 7.6E+08 seconds. T for the construction worker is 42 days or 3.6E+06.

**Response:** *The Exposure Time value for the construction worker will be corrected to 3.6E+06 in these unnumbered tables. This correction results in no changes to the summed risk values because this pathway is a minor contributor to total risk.*

The PEF values listed in the input parameters box in these four tables are incorrect. The construction worker PEF should be 1.27E+06.

**Response:** *The PEF values listed on these tables are not incorporated into the risk calculations. The correct PEF (1.27E+06 for the construction worker) is used to calculate risks, and is found on Tables 4.5, 4.2a, 4.4, and 4.4a. To eliminate confusion, the PEF value shown on the unnumbered tables that follow these numbered tables will be removed.*

**30) Appendix G, Calculation of DA event Table** – The subject unnumbered table follows Table 4.5a. The table is mistakenly labeled as being for the RME receptor.

*Response: The table will be correctly labeled as being for the CTE receptor.*

**31) Appendix G, Calculation of Ambient Air Concentration Table** – The unnumbered table following Table 4.6 includes the incorrect exposure time for the construction worker receptor.

*Response: The Exposure Time value for the construction worker will be corrected to 3.6E+06 in these unnumbered tables. This correction results in no changes to the summed risk values because this pathway is a minor contributor to total risk.*

**32) Appendix G, All Dermal Hazard Calculation Tables** – Add cadmium to list of ABS values at the bottom of page.

*Response: The cadmium ABS will be provided on the printed/pdf versions of the dermal hazard calculation tables.*

**33) Appendix G, Tables 7-14 and 7-14a** – In addition to the comments for Table 5-11 asking for corrections to the RfD and dermal-adjusted RfD values, the subject tables contain incorrect ingestion values for  $\delta$ -HCCH, arsenic, and cadmium and incorrect dermal values for  $\delta$ -HCCH, arsenic, and manganese.

*Response: We are not sure to what "incorrect" ingestion and dermal values this comment refers, and request clarification. Tetra Tech believes the values used are appropriate.*

**34) Appendix G, Mass Transfer during Showering Calculation** – The subject unnumbered table follows Table 4-15 and contains an incorrect site name.

*Response: The site name will be corrected in this table.*

**35) Appendix G, Calculation of Ambient Air Concentration Table** – The subject table follows Table 4.17a. It incorrectly identifies the receptor as an adult and the exposure time does not correspond to six years. Additionally, there is no corresponding RME receptor table for this calculation.

**Response:** *This unnumbered table is not necessary because it is not included in the calculations for the child receptor. The table will be removed.*

**36) Appendix G, All Cancer Risk Calculations for Child Receptors** – We cannot establish that the age-dependent adjustment factors (ADAF) of 10X (ages 0-<2) and 3x (ages 2 - <16) have been applied to the oral slope factors and unit risk factors when carcinogenic risks were calculated for the mutagenic contaminants. Please clarify.

**Response:** *The age-specific mutagenic adjustments have been made in the risk calculations of c-PAHs. The cells containing these calculations were outside of the print area of the Table 4's, and are correctly incorporated into the Table 7's and 8's for the child receptor. In future risk assessments the ADAF cells will be labeled and included on the pdfs of these tables.*

**37) Appendix G, All appendix G Tables** – Footnotes appear sporadically. Please assure all appropriate footnotes appear on the proper pages.

**Response:** *A final check of footnotes will be completed.*

**38) General Comment** – It appears that a large number of the maximums of contaminant levels are located in just a few samples. Those locations are samples number -01, -02, -03 (NW corner), and -21 (S of B1517). At these locations many of the exceedances are an order of magnitude higher than the remaining sample concentrations and would be considered “hot spots”. A removal at these locations would have a significant effect on the output of the risk assessment. Such a removal(s) should be considered.

**Response:** *See Comments 4 and 7.*