cc: Dave Douglas

N91192.AR.000428
NIROP FRIDLEY
5090.3a

Minnesota Pollution Control Agency

January 11, 1999

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Commanding Officer
Southern Division
Naval Facilities Engineering Command
Attn.: Joel R. Sanders, Code 1868
P.O. Box 190010
North Charleston, South Carolina 29419-9010

RE: Naval Industrial Reserve Ordnance Plant Superfund Site

Dear Mr. Sanders:

The Minnesota Pollution Control Agency (MPCA) staff has reviewed the document entitled "Remedial Investigation for Operable Unit 3 Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota" (OU3 RI Report), dated August 31, 1998. The OU3 RI Report is for Operable Unit 3 (OU3) of the Naval Industrial Reserve Ordnance Plant (NIROP) Superfund Site, and was submitted pursuant to the Federal Facility Agreement, dated March 27, 1991, between the MPCA, the U.S. Environmental Protection Agency (U.S. EPA), and the U.S. Navy (Navy).

The MPCA staff hereby modifies the OU3 RI Report pursuant to Attachments I through IV of this letter. Attachment II focuses specifically on risk assessment issues; Attachment III focuses specifically on quality assurance/quality control issues; and Attachment IV focuses specifically on information contained in the Initial Assessment Study (IAS) prepared by Envirodyne Engineers, Inc., dated June 1983, that may not have been fully addressed by the Navy. The MPCA staff requests that the Navy modify the OU3 RI Report pursuant to Attachments I through IV.

Since this report is very large, the MPCA staff requests that in addition to making corrections to the OU3 RI Report, that the Navy also produce an itemization of where requested changes were made in the OU3 RI Report as the Navy has did for the OU3 RI Work Plan.

If you have any questions regarding this letter, please contact David Douglas, of my staff at (651)296-7818.

Sincerely,

Mike Ruff, for

Michael J. Kanner
Manager
Site Remediation Section
Metro District

MJK:csa

Enclosure

cc: Thomas Bloom, U.S. Environmental Protection Agency
Patrick K. Morrow, U.S. Navy
Mark Sladic, Tetra Tech NUS, Inc.

Attachment I

Modifications to the Report Entitled
"Remedial Investigation for Operable Unit 3
Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota,"
Dated August 31, 1998

1. **Executive Summary, Summary of Field Investigations**

In the second paragraph of this section, the Navy states that soil sampling in Phase I was performed to:

(1) identify Contaminants of Potential Concern (COPCs):
(2) determine the concentration and general location of the COPCs;
(3) evaluate the potential human risk;
(4) quantify the potential for migration of the COPC to groundwater; and
(5) identify conditions which are indicative of the presence of free-product source areas.

The staff cannot find a table in the report that identifies the COPCs for OU3. The staff requests that the Navy identify the COPCs for OU3 in a single table. Without knowing what the Navy considers to be COPCs, it is not possible for the staff to evaluate whether or not we agree that the Navy has fully met any of the other four items cited above. The staff has not been able to determine where in the report the Navy has discussed the last two items. The staff requests that the Navy explain what it has done to meet the Navy's objectives cited above. If the Navy has not met the objectives above, the Minnesota Pollution Control Agency (MPCA) staff requests that the Navy complete this work.

2. **Executive Summary, Nature and Extent of Contamination**

In the report, the Navy has summarized the data based on the depths at which the contaminants were found without any discussion about the seven groups of facility operations, or the three mechanisms which could have resulted in releases of chemicals from the Areas of Concern (AOCs) to the environment. The absence of this evaluation appears to be inconsistent with (1) the discussion about potential sources of contamination in the main Naval Industrial Reserve Ordnance Plant (NIROP) building found in Section 3.1.1 of the "Final Work Plan for Operable Unit 3," dated June 30, 1997; (2) the objective of finding sources of contamination as cited in Section 1.1 of the report; and (3) the statement made in the first paragraph of the report in the section entitled, "Initial Screening of Possible Alternative Response Actions:" "Response actions for the site will likely focus on the localized areas of contamination."

The staff requests that the Navy evaluate the nature and extent of contamination based on the seven main groups of potential sources and the three mechanisms that could have resulted in releases of chemicals from the AOCs to the environment inside the main industrial plant building as discussed in Section 3.1.1 of the "Final Work Plan For Operable Unit 3 Remedial (RI) Investigation/Feasibility Study (FS)," June 30, 1998.

This request is also consistent with the "Guidance for Conducting RI and FS Under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Interim Final," United States Environmental Protection Agency (U.S. EPA)/540/G-89/004, dated October 31, 1988. Section 3.2.3 of this document states that:

> Source characterization involves the collection of data describing (1) facility characteristics that help to identify the source location, potential releases, and engineering characteristics that are important in the evaluation of remedial actions...

3. **Executive Summary, Human Health Risk Assessment, page ES-6, fourth, fifth, and sixth bullets**

The text indicates that the Navy conducted a "cursory review of ground water." Attachment A, Task B.1 of the Federal Facilities Agreement (FFA) requires that the Navy conduct a **complete review** of the magnitude and extent of hazardous substances, pollutants and contaminants in all media investigated. It is not clear what the Navy means by "cursory review of ground water." The staff requests that the Navy explain what this phrase means and what is left out of the OU3 RI Report had a complete review been conducted.

The staff requests that the Navy conduct a complete review of ground water hazardous substances, pollutants and contaminants pursuant to the FFA, and revise the RI Report accordingly; conduct an updated Risk Assessment of OU1 for all new contaminants of concern including evaluating the additive effect of multiple contaminants in ground water; and re-evaluate formerly identified contaminants of concern using revised Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds, e.g., Health Risk Limits, pursuant to the process described in "Re-Opening and Modification," Section XIV, Subsection 14.10 of "Consultation with U.S. EPA and MPCA" (also see page 3 of Attachment A, Section IV, "Remedial Investigations.")

4. **Executive Summary, OU2 RI Conclusions, page ES-7**

As the Navy knows, OU3 now contains the saturated zone outside the main NIROP building (see Table 1 of the Site Management Plan, dated January, 1998) so the contamination in this area needs to be evaluated concurrent with the new information about the contamination in the saturated and unsaturated zones under the main NIROP building. The staff requests that the Navy modify the OU3 Risk Assessment using the worker scenarios and processes identified for OU3 for the saturated zone of what was formerly known as OU2 as required by "Re-Opening and Modification," Section XIV, Subsection 14.10 of "Consultation with U.S. EPA and MPCA." Otherwise, the exposure scenarios for the old OU2 and the new OU3 are different and any remedial alternatives selected for both operable units may be different. The Navy, U.S. EPA, and MPCA need to agree upon the contaminants of concern that are relevant for the new OU2 Risk Assessment before the Navy begins this work.

5. **Executive Summary, Initial Screening of Possible Alternative Response Actions, page ES-8, first paragraph**

The text states that "...the remediation activities at OU3 must be focused on the soil rather than the ground water beneath it ["it" is presumed to be the main NIROP building]." The staff requests that the Navy modify this text and the OU3 RI Report to reflect that OU3 is defined as the saturated and unsaturated subsurface source areas under the main NIROP building and that contaminated ground water itself is considered a saturated source of ground water contamination in Minnesota.

In Minnesota, contaminated media in the saturated zone are considered a source of ground water contamination pursuant to Minn. R. 7060.0500, Nondegradation Policy, subp. 3, Control Measures, that reads as follows:

> Treatment, safeguards, or other control measures shall be provided by the person responsible for any sewage, industrial waste, or other waste, or other pollutants ... which have been discharged to the zone of saturation, to the extent necessary to ensure that the same will not constitute or continue to be a source of pollution of the underground waters or impair the natural quality thereof.

This request is also consistent with the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," U.S. EPA/540/G-89/004, dated October 31, 1988. Section 3.2.3 of this document states that:

> In a practical sense, heavily contaminated media (such as soils) may also be considered sources of contamination, especially if the original sources (such as a leaking tank) is no longer present on the site or is no longer releasing contaminants.

The next sentence of this paragraph in this section of the OU3 RI Report states that ground water improvement is not a requirement of an alternative response action for OU3. The staff requests that the Navy delete this sentence. Any OU3 remedy evaluated or implemented must address contamination in all media contaminated by sources in OU3, or affected by the remedy. For instance, we must consider the impact of air emissions in the Phase II upgrade of the OU1 remedy.

Also the Navy is reminded of the "decision statement" cited in Section 4.2 of the OU3 RI/FS Work Plan, dated May 31, 1998:

> If COPC sources exist in the unsaturated or saturated zone beneath the building at concentrations that could result in exceedances of ground water standards, then [the Navy must] evaluate alternatives for source control/removal that would result in a cost-beneficial reduction in the overall time for ground water restoration.

The second paragraph indicates that "additional sampling will probably be needed" before implementing a remedy. Pursuant to the Federal Facility Agreement (FFA), Attachment A, Part IV, Task B, subp. 2, "Initial Screening of Possible Alternative Response Actions," the staff requests that the Navy make a definite determination as to whether or not more sampling is necessary to evaluate each possible response action.

6. **Section 1.1 Purpose of Report, page 1-2, last paragraph**

This will likely be the last RI at the site, but this cannot be determined with certainty at this time. Please change the text accordingly.

7. **Section 1.2.2, Facility History, pages 1-5 & 1- 6**

The discussion of the discovery and removal of barrels buried at the NIROP Site does not include discussion of the barrels discovered and removed during the OU2 Soil Remedial Investigation. The text should be modified to correct the record that the barrels were discovered during the advancement of soil borings for the Soil Remedial Investigation and not as a result of a geophysical survey.

Also, the report mentions a milling waste loading area in the present location of the existing hazardous materials storage building, but does not mention the soil removal action that occurred to facilitate the building of the hazardous materials storage building. The text should be revised to include a description of the removal action.

8. **Section 1.2.4, Areas of Concern at OU3, Sanitary Sewer and Storm Sewer, pages 1-24 and 1-25**

In Brown & Root Environmental's letter of November 6, 1996, the Navy documented agreements made between the Navy and the MPCA staff with regard to an MPCA staff request to investigate NIROP's sewer lines (see Attachment III, Item MPCA I.34). The Navy's response was as follows: "Annual inspections do not indicate exfiltration issues with sewer systems. The sampling strategy is designed to provide areal coverage of the building to characterize any contamination. The need for additional sampling will be evaluated after the results of Phase I are received. The MPCA agreed."

On page 1-24 of the OU3 RI Report the Navy states that "[t]he condition of the clay pipes that make up the sanitary sewer system for the plant is unknown. TCE discharged to the sanitary sewer system could have leaked to the soil if there were cracks in the pipe." On page 1-25, the Navy states that "[t]he condition of the storm sewer system is unknown. Contaminants which entered the storm sewer could have leaked to the soil if there were cracks in the sewer pipe." These narratives identify unresolved issues about both the sanitary and storm sewers. However, the OU3 RI Report does not indicate that the Navy gained any understanding of possible exfiltration from the sewers. Also, from its own analysis of the sampling data, the MPCA staff cannot determine whether or not there has been exfiltration from the sewers. The OU3 RI Report makes no recommendations on how to resolve this matter.

No further work to resolve this matter is indicated in the report. Therefore, the MPCA staff requests that the Navy develop a plan for resolving this matter, including, at a minimum, the televising of the 15-inch sanitary sewer line to determine the condition of the clay pipes under the main NIROP building, and to determine whether or not hazardous wastes, e.g. metal sludge, are present in the sewer lines. Also, see sewer system risk assessment issues raised in Attachment III and sewer system questions raised in Attachment IV.

9. **Section 2.3.3.1 Soil Sampling and Screening Procedures for Direct-Push Borings**

The Navy refers the reader to Appendix A.1 regarding the UV fluorescence test results. There do not appear to be any results indicating the presence of Dense, Non-Aqueous Phase Liquid (DNAPL). Has the Navy concluded that it found no evidence of DNAPL? If no positive test results were found, what tests were done to make sure that the UV fluorescence test was being conducted properly? How well does the UV fluorescence test data compare to the laboratory data?

10. **Section 2.3.3.2, , Soil Sampling and Screening Procedures for Well Borings**

Text is missing from the first paragraph, leading to page 2-8. Please fill in missing text.

11. **Figure 2-1**

What was the basis for selecting these background locations? Why weren't background samples taken off-site?

12. **Tables 4-1, 4-2, and 4-3**

The staff requests that the Navy memorialize for the record the rationale for using the background levels that appear in these tables.

13. **Figures 4-7, 4-8, and 4-9**

What are "benchmarks?" This term is not a standard term in state or federal Superfund. The staff requests that the Navy identify the "benchmark" used for each chemical that appears in these figures as well as all chemicals found in the RI. The staff requests that the bench mark be shown next to each chemical identified on these figures or be included in a separate table.

14. **Section 4.2, Groundwater, Cross-Sections**

The latest groundwater data for all site wells, including data from the new OU3 nested wells, should be plotted on the cross sections in the OU3 RI Report and iso-concentration maps should be constructed for the major contaminants. Well data should be the most recent concurrent data. A graphical look at contaminant distribution will be helpful in understanding geological controls on contaminant distribution and in evaluating OU1 remedy effectiveness. An evaluation of this data could be used to identify potential ground water source areas.

For example, it seems apparent that in the area beneath the East Plating Shop there are levels of Trichlorethene (TCE) that indicate potential DNAPL in that area. Source areas were to be identified in the OU3 RI Report and their impact on ground water contamination evaluated. A discussion of the East Plating Room as a potential source area should be included in the report. In addition, potential remedial alternatives for source areas should be developed to be evaluated in the FS.

15. **Figure 3-7, Cross-Section D-D'**

The cross-section D-D' does not accurately portray the St. Peter Sandstone in the southwestern portion of the section. It is likely that the St. Peter is not present in this area due to erosion of the unit (as in Section E-E'), and there are no geologic logs to indicate its presence southwest of well AT-3A. The cross-section should be modified to indicate the uncertainty of the interpretation that the St. Peter is present in this area.

Also, monitoring wells MS-31I and MS-31D are both screened in silty clay. Both wells indicate very low or no detection of contaminants. The use of these wells to monitor aquifer conditions under the building will be very limited because the wells are screened in fine grained and not aquifer materials. This should be noted in the report and considered when evaluating ground water data in the report an in future annual monitoring reports.

16. **Tables 4-7 and 4-8, Summary of Groundwater Analytical Results - Filtered and Unfiltered**

The Health Risk Limits (HRLs) and Maximum Concentration Limits (MCLs) should be listed in the tables and a column developed that indicates compounds that exceed HRLs or MCLs. A list of ground water Contaminant of Concerns (COCs) should be developed from this evaluation.

17. **Section 5.1.5, Organic Partition Coefficient, page 5-3, paragraph 1**

Clarify that the amount of organic carbon in the soil is also critical to the mobility of contaminants in the soil.

18. **Section 5.2.1, Ketones, page 5-4**

The sentence ending in ". . .such as. . ." is incomplete. Please complete sentence.

19. **Section 5.2.2, Monocyclic Aromatics, page 5-5**

The discussion of literature-derived biodegradation rates must include a brief statement that these rates are very much site specific. Please include such a statement in the report.

20. **Section 5.2.3, Halogenated Aliphatics, page 5-6**

Omit the phrase ". . . which degrades slowly" in reference to vinyl chloride. Vinyl chloride can degrade rapidly under favorable conditions.

21. **Section 5.2.4, Polycyclic Aromatic Hydrocarbons (PAHs), page 5-6**

Add the molecular weight of the PAH as a factor influencing the rate of biodegradation, with higher molecular weight PAH being more resistant to biodegradation.

22. **Section 5.3, Contaminant Fate and Transport, including Subsections 5.3.1, 5.3.2, and 5.3.3**

The following narrative can be found in Section 3.4.1.4, Contaminant Fate and Transport, of the "Guidance for Conducting RI and FS Under CERCLA, Interim Final," U.S. EPA/540/G-89/004, dated October 31, 1988:

> Results of the site physical characteristics, source characteristics, and the extent of contamination analyses [from the RI] are combined in the analyses of contaminant fate and transport... Contaminant fate and transport may also be estimated on the basis of site physical characteristics and source characteristics [if information on the contaminant release is not available].

The discussion in the above-cited report sections do not discuss site physical characteristics or source characteristics. There is no discussion about AOCs or AOC groups or release mechanisms. The staff requests that the Navy expand the discussion to address this problem.

23. **Section 5.4, Natural Attenuation**

The MPCA staff agrees with the Navy's overall conclusion that natural attenuation is not an effective remedy for the ground water contamination migrating toward the river. The following detailed modifications/questions/comments are intended only to strengthen the presentation of the evaluation of natural attenuation in the report:

a) **Page 5-10, paragraph 5**

Delete the statement, "Trichloroethene is not as mobile as the majority of volatile contaminants." Mobility is primarily determined by Koc values. The Koc for TCE is 150 mg/g, whereas the Koc for benzene and toluene is 100 and 247 mg/g, respectively. In addition, the water solubility for TCE is similar to that of benzene.

b) **Page 5-10, paragraph 5**

Clarify the statement "During this process, iron III is reduced to iron II so that iron II concentrations may be used as an indicator of anaerobic degradation *of organic carbon*" to indicate that the presence of iron II does not automatically indicate the biodegradation of chlorinated solvents.

c) **Page 5-10, last paragraph**

Were natural attenuation parameters studied at the site to evaluate the potential for the bioremediation of petroleum hydrocarbons? Our understanding is that the evaluation was for chlorinated solvents.

d) **Page 5-11, paragraph 3**

Although chloride concentrations might be used to verify similar groundwater systems, the intent in natural attenuation studies is to indicate whether chlorinated solvents are dehalogenating. Thus, background concentrations of chloride are needed to compare with the contaminated plume concentrations.

e) **Page 5-11, paragraph 4**

Table 5-1 refers to the physical data for contaminants and is not consistent with the context of the paragraph. Perhaps the reference is to Table 5-3. Please clarify this.

f) **Page 5-12, last paragraph**

The dissolved oxygen readings seem high and are inconsistent with the presence of reduced iron, reduced manganese, and negative Eh readings. For example, in sample number 003 MS-28S -01, oxygen is reported at 1.7 ppm while reduced iron is reported as 2.3 ppm. Either the water was mixed upon sampling, or the oxygen readings are suspect. The report should point out this inconsistency and re-evaluate the potential for biodegradation assuming oxygen readings were high.

g) Analysis of nitrate, sulfate, and chloride are difficult without upgradient background samples for comparison. Were background groundwater samples collected for this purpose?

h) Describe how methane samples were collected and preserved.

i) **Table 5-3**

Revise the table with these statements:

i) Dissolved chloride increases due to the anaerobic dehalogenation of chlorinated solvents.

ii) Dissolved manganese increases due to anaerobic manganese reduction when microorganisms use Mn(IV) as an electron acceptor.

iii) The reference to hydrogen sulfide is confusing. While it is true that it will decrease under iron reducing processes, it will also decrease under nitrate reduction or aerobic conditions. It is perhaps better to state that hydrogen sulfide may increase under sulfate reducing conditions.

24. **Section 6.0, Human Health Risk Assessment Procedures**

In the first paragraph the Navy states, "[e]xposures to groundwater were evaluated in the OU1 Remedial Investigation Report (RMT, Inc., July 1988). Soil criteria for the protection of groundwater is addressed by the SESOIL model presented in Section 7.0."

As the Navy knows, OU3 is defined to include sources in the saturated and unsaturated zones under the main NIROP building, and the unsaturated zone sources in OU3 and OU2 are different qualitatively and quantitatively as are the contaminants found in the saturated zones of these operable units. For these reasons, the OU1 Risk Assessment is not appropriate for the saturated zone of OU3. For the same reasons, it is not appropriate to limit the soil leaching model to the contaminants of concern identified for OU3 as was done in Section 7.0. The MPCA staff requests that the Navy re-write the OU3 Risk Assessment to focus on the COPCs found in all of what is know known as OU3.

25. **Table 6-8**

The staff requests that the Navy identify in this table the screening value used to place the chemical on the table.

26. **Chapter 6, General Modification**

The OU3 RI Report does not identify a set of ground water COCs even though the report (Table 8-1) lists possible OU 3 remedial alternatives. Also, there is no clear indication where any of these remedial alternatives would be applied for ground water contamination (or for soil contamination). To begin to rectify this problem, using MCLs and HRLs, the Navy should screen the ground water data to determine a list of ground water COCs. The COCs are those chemicals that exceed MCLs and HRLs. Once a list of ground water COCs is determined, the Navy should produce maps that show where ground water contamination exceeds HRLs and MCLs. The maps should be superimposed on existing OU3 RI Report maps that locate the AOCs so that any association between ground water contamination and disposal at AOCs can be established. These maps should clearly indicate the areas where remedial measures may be required. Identification of areas that require remedial action is an essential outcome of the RI and risk assessment that need to be completed as soon as possible but before the FS begins. Until this work is completed, the FS should not proceed.

27. **Section 6.4.3 Identification of Other Human Health-Based Criteria**

In the first paragraph, the Navy states that TBCs are not enforceable. In Minnesota, TBCs can be as important as ARARs in making decisions about protecting public health and the environment under the state Superfund law. Please change the text accordingly.

28. **Section 6.6.2, Uncertainty In Selection of Chemicals of Concern**

It is the staff's understanding that Table 6-1 is the list of all chemicals detected in OU3; however it is still not clear what the Navy considers a OU3 COPCs since metals such as calcium were eliminated previously but appear on Table 6-1. Please include a table that identifies the OU3 COPCs.

29. **Section 7.0, SESOIL Modeling Results and Section 8.4, SESOIL Modeling**

The main NIROP building forms a cap over the underlying soils, thereby eliminating infiltration and recharge due to precipitation. Without infiltration, contaminants cannot leach through the soil profile, and soil leaching models are inappropriate for evaluating the risk contaminants pose to ground water. Therefore, eliminate from the report the evaluation of risk to ground water by SESOIL modeling in Sections 7.0 and 8.4. (However, please note that leaching should be reconsidered if the main building floor is removed or if it is found that the sanitary sewer system is leaking).

This discussion should be replaced by discussion that includes reasons for not assuming leaching to ground water. In addition, the report should discuss the more likely mechanism of transport of contaminants to ground water: the gravitational mass transfer of free product through the soil from dry wells and sumps. The evaluation of risk should then include those areas of concern that contain very high concentrations of contaminants that can still pose a threat to ground water by non-leaching transport (for example, soils under the East Plating Room area), while other areas that contain very low concentrations of Volatile Organic Compounds (VOCs) can be eliminated as a potential source of ground water contamination.

30. **Section 7.1, Introduction**

In Section 6.6.2, the Navy states that "[a]ll chemicals that were detected at the site were retained as COPCs." Therefore, for the record, what was the Navy's rationale for only SESOIL re-modeling the OU2 contaminants of concern for the OU3 leaching?

31. **Table 8-1, Preliminary Technology Screening Matrix**

a) The Navy should include co-metabolic in situ bioremediation in the list of alternatives. This does not require infiltration of water to the soil, but can be accomplished by air venting and pulsing methane at low concentrations through the soil.

b) The Navy should include barometric soil vapor extraction (SVE) pumping as an alternative. This is an effective technology for low level VOC contamination and does not require high maintenance or operating costs.

c) In situ biodegradation was eliminated from the technology list because it is stated that it requires circulation of liquid through the soil. Technologies are available that do not circulate liquids, but instead circulate gas to promote insitu biodegradation. The Navy should retain in situ biodegradation for evaluation.

d) The Navy should include mass removal/pumpout technology as an alternative for the saturated zone.

e) The Navy should add removal of hazardous wastes in the sewers if these are present as a result of televising the sewers (see Item 8 above).

Attachment II

Risk Assessment-Related
Modifications to the Report Entitled
"Remedial Investigation for Operable Unit 3
Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota, "
dated August 31, 1998

These modifications focus on potential human health effects from contact with contaminated soil. The sections reviewed were: Executive Summary and Sections 1, 2, 4, 6 and 8. Review responses and conclusions are based on the assumptions that the Navy has sampled the source locations and the reported data represent the nature and magnitude of contamination at the NIROP site.

Identified Outstanding Issues for Soil.

The report should be modified to address these issues:

- Presence or absence of vinyl chloride should be verified.
- Chromium speciation in the former East Plating Shop area. The high level of chromium detected in this location is of concern *if* it represents hexavalent chromium.
- High trichloroethene concentrations at 14 – 16 foot depth in the former East Plating Shop area could pose a vapor migration problem, particularly if the existing building is removed and a foundation is placed in or near this location.
- OU2 has been incorporated into OU3. The data from OU2 should be evaluated utilizing the same risk characterization methodology as applied to OU3 (e.g., industrial soil reference value evaluation).
- The sanitary sewers and storm sewers are clearly identified as areas of concern in the report. However, it appears that the condition of these structures and possible residual contamination within or adjacent to these structures has not been adequately evaluated.
- The detection limits at AOC28 (0 – 4 foot sample) and AOC46 (8 – 12 foot sample) significantly exceeded levels of concern resulting in the inability to evaluate the potential risk posed by contamination at these locations. These locations should be resampled. If that is not possible, the impact of the lack of data on the risk evaluation should be discussed.

The following are specific review responses.

1. **Executive Summary, Nature and Extent of Contamination**

Vinyl chloride was not included in the sampling data reported. Vinyl chloride would be expected to be present and is a very toxic contaminant. The absence of quantitative data results in an underestimation of risk. The presence or absence of vinyl chloride should be verified.

The greatest levels of contamination appear to be associated with the intermediate wells. The documentation of the risk evaluation of ground water is lacking in the report. See Response 14 of this attachment. Appendix G contains only a copy of the deep aquifer evaluation. The evaluations for the upper and lower portions of the unconfined aquifer seem to be missing from the report. The evaluation for the upper and lower portions of the unconfined aquifer should be provided.

2. **Executive Summary, Human Health Risk Assessment**

Although the level of contamination in most areas does not exceed the human health target risk levels, there are localized areas of contamination. This should be clearly stated in the Executive Summary.

3. **Executive Summary, OU2 RI Conclusions**

OU2 has been incorporated into OU3. The data from OU2 should be evaluated utilizing the same risk characterization methodology as applied to OU3, e.g., industrial soil reference value evaluation.

4. **Section 1.2.4, Areas of Concern at OU3**

The discussion regarding the sanitary sewer and the storm sewer is inadequate. Since these are identified as areas of concern, the report should discuss how these areas will be evaluated for impact, e.g., determination of condition, residual contamination, etc.

The East Plating Shop is not mentioned in this section although it is known to be a localized area of contamination. A narrative discussing the East Plating Shop as an AOC should be included in this part of the report.

5. **Section 2.6 Determination of Background Concentrations**

For future reference, the 95% UCL of the mean should not be utilized as the background value. The 95% UCL of the mean is utilized as a conservative, i.e., upper-end, estimate of the average exposure concentration. Utilizing an upper-end value for background is not conservative. Background levels may be overestimated, particularly if the number of samples is small and variability is high. For example, the calculated background value for calcium presented in Table 2-6 is 1.5 times higher than the maximum concentration detected.

The values reported in Table 2-6 do not affect the conclusions of the risk evaluation since the concentrations are below levels of concern. However, note that the 95% UCL value presented may not be representative of background concentrations. (This is mainly a comment since the method the Navy used to calculate background does not influence the conclusions. If the Navy needs to calculate background at a future date, the Navy should not utilize the 95% UCL methodology).

6. **Section 4, Nature and Extent of Contamination**

The list of volatiles appears to be limited. For example, vinyl chloride, a highly toxic degradation product, is not listed. Rationale for why analysis was limited to the listed volatiles should be presented.

The text should also identify samples for which the detection limits exceeded the levels of concern (e.g., detection limits for sample AOC28, AOC46, etc.). Possible reasons for the high detection limits should be presented (e.g., matrix interference).

7. **Section 6.3.3 Estimation of Exposure Concentrations**

Rationale and documentation should be presented for why data was not subdivided into areas of concern for estimating potential exposure concentrations (e.g., no pattern of nature and magnitude of contamination versus area of concern or historical activities). The size of the potential exposure area represented by the sampling points should also be discussed. For example, if a high concentration exists at a particular sampling point, it is important to note whether that point potentially represents a 20 foot square area or a 200 foot square area.

Depths greater than 4 feet should also be evaluated for the future industrial and minor construction worker scenarios. This evaluation assists in whether controls are required to limit accessing soils beyond 4 feet.

Some of the maximum values presented in Table 6-4 do not correspond with the maximum values presented in Table 4-6. An explanation for these inconsistencies should be presented. If Table 6-4 is in error, it should be corrected.

8. **Section 6.4.4 Risks to Industrial Workers**

Utilizing the exposure point concentrations in Table 6-4 , the MPCA staff was able to duplicate the risk estimates presented in the report. (Note, due to time constraints the MPCA staff did not verify the exposure point concentrations presented in Table 6-4).

The exposure point concentrations in Table 6-4 were based on calculating a conservative mean across all sampling locations within the 0 – 4 foot depth. Since we do not know if workers activities will result in a more localized exposure scenario, the MPCA staff also conducted a screening risk characterization utilizing the maximum concentrations detected in the 0 – 4 foot range and the October 1998 Industrial Soil Reference Value working draft spreadsheet. The screening evaluation for the 0 – 4 foot depth indicated that the risk was within the acceptable range even though maximum concentration values were utilized.

Also, since the MPCA staff do not know whether deeper soils will be excavated at a later date, a screening risk characterization utilizing the maximum concentrations detected in the 0 – 12 foot range was conducted. This screening evaluation indicated that the risk exceeded the acceptable range due to the high chromium concentration in the former East Plating Shop. We do not know what fraction of the total chromium level is present as hexavalent chromium. Hexavalent chromium would be expected based on the historic use in this location, i.e., metal plating. In the absence of speciation data, all of the chromium was assumed to be in the hexavalent form. Speciation of the chromium in the former East Plating Shop should be conducted. If that is not possible, at a minimum, a discussion of the impact of the lack of information for these areas should be included in the report. This discussion should include the size of the area, type of contaminants suspected to be present, the impact on the risk estimate, etc.

Note that since the detection limits significantly exceeded levels of concern for samples AOC28 and AOC46, the potential risk at these locations could not be evaluated. Samples for these areas should be reevaluated. If that is not possible, at a minimum, a discussion of the impact of the lack of information for these areas should be included in the report. This discussion should include the size of the area, type of contaminants suspected to be present, the impact on the risk estimate, etc.

9. **Section 6.4.5 Major Infrequent Construction Worker**

For future reference it should be noted that since the methodology was agreed upon for the risk assessment of OU3, a decision to utilize a target lifetime cancer risk level of 1E-6 and a hazard quotient and hazard index of 1 for subchronic exposure has been made. The effect (carcinogenic and noncarcinogenic) of a contaminant depends on the dose and the rate at which the dose is administered. A specific dose given in a short-period of time may not produce the same effect when given over a longer period of time. The lifetime average daily dose utilized in the evaluation of cancer risk is calculated by taking the total intake during the exposure period and normalizing it to a lifetime. The actual exposure may occur for only a small portion of the lifetime. The factors that may influence cancer risk are the existence of critical periods of susceptibility during a lifetime and the intensity of the exposure. If the exposure duration is significantly less than a lifetime, the acceptable subchronic excess lifetime cancer risk should be no more than 10 percent of the total chronic acceptable excess lifetime cancer risk (i.e., 1E-6). This decision does not significantly impact the conclusions of the current evaluation.

The maximum contaminant concentration from the 0 - 12 foot range was utilized for this evaluation. As in the above evaluation, all of the chromium was assumed to be in the hexavalent form. The evaluation indicated that the lifetime cancer risk exceeded the subchronic cancer target risk due to the high chromium concentration utilized (see above discussion in Response 8). If hexavalent chromium is eliminated from the evaluation, the estimated cancer risk is within the acceptable subchronic risk range. The noncancer hazard quotient target risk was also exceeded for hexavalent chromium. Given the potential significance of the chromium contamination, speciation of the chromium in the former East Plating Shop should be conducted. If that is not possible, at a minimum, a discussion of the impact of the lack of information for these areas should be included in the report. This discussion should include the size of the area, type of contaminants suspected to be present, the impact on the risk estimate, etc.

Note that since the detection limits significantly exceeded levels of concern for samples AOC28 and AOC46, the potential risk at these locations could not be evaluated. Samples for these areas should be re-evaluated. If that is not possible, at a minimum, a discussion of the impact of the lack of information for these areas should be included in the report.

This discussion should include the size of the area, type of contaminants suspected to be present, the impact on the risk estimate, etc.

10. **Section 6.4.5 Major Infrequent Construction Worker, page 6-20 last bullet**

The last sentence appears to have a typographical error. "Consequently, exposures to arsenic in soil by the major infrequent construction worker are not expected to result in adverse health effects."

The text should be changed accordingly.

11. **Section 6.4.5 Major Infrequent Construction Worker, page 6-21, Exposures to Lead**

The last sentence appears to have a typographical error. "Consequently, exposures to lead in soil by the major infrequent construction worker are not expected to result in adverse health effects."

The text should be changed accordingly.

12. **Section 6.4.6 Minor Frequent Construction Worker**

Utilizing the exposure point concentrations in Table 6-4, the MPCA staff was able to duplicate the risk estimates presented in the report. (Note, that due to time constraints the MPCA staff did not verify the exposure point concentrations presented in Table 6-4).

The exposure point concentrations in Table 6-4 were based on calculating a conservative mean across all sampling locations within the 0 – 4 foot depth. Since we do not know if workers activities will result in a more localized exposure scenario, the MPCA staff also conducted a screening risk characterization utilizing the maximum concentrations detected in the 0 – 4 foot range and the October 1998 Industrial Soil Reference Value working draft spreadsheet. The screening evaluation for the 0 – 4 foot depth indicated that the risk exceeded target risk levels by less than a factor of 2. The main contributors to this risk were arsenic and carcinogenic PAHs. The maximum concentrations of these contaminants are not located within the same area and elevated concentrations of arsenic and cPAHs occur at only very limited locations. Based on the available data, the conservative exposure concentration utilized, i.e., maximums, and the limited level of exceedence, it is not likely that the contamination will pose an unacceptable risk.

Since the MPCA staff also do not know whether deeper soils will be excavated at a later date, a screening risk characterization utilizing the maximum concentrations detected in the 4 – 12 foot range was also conducted. This screening evaluation gave virtually identical results as the 0 – 4 foot screening evaluation with the exception of an additional significant contribution from hexavalent chromium.

The cumulative risk, including the contribution by hexavalent chromium, also exceeded the target risk level by less than a factor of 2. Given the potential significance of the chromium contamination, speciation of the chromium in the former East Plating Shop should be conducted.

Note that since the detection limits significantly exceeded levels of concern for samples AOC28 and AOC46, the potential risk at these locations could not be evaluated. Samples for these areas should be reevaluated. If that is not possible, at a minimum, a discussion of the impact of the lack of information for these areas should be included in the report. This discussion should include the size of the area, type of contaminants suspected to be present, the impact on the risk estimate, etc.

13. **Section 6.4.6 Minor Frequent Construction Worker, page 6-22, Exposures to Lead**

The last sentence appears to have a typographical error. "Consequently, exposures to lead in soil by the minor frequent construction worker are not expected to result in adverse health effects."

The text should be changed accordingly.

14. **Section 6.5 Analysis of Groundwater**

Appendix G contains only a copy of the deep aquifer evaluation. The evaluations for the upper and lower portions of the unconfined aquifer seem to be missing from the report. The evaluation for the upper and lower portions of the unconfined aquifer should be provided.

15. **Section 6.6.2 Uncertainty in Selection of Chemical of Concern**

The list of VOCs may not be complete. Rationale for why analysis was limited to the listed volatiles should be presented. For example, vinyl chloride would be expected to be present and is a very toxic contaminant. Vinyl chloride was not included in the soil data tables. The absence of quantitative data results in an underestimation of risk and this should be clearly stated in the report.

16. **Section 6.6.4 Uncertainty in the Toxicological Evaluation**

There were numerous contaminants detected at the site for which toxicity values do not exist. The risk from these contaminants can not be quantified and therefore the estimated risk is underestimated. This section of the uncertainty discussion should list the contaminants which did not have complete toxicity values available and the consequences of this stated in the report.

17. **Section 8.1 Conclusions from the OU2 Report**

The previous risk evaluation of OU2 utilized a residential exposure scenario. The data from OU2 should be evaluated utilizing the same risk characterization methodology as applied to OU3, e.g., industrial soil reference value evaluation.

Please note that carcinogenic PAHs were identified as a COC at OU2 based on the residential-based evaluation.

Attachment III

Quality Assurance/Quality Control-Related Modifications to the Report Entitled "Remedial Investigation for Operable Unit 3 Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota, " dated August 31, 1998

1. **Volume I, Section 5.1.5.**

Mobility of some compounds are affected by the presence of other compounds. This was not taken into account in the discussion. The Navy needs to discuss whether or not other chemicals present increased the mobility of compounds that are noted as not being mobile, e.g., polychorinated biphenyls, polyaromatic hydrocarbons, and phthalates.

2. **Volume III, Section F, page F-9**

A blank action level is referenced. The Navy needs to indicate whether or not this is the reporting limit.

3. **Data Reports (audit reports) in the appendices of the report**

The recovery limits used for some of the metals data appear to be too wide. Seventy to one hundred thirty percent is a wide window for metals. The text references a 30% recovery level which is much too low. If recoveries are consistently low, then the metal concentrations must be suppressed in the matrix and the reported concentrations are questionable (Flagged J).

The Navy needs to flag data with a recoveries outside of the 80-120% recovery window as J for all metals except mercury. Mercury has a window of 70-130%. Data with less than a 50% recovery or over 150% recovery for metals should be flagged R.

4. **Missing Discussion**

Precision, accuracy, reproducibility, completeness, and comparability of the data needs to be discussed as required by the Quality Assurance Project Plan (QAPP).

5. **Missing Discussion**

The Navy needs to discuss the data with respect to the Data Quality Objectives (DQOs) as required by the QAPP.

6. **Data Tables**

Is all of the VOC data reported? A limited list of VOCs was reported. The MPCA staff assumed that those reported are the only detections.

7. **Mobile Laboratory Data (Comment)**

The mobile laboratory data was questionable for quantitative use. The Navy used this data only as screening data for laboratory analysis; therefore, the Navy used this data appropriately.

Attachment IV

Initial Assessment Study
Prepared by Envirodyne Engineers, Inc., dated June, 1983
As reported in the
"Remedial Investigation for Operable Unit 3
Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota ,"
dated August 31, 1998

Please note that the citations referenced Part I refer to OU3 RI Report while the citations in Part II refer to the Initial Assessment Study. Part I, Item 2 and Part II are intended to establish the rationale for the questions that the MPCA staff asks the Navy in Part III of Attachment IV.

Part I. Operable Unit 3 Remedial Investigation Report
1. **Section 1.2.3, page 1-8, the first paragraph**

The Initial Assessment Study (IAS) prepared by Envirodyne Engineers, Inc., dated June, 1983 contains the most comprehensive assessment of waste generation and disposal in the early years of operation of the NIROP, and it is important to know more about this history.

The IAS indicates that the locations of buried wastes were not recorded, but identifies disposal areas as Sites 1 and 2 on Figure 3-1. The findings of the IAS should be more fully articulated in the report.

2. **Section 1.2.3, IAS References to Waste Generation and Disposal at NIROP**

Investigations at NIROP to date have focused almost exclusively on the contamination of soil and ground water from the NIROP facility and, to some extent, the ground water contamination in the Anoka County Riverfront Park. However, recent MPCA staff discussions concerning the amounts of chlorinated solvents used at NIROP have raised questions concerning the fate of the very large amount of solvents and other chemicals used at the facility. As stated in the executive summary of the IAS, the purpose of the IAS was to "...identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations."

The IAS contains important information about waste generation and disposal activities at NIROP.

It is important to determine more about the waste generation and disposal activities identified in the IAS because:

a. the IAS and all subsequent NIROP studies do not identify any off-site disposal areas (Off-site disposal areas could include what is now considered the FMC Superfund Site and/or the dump in the southern part of Anoka County Riverfront Park);

b. as cited in paragraphs 2 and 3 of Section 2.2.2 of "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final U.S. EPA/540/ G-89/004, OSWER Directive 9355.3-01, October 1988, "[d]at relating to the varieties and quantities of hazardous wastes disposed of at the site should be compiled.... [and]...[r]ecords of disposal practices and operating procedures at the site, including historical photographs, can be reviewed to identify locations of waste materials onsite, waste haulers, and waste generators;"

c. as cited in Section 1.3.1.2 of OSWER Directive 9355.3-01, if there were disposal rules in effect when the disposal activities took place, it is important to determine whether waste was disposed of properly, ect.

d. it could help identify off-site disposal areas that may need investigation and possible remediation; and

e. determining what was taken off-site helps the MPCA staff determine what volumes of waste the MPCA staff expects to find on-site and when the MPCA staff might expect the site to be cleaned-up.

Part II. Initial Assessment Study

The following citations from the IAS starting with Section 5.2.1 highlight where the Navy identified that materials that were possibly hazardous substances or wastes were either disposed of on NIROP (e.g., in sewers) and/or were transported off NIROP Fridley.

If the estimates of waste disposed of in the sewers or transported off-site are yearly averages from 1941 to 1983 - the IAS was written in 1983 - each section below identifies the estimated volumes of waste disposed. Unless otherwise noted, the estimates cited below are for the 42 year period between 1941 and 1983. Please note that Section 5.1 of the IAS contains the following statement.

> Since no major functional changes have occurred in these operations since plant construction, most of the departments continued to generate wastes similar to those produced initially. Therefore, the information obtained during the on-site survey concerning recent operations was judged to be representative of the past waste generation.

1. **Section 5.2.1, Machine Shop**

In the third paragraph, the IAS states that "[a] majority of spent cooling solutions [water soluble organic machine coolants] were discharged to the sanitary sewer. The quantity of discharged coolant ranged from 50,000 to 150,000 gallons per year."

In the last paragraph, the IAS indicates that waste lubricating and hydraulic oils were periodically disposed of off Navy property and "approximately eight barrels of unburnable oil sludge were disposed of off Navy property annually."

Estimated volume of coolant disposed of in the sanitary sewer system: 2,100,000 to 6,300,000 gallons.

Estimated volume of unburnable oil sludge disposed of off-site: 336 barrels.

2. **Section 5.2.2, Metal Plating**

In the fourth paragraph, the IAS states that "[b]efore the treatment system [for plating wastes] were installed in 1973, all liquid plating wastes were discharged directly into the sewer system or disposed of off Navy property."

In the last paragraph, the IAS states that "[p]lating tank sludges were disposed of off Navy property in a hazardous waste landfill or treated by the plating department treatment system for the past few years. Prior to 1973, these waste sludges were disposed of both on and off Navy property."

Estimated volume of metal plating wastes disposed of in the sanitary sewer system from 1941 to 1973: 1.168 trillion gallons.

Estimated volume "untreatable" sludge disposed of (on- and) off-site from 1941 to 1973: 160 barrels.

3. **Section 5.2.3, Degreasing and Solvent Cleaning**

The IAS states that "[t]hese [open-top degreasing] units were cleaned about every third month and generated a total of approximately forty 55-gallon drums per year of waste solvent." The narrative in this section is poorly worded. The staff requests that the Navy clarify the volumes of waste generated.

Estimated volume of waste solvent disposed of in the sanitary sewer system: none identified.

Estimated volume of waste solvent disposed of off-site: (1) nine 200 gallon open-top degreasing units: 6,720 barrels; (2) 1,1,1,-trichloroethane and/or Stoddard Solvent waste from six 75-gallon tanks: 504 barrels.

4. **Section 5.2.4, Paint Shop**

In the first paragraph, the IAS states that "[a]n estimated 2 to 3 barrels of material were removed from the tank during each cleaning operation. Some of this painting sludge was presumably disposed of in the scrap yard, trenches, and pits north of the NIROP building, but the majority of this material was allegedly hauled to a landfill off Navy property." In the second paragraph, the IAS states that "[s]pent filters were compressed into 55-gallon drums for disposal off Navy property."

In the last paragraph, the IAS states that "[t]he cleaning operations [for painting equipment] generated as much as 20 gallons of waste solvent and paint per day, which was disposed of off Navy property as a hazardous waste. **This operation was by far the largest generator of liquid wastes disposed of at the facility** [emphasis added]."

Estimated volume of paint wastes (spent cleaner and phosphatizer solution) disposed of in the sanitary sewer system: unknown.

Estimated volume of disposed of off-site: (1) paint sludge: 168 to 252 barrels and (2) cleaning solvents, e.g., MEK, toluene, naphtha: 306,000 gallons (or 5,575 fifty-five gallon barrels.

5. **Section 5.2.5, Assembly**

The IAS states that "[a]pproximately one barrel of waste chlorinated solvent was disposed off of Navy property each month."

Estimated volume of chlorinated solvent or rinse water disposed of in the sanitary sewer system: unknown.

Estimated volume of chlorinated solvent disposed of off-site: 504 barrels.

6. **Section 5.2.6, Foundry**

The IAS states that "[u]ntil approximately 1970, core butts were generally disposed of Navy property, but a limited amount of waste sand was reportedly disposed of on Navy property at the north end of the NIROP. After 1970, this material was disposed of by contract hauler to a landfill certified of this type of waste. An average of approximately 10,000 tons of waste sand was generated and disposed of annually."

Estimated volume of washing liquids disposed of in the sanitary sewer system: none identified.

Estimated volume of core butts disposed of off-site: unknown.

7. **Section 5.2.7, Heat Treating**

The IAS states that "[t]he low and high temperature salts were disposed of off Navy property at a hazardous waste landfill because of their reactive nature. Grit/blast wastes were considered non-hazardous and were disposed of with foundry sand off Navy property."

Estimated volume of heat treating wastes disposed of in the sanitary sewer system: none identified.

Estimated volume of heat treating wastes disposed of off-site: unknown.

8. **Section 5.2.8, Photo Shop**

The IAS states that "[t]he operation discharged approximately 300,000 gallons of rinsewater annually."

Estimated volume of processing wastes, including silver, disposed of in the sanitary sewer system: 12,400,000 gallons.

Estimated volume of processing wastes disposed of off-site: none identified.

9. **Section 5.2.9, Welding Department**

The IAS refers to the generation of soil wastes, carbide, and waste sludge.

Estimated volume disposed of in the sanitary sewer system: none identified.

Estimated volume disposed of off-site: none identified.

In summary, based on these assumptions cited earlier in the second paragraph of Part II, the IAS documents an estimated 13,801 55-gallon barrels (or 55-gallon barrel equivalents) of waste taken offsite and an estimated 1.186 trillion gallons discharged into the NIROP sanitary sewer system.

10. **Specific IAS References to Disposal of Hazardous Wastes Off Navy Property**

The IAS contains numerous entries that indicate that substantial amounts of hazardous waste was disposed off Navy property prior to 1973. These citations from the IAS refer to this activity.

a. **Page 5-3, Section 5.2.1**

Lubricating and cutting oils drained from the machines was periodically pumped from the reservoirs to barrels for disposal off Navy property.

b. **Page 5-3, Section 5.2.2**

Before on-site treatment systems were in place, all liquid plating wastes were either discharged to the sanitary sewer or disposed of off Navy property. Sludge from plating tanks were likely disposed of off Navy property prior to 1973.

c. **Page 5-4, Section 5.2.3**

About 1 drum per month of solvent was generated in cleaning large degreasing units which was disposed off Navy property.

d. **Page 5-4, Section 5.2.4**

Painting sludge was hauled to a landfill off Navy property.

e. **Page 5-5, Section 5.2.4**

The cleanup of painting equipment generated as much as 20 gallons per day of solvents, which was disposed of off Navy property as hazardous waste.

f. **Page 6-3, Section 6.2.4**

PCB was placed in 55-gallon drums, which in turn were placed into an 800-gallon concrete vault. The three sealed vaults were located outside the northeast corner of the building. Apparently, these were awaiting proper disposal. Prior to implementation of this procedure, it is likely that PCB was mixed with other waste oils and disposed of off Navy property.

g. **Page 7-1, Section 7.2**

"Between the 1940s and the early 1970s, small burnable material was processed in the NIROP incinerator. Incinerator ash was, in turn, hauled to a disposal area off Navy property."

"Hazardous wastes were placed in 55-gallon drums for disposal off Navy property by a contractor. On the average, approximately 30 drums per month were disposed of since the early 1970s. Before 1973, industrial wastes such as painting sludge and chlorinated solvents were typically disposed of in landfills off Navy property."

h. **Page 8-3, Section 8.3**

Waste materials were disposed of in two pits at the site (OU2 soils site). "The pits were reportedly used during a period of wet weather which prevented access to the **normal disposal site off Navy property** [emphasis added]. The pits were used on a one-time basis and covered with soil."

Part III. Questions about Waste Generation and Disposal Activities Identified Above as Cited in the Initial Assessment Study

Please answer the following questions related to information in the IAS and place the questions and answers in an addendum to the modified OU3 RI Report:

1. Did any of the materials (in the waste generation and disposal activities described above from the IAS) disposed of on NIROP Fridley and/or transported off NIROP Fridley contain hazardous substances or wastes?

   ["Hazardous substances" and "Hazardous wastes" are defined by the following statutes: United States Code, Title 42, Sections 7412 and 6921; Title 33 Section 1321 (b)(2)(A) and Minn. Stat. Section 115B.02, Subdivisions 8(a)(b)(c) and 9(a)(b)]

If the answer is YES to any part of this question, identify:

a. every date on which these hazardous substances or wastes were disposed of on NIROP Fridley and/or transported off NIROP Fridley;

b. for each transaction, the nature of the waste material or hazardous substances, including the chemical content, characteristics, physical state (e.g. solid, liquid), and the process for which the substance was used or the process which generated the substance;

c. the quantity of the materials or hazardous materials involved (weight or volume) in each transaction and the total quantity for all transactions;

d. all tests, analyses, and analytical results concerning such material;

e. the measures taken to determine the actual methods, means, and site of treatment or disposal of the waste materials or hazardous substances involved in such transactions;

f. the type and number of containers in which the waste materials or hazardous substances were contained when they were located on the Site, and all markings on such containers;

g. all information pertaining to the disposal of the waste materials or hazardous substances involved in such transactions including information on the transport and final disposition of the waste materials or hazardous substances;

h. the type and number of containers in which the waste materials or hazardous substances were contained when any arrangements were made for transport, treatment or disposal and any records pertaining to these services;

i. all documents containing information responsive to items a - h above, or in lieu of identification of all relevant documents, provide copies of all such documents or provide a time and place at which you will produce all such documents for inspection and copying; and

j. all persons with knowledge, information, or documents responsive to a - h above.

2. Identify any other persons who may have arranged for disposal or treatment or who may have arranged for transportation for disposal or treatment of waste materials, including hazardous materials and/or drums at the Site. Include any documentation you have regarding arrangement, disposal and transportation.

3. Identify any measures that were taken to determine the operating conditions of the sanitary sewer system and whether tests were conducted to ensure its proper maintenance and operability.

4. Identify any other persons who may be able to provide a more detailed or complete response to the above questions or who may be able to provide additional relevant documents.