



DEPARTMENT OF THE NAVY  
CRANE DIVISION  
NAVAL SURFACE WARFARE CENTER  
300 HIGHWAY 361  
CRANE, INDIANA 47522-5000

IN REPLY REFER TO:

5090/S4.7.7  
Ser PRCR4/6157

31 MAY 2006

U.S. Environmental Protection Agency, Region V  
Waste, Pesticides, & Toxics Division  
Waste Management Branch  
Corrective Action Section  
77 West Jackson Blvd.  
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center submits the Final Corrective Measures Implementation Plan (CMIP)/Quality Assurance Project Plan (QAPP) for the Mustard Gas Burial Ground (MGBG), Solid Waste Management Unit 01. The final document is presented as enclosure (1). Enclosure (2) contains the responses to the March 6, 2006 comments from the U. S. EPA. The permit required Certification Statement is provided as enclosure (3).

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code PRCR4-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,

A handwritten signature in cursive script that reads "Christine D. Hunsicker".

J. M. HUNSICKER  
Environmental Site Manager  
By direction of the Commanding Officer

Enclosures: 1. Final MGBG CMIP/QAPP  
2. Responses to Comments  
3. Certification Statement

Copy to:  
ADMINISTRATIVE RECORD  
SOUTHNAVFACENCOM (Code ES31) (w/o encl)  
IDEM (Doug Griffin)  
TTNUS (Ralph Basinski) (w/o encl)  
NAVFAC MW (H. Hickey)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Christine D. Freeman

SIGNATURE

CV

Manager, Environmental Protection

TITLE

5/31/06

DATE

**RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY (EPA) COMMENTS  
(DATED 6 MARCH 2006) REGARDING THE CORRECTIVE MEASURES IMPLEMENTATION PLAN  
(CMIP) FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 01, NAVAL SURFACE WARFARE  
CENTER (NSWC) CRANE, CRANE, INDIANA**

Certain comments below reflect agreements among U.S. EPA Region 5, Indiana Department of Environmental Management (IDEM), and NSWC Crane, Navy Southern Division, and Tetra Tech NUS, Inc. (TtNUS) representatives regarding changes to be made to render the CMIP for SWMU 01 acceptable to EPA and IDEM. The agreements were reached during a teleconference held on April 4, 2006 at 10:00 AM Eastern Daylight Time. Not all comments were discussed, therefore, the comments that were discussed are marked with an asterisk (\*). Changes to typographical errors subsequently identified by EPA (responses to these comments submitted by Navy to EPA on 2 May 2006 and later approved by EPA on 11 May, 2006) are incorporated into this document.

Attendees of the teleconference were:

<b>Name:</b>	<b>Affiliation:</b>
Peter Ramanauskas	EPA Region 5
Allen Debus	EPA Region5
Doug Griffin	IDEM
Tom Brent	NSWC Crane
Bill Gates	Navy Southern Division
Ralph Basinski	TtNUS
Tom Johnston	TtNUS

**Comment 1:**

**Referring to the first bullet of Section 1.4.2, the Land Use Control Boundary should be expanded to include wells 1-26, 1-27, 1-18, 1-03, 01T06, 01-04.**

Response to Comment 1:

Wells 1-26, 1-27, 1-18, 1-03, 01T06, 01-04 are currently included within the Land Use Control Boundary 1 shown on Figure 1-9. The land Use Control Boundary 1 is the solid boundary encompassing all wells northwest of well 01-01. However, it appears that some confusion exists because of the line type and color used to delineate the SWMU boundary and the LUC Boundary 1. Therefore, the color scheme has been changed so that the SWMU boundary is a solid, maroon- or purple-colored solid line and the LUC Boundary 1 is a black dashed line. To effect this change, Figures 1-6 and 1-9 have been changed to incorporate this line scheme.-

**\*Comment 2:**

**Referring to the last sentence of the first paragraph of Section 1.5.3, the 1,1,2,2-PCA boundary is proposed to define the extent of the VOC contamination within the LUC boundary. What about the boundaries of other COCs/degradation products?**

Response to Comment 2:

The last sentence of the first paragraph of Section 1.5.3 in its entirety is as follows:

"The 1,1,2,2-PCA boundary will be used to define the extent of all VOC contamination within the LUC boundary unless data indicate that another indicator would be more appropriate."

**ENCLOSURE (2)**

This statement allows for other indicators besides 1,1,2,2-PCA to be used to estimate the complete extent of VOC contamination in groundwater. This flexibility was designed into the monitoring program because changing conditions could cause other indicators to be more appropriate for delineating the extent of groundwater contamination. For the time being, however, 1,1,2,2-PCA provides a reasonable estimate of the extent of the entire groundwater plume because it exhibits the greatest spatial extent of VOC concentrations greater than MCSs. As a follow up to the April 4, 2006 teleconference, this condition was verified. This is stated in paragraph 1 of page 1-4 and additional characteristics of the site that support the statement are provided in the bullets and text surrounding that statement. The MCS for 1,1,2,2-tetrachloroethane is 0.9 ug/L, not 18.8 ug/L as was originally listed in Table 3-4. This error has been corrected. The plotted isopleth for 1,1,2,2-tetrachloroethane on Figure 1-9 represents 1 ug/L, which is essentially the same as 0.9 ug/L, and has not been changed.

**\*Comment 3:**

**Section 1.5.3 recommends limited deep zone groundwater monitoring. Initially, all 4 deep groundwater monitoring wells should be included. The following additional shallow wells should also be initially included to show that the plume is well-bounded by non-detections and is not migrating in those directions: 01-26, 01-27, 01-03, 01-04, 01-10, 01-09, 01-07, 01-23, 01-24. There is limited temporal data available for well 01T05 and the TCE concentration is near the MCS. Monitoring on at least the perimeter and deep wells should be done annually for the first 5 years with frequency reduction to 2-years thereafter. Annual sampling will provide additional evidence that the plume is not expanding and provide more data with which to determine concentration trends for use in Decision Rule 2 of Section 1.5.4. The second to last sentence on page 1-9 should include re-evaluation of remedy should plume boundary increase or change shape.**

Response to Comment 3:

Verification of the VOC plume configuration and migration was done during the RFI (TtNUS, 2004) and CMS (TtNUS, 2005). Available data represent about 25 years from the early 1980s to 2004. The data indicate that the plume is not expanding or that there might be a nearly insignificant migration or expansion — in the direction of well 01T05 only. The plume configuration was shown to mimic local topography, with a source area in, or near, the Primary Burial Area (PBA) located immediately upgradient of well 01T07. Concentrations over time have decreased considerably, indicating that the total plume VOC mass has decreased significantly since the early 1980s. Temporal analysis shows that VOC concentrations will exceed MCS for decades during which time the plume VOC concentrations are expected to continue decreasing. To provide additional checks on this conceptual model, the following wells have been added to the long-term monitoring program (Table 3-1) with the potential for eliminating them from the program if they do not appear to add materially to the continuing understanding of site conditions:

- 01-10 (shallow well about 180 feet north of the PBA)
- 01-23 (shallow well about 250 feet southeast of well 01T05)
- 01-26 (shallow well about 350 feet south of well 01T05)
- 01-06 (shallow well about 300 feet north of the PBA)
- 01C01 (deep well about 200 feet southwest of PBA)
- 01T04 (deep well about 300 feet northwest of the PBA)

Text and tables throughout the CMIP have been changed to reflect the addition of these wells to the program. In addition, the second to last sentence of the last paragraph on page 1-9 has been changed as follows (changed text is bold):

*"If the VOC plume boundary changes shape or increases in size, additional wells may be installed to bound an increased extent of contamination **and the remedy will be re-evaluated to assess its effectiveness.**"*

All teleconference participants agreed that sampling and analysis every two years is acceptable in light of the body of evidence demonstrating that COC concentrations are decreasing, albeit, rather slowly, and that there is no imminent health risks to human receptors.

**Comment 4:**

**Referring to the last sentence of the third paragraph on page 1-11, concentrations will approach 'non-detect' rather than zero.**

Response to Comment 4:

The last sentence of the third paragraph on page 1-11 has been changed as follows:

"The rate of decrease is expected to slow with time, and concentrations are expected to asymptotically approach non-detect levels."

**\*Comment 5:**

**Referring to the third sentence of Decision Rule 1, detection limits should be compared to chosen MCSs now as this information is readily available. The Navy should include all site wells in the quarterly monitoring proposed in this decision rule as IDEM may not approve a site clean closure if there is no data from all wells through the plume.**

Response to Comment 5:

Detection limits have been compared to MCSs. Based on this comparison, the selected analytical methods provide detection limits less than MCSs for all target analytes listed in Table 3-4 of the CMIP, except dibromomethane. This compound, however, should not have been included in the target analyte list because it is neither a COC nor a COC degradation product and it has not been detected at SWMU 01. Dibromoethane has been deleted from the target analyte list.

Per the teleconference on April 4, during which it was agreed that additional text would be added to clarify that the quarterly monitoring would include those wells that needed to be monitored for closure. The following note has been inserted immediately before Decision Rule 1:

*"Note: A data review will be conducted in Sampling Round 10 or at the first time that COC concentrations throughout the plume appear to be less than MCSs in all wells, or within 60 days of deciding that the land use will change, whichever occurs first. If COC and COC degradation product concentrations appear to be less than MCSs in all wells at that time, the data review will determine which wells must be monitored quarterly to demonstrate that the site is suitable for unrestricted use. The data review will consider that perimeter wells are likely to have had COC concentrations less than MCSs for a period of time prior to that point. Such perimeter wells may not require quarterly monitoring. This Decision Rule 1 will apply only to those wells selected for demonstrating that the SMWU is suitable for unrestricted use. At a minimum, this evaluation will be conducted in the tenth sampling round and every seven years thereafter or within 60 days of deciding that land use will change. "*

In addition, sentences 3 and 5 of Decision Rule 1 have been deleted.

**\*Comment 6:**

**Referring to Decision Rule 3, provide rationale for evaluation of sampling frequencies only after the fourth round of data collection (nearly 8 years).**

Response to Comment 6:

Regarding the first evaluation of sampling frequencies only after the fourth round of data collection, the fourth sampling round is actually six years from the start of monitoring because the first round of sampling is Year 1. Please also see the response to Comment 3 concerning the need only for biennial sampling. In addition, to accommodate the scheduled biennial sampling frequencies and data reviews while ensuring that a detailed data review is conducted periodically, the teleconference attendees agreed that the currently scheduled 5-year review will be replaced by a 7-year review. A five year review will still be conducted to be consistent with Navy policy but its scope will be consistent with the currently scheduled biennial reviews.

The CMIP has been revised to change the five-year review to a seven-year review. Waiting until the seven year review to conduct a detailed data evaluation will help to ensure that the sampling frequency evaluation is based on a large enough collection of data to represent true trends, especially early in the program. All teleconference participants agreed, however, that the design of the CMIP incorporates data reviews every two years and these reviews may prompt a re-evaluation of the monitoring plan design or land use controls if unexpected or unusual circumstances are detected.

**\*Comment 7:**

**Section 1.4, p. 1-6: Edit the Corrective Action goal to incorporate impact of the MCS and provide some indication of timeframes for completion of the goal (MNA isn't an open-ended activity) Also, what is the contingency plan if MNA goals aren't achieved within projected timeframes? Referring to Decision Rules 2, 4 & 5, should changes to the monitoring and LUC remedy be required (e.g., continued plume expansion/migration), a contingency remedy must be implemented. This would no longer be called an Interim Measure/Interim Action. The Navy should be prepared to implement the contingency remedy soon after it is deemed necessary (i.e., enhanced in-situ natural attenuation).**

Response to Comment 7:

The corrective action goal and introductory text on page 1-6 has been changed as follows:

“The corrective action goal for SWMU 01 is as follows:

Monitor and assure the public that solvent (VOC) contaminant concentrations are reduced to less than MCSs (See Table 3-4) by the year 2040, or that the remedy is re-evaluated at that point in time to ensure that the selected remedy is protective of human health and the environment.”

In addition, Decision Rules 2, 4, and 5 have been changed as follows:

“Decision Rule 2

If COC concentration trends for monitored wells begin to increase at any well location by the first 7-year review and subsequent 7-year reviews, re-evaluate the remedy. This evaluation requires that at least six data points are available since, and including, the year 2000 for any individual well. Factors to consider for this evaluation include the following:

- Potential for imminent threat to human health and the environment. If threats are not imminent, there may be little reason to implement a change to the remedy (see next bullet).
- Expected future concentration trends. If a transient spike causes a trend line to appear to be increasing, but the overall trend is expected to be decreasing to MCS levels, the need to implement change to the remedy is lessened. If the trend appears to be increasing, consideration should be given to the amount of increase expected during the next 7-year monitoring period. Larger increases will be stronger evidence than smaller increases that a change is warranted.
- Potential for increasing trends to represent an impact to media other than groundwater.
- The changes likely to be considered for implementation include enhanced natural attenuation and other measures that can reverse increasing concentration trends.

#### Decision Rule 4

If SWMU 01 land use changes in a manner that will cause increased potential for exposure of humans or the environment to SWMU 01 groundwater, consider changes in LUCs and/or re-evaluate the remedy to determine whether the rate of VOC concentration decrease can be enhanced. Changes in LUCs might, for example, limit the rate of groundwater usage. Further detail concerning implementation of LUCs is provided in Section 6.0.

#### Decision Rule 5

If LUCs are determined to be ineffective at preventing human exposure to groundwater, improve the effectiveness of the LUCs by adding more LUCs or changing existing LUCs. If changes in LUCs will not prevent human exposure to groundwater, alter the remedy to be more protective of human health and the environment. Examples of such alterations include enhanced natural attenuation in the most highly contaminated areas of the VOC plume. Further detail concerning implementation of LUCs is provided in Section 6.0.”

#### **Comment 8:**

**Referring to Table 1-1, what are the non-footnoted Risk-Based Cleanup Levels based on? If these are mostly screening values only, it may be best to remove them.**

Response to Comment 8:

Table 1-1 has been simplified by removing all limits except the MCSs. In addition, the callout for this table, located in the second paragraph of Section 1.4 has been changed to a callout to Table 3-4, which includes MCSs for all COCs and degradation products. The revised text is as follows:

*“Acceptable contaminant concentrations were described as MCSs in the SB Report (TiNUS, 2005b) and are presented in Section 3.0 (Table 3-4) of this CMIP.”*

**Comment 9:**

**Referring to Section 3.1, inspection, cleaning, maintenance, and repair should be conducted with every sampling event to ensure that the groundwater collected is chemically and physically representative of the groundwater in the screened geologic unit.**

Response to Comment 9:

Dedicated sampling pumps for monitoring wells are designed for long term operation. Therefore, they should not need to be removed from wells and inspected more frequently than about every 10 years. This has been demonstrated at the NSWC Crane Ammunition Burning Grounds where dedicated monitoring well pumps have been performing satisfactorily since 1998. This has also been the experience of the Navy.

The first paragraph of Section 3.1 has been changed as follows to focus the biennial inspections on exterior well features:

“All exterior features and well depths of monitoring wells to be sampled will be inspected in accordance with SOP 01 at the beginning of each sampling round. Well casings, caps, or locks that appear to be broken, vandalized, or disturbed, either by natural causes or human activities, will be reported at once to the FOL, and steps will be immediately taken to either repair the well or find a suitable replacement for the well.”

**Comment 10:**

**Referring to Section 3.7, what test kits are being anticipated for use here?**

Response to Comment 10:

Test kits are identified in Table 3-4. Table 3-4 is introduced in the first paragraph of Section 3.0 as one of the tables that identifies the LTM analytical requirements

No change has been made in response to this comment.

**\*Comment 11:**

**Referring to Section 3.10, well development and purge fluids should be checked to ensure VOC concentrations are at acceptable concentrations prior to discharge to the NSWC sanitary sewer.**

Response to Comment 11:

The NSWC Crane National Pollutant Discharge Elimination System (NPDES) permit has a daily maximum limit for total toxic organics (TTOs) of 2.13 mg/l as a total of all TTOs. The release of purge fluids at NSWC Crane has typically been done at a location that ensures these limits are not violated by ensuring a large dilution occurs between the purge fluid discharge point and the NPDES monitoring point. Historically, the purge fluid discharge point has been acceptable in this regard. Because VOC concentrations are decreasing, there is no anticipated need to begin checking the purge fluids at the release point. However, the last sentence of Section 3.10 under **Well Development and Purge Fluids** has been changed as follows:

“Discharge will occur at a manhole designated by NSWC Crane. This point shall be far enough upstream of the NPDES monitoring point that there is no risk of exceeding current NPDES permit Total Toxic Organics concentrations or other NPDES requirements.”

**Comment 12:**

Referring to Table 3-4, the Navy should remove the risk based target level column if it consists of screening values. Combine those RTBLs into the MCS column if no other values such as MCL or IDEM RISC Residential Closure values exist for those constituents. Recheck the MCS values versus applicable MCLs and IDEM Residential closure values for groundwater as they do not match those shown in Table 1-1. For example, the MCS for TCE appears incorrectly at 1634 ug/L while the MCL is 5 ug/L. MCSs should be provided for other parameters/breakdown products of the primary organics such as vinyl chloride. All VOC breakdown products should be included in the groundwater monitoring program.

Response to Comment 12:

RBTLs have been eliminated from Table 3-4. All Table 3-4 MCSs have been double checked and corrected as necessary to ensure that they are accurate. MCSs are now included for chemicals that did not have MCSs in the original Table 3-4. Please also see the response to Comment 8.

**Comment 13:**

The second paragraph of Section 5.3 is unclear. How will an increase in daughter product chemical concentrations be seen if analysis for them is not included in LTM? All breakdown/daughter products should be included in groundwater monitoring rounds to determine degradation and concentration trends.

Response to Comment 13:

All COCs and COC breakdown products are currently included in the long-term monitoring plan and are identified in Table 3-4. The following new sentence has been inserted after Section 5.3, sentence 1, as follows:

“However, COC degradation products will also be monitored as COCs to ensure that generation of degradation products does not lead to an unacceptable condition.”

Sentence 2 of Section 5.3 was revised to the following:

“The COCs and degradation products are listed in Table 3-4.”

In addition, the second paragraph of Section 5.3 has been deleted.

Please also see the responses to Comments 8 and 12.

**Comment 14:**

**LUCIP: Modify as needed based on IDEM feedback.**

Response to Comment 14:

IDEM indicated in the April 4, 2006 teleconference that what is acceptable to EPA will be generally acceptable to IDEM.

Several changes have been made to the document that are reflected in this response to comments.

**\*Comment 15:**

Per our Waste Management Branch (WMB) SOP for preparation of quality documents, as well as USEPA policy, a QAPP is required for this specific data collection activity. However, because the subject document already contains many QA elements, it is not necessary to prepare an entirely new document to supplement the CMIP. Portions of the QAPP formerly relied on for this SWMU's RFI may be incorporated into the CMIP by reference. If it would help, we can discuss specifics of how this should be done via conference call. A possibility is that the CMIP could be converted into an approvable 'QA-like' CMIP document that would satisfy USEPA's policy and SOP. (Applies to DBG CMIP as well).

Response to Comment 15:

Per the April 4, 2006 teleconference the following changes will be made:

- The title of the document will be Resource Conservation and Recovery Act Corrective Measures Implementation Plan/Quality Assurance Project Plan for SWMU 01 – Mustard Gas Burial Ground
- A title/signature page has been added to incorporate signature spaces for the following personnel:
  - Prime Contractor Project Manager
  - Prime Contractor QA Manager
  - EPA Quality Assurance Coordinator
  - EPA Permitting Project Manager
  - Hak Cho, Corrective Action Section Chief
  - Jose Cisneros, Waste Management Branch Chief
  - NSWC Crane Site Manager
  - Navy Southern Division Remedial Project Manager
  - Laboratory Quality Assurance Officers (two laboratories)
  - Laboratory Director or Manager (two laboratories)
- Laboratory SOPs are now included in Appendix C of the CMIP.
- Table 2-1 and Figure 2-1 have been updated to incorporate the laboratory information.
- The required laboratory-specific information has been inserted throughout the CMIP as necessary.

The following changes not discussed in the teleconference have also been made:

- References to sample bottle tags in Sections 3.0 and 4.0 have been removed because IDEM does not require such tags.
- The title of Section 3.8 has been changed to "Sample Nomenclature and Custody"
- The last sentence of Section 3.8 has been changed to: "Each sample bottle must be maintained under chain of custody in accordance with SOP 11 at all times until analysis is complete."
- The requirement to use sample bottle tags has been removed from SOP 11.
- The following new Subsection has been added to Section 5.0:

***"Section 5.9 Project Data Management***

*All laboratory data collected for this project must be provided to the Navy in a format consistent with the requirements posted on the Internet site identified in Section 4.3.4. Field data such as sampling logs and field notebooks may be provided in hardcopy format, however field analytical data such as results of well stabilization and natural attenuation monitoring should be provided in an electronic format compliant with Section 4.3.4. The Prime Contractor will ensure that data are managed in a way that preserves the integrity of the data, allowing only authorized personnel access to the data. Copies of calculations used to render project decisions and the supporting data will be provided in scheduled reports."*

**Comment 16:**

**A title page that contains approving signatures for all parties who are employed in a QA capacity should be appended to the front of the CMIP-QA document. The list of signatories should be consistent with previously approved Crane QAPPs, but should also include the following two individuals: Hak Cho, CAS Chief; Jose Cisneros, WMB Chief. The laboratory QA representative or lab QA manager should approve this QAPP.**

Response to Comment 16:

Please see response to Comment 15.

**\*Comment 17:**

**Section 1.5, p. 1-7: The statement that "...the party that will implement the LTM program ... on behalf of the Navy has not been identified," should be alleviated. The proposed data collection plan cannot be approved until these parties have been identified because key/appropriate (e.g. – field crew and laboratory) officials must approve the CMIP's QA components reflecting how the work shall be performed. (Applies to the DBG CMIP as well).**

Response to Comment 17:

The analytical laboratories have been identified and the pertinent information for the laboratories has been included in the necessary locations to eliminate some of the "TBDs". However, the Navy does not know at this time who the Prime Contractor will be. Per the teleconference of April 4, 2006, the Prime Contractor Statement of Work will include a requirement to implement the plan as written. Therefore, EPA may issue a conditional approval of the plan pending identification of the Prime Contractor. The identity of the Prime Contractor and all related information will be provided upon hire of the Prime Contractor. This will require revisions to Section 2.0 of the CMIP, including Table 2-1 and Figure 2-1.

Also per the teleconference, all key parties will indicate approval of the CMIP by signing the Title/Signature page.

**\*Comment 18:**

**Section 2.2.1, p. 2-5: This section refers to IDEM's role. As U.S.EPA is reviewing and approving this CMIP, EPA's QA functions and role should be included here only, unless IDEM wishes to review and approve this portion.**

Response to Comment 18:

IDEM has been removed as an approving authority for this document. However, IDEM's role as an approving authority has been retained for project decision making. Reports will be issued to IDEM with courtesy copies submitted to EPA.

**\*Comment 19:**

**Table 2-1: The "TBD" loose ends should be resolved prior to approval of this document.**

Response to Comment 19:

Please see response to Comment 17.

**Comment 20:**

**Section 3.11, p. 3-7: Equipment rinsate blanks should be routinely collected as well at an appropriate frequency (see also Table 3-6).**

Response to Comment 20:

A provision has been added to the QAPP to include equipment rinsate blanks when sampling from more than one well with a non-dedicated pump.

There will be no need for equipment rinsate blanks when only dedicated pumps will be used. The following text will be added to the end of Section 3.4 to clarify this:

"The use of dedicated pumps and tubing for each LTM well will eliminate the need for collecting equipment rinsate blanks."

**\*Comment 21:**

**Table 3-1: Perhaps here, or in another appropriate section, some discussion could be provided as to the adequacy of the currently existing well screening depths as optimal in gauging final corrective measures goals.**

Response to Comment 21:

The following text has been inserted into paragraph 1 of Section 3.0:

"Well screen depths and lengths were re-evaluated to ensure that they will support attainment of project objectives. The wells were situated to provide data sufficient for characterizing groundwater conditions and site risks. Maintaining the current well screen depths and lengths for the long-term monitoring will ensure comparability of future and historical data. The wells selected for inclusion in the monitoring program are those that are believed to best reflect the ability to detect changing groundwater contaminant or geologic conditions across the site."

In addition, rationales for selecting the six new wells (added in response to Comment 3) have been inserted into to Table 3-1.

**\*Comment 22:**

**Table 3-5: This table should be revised such that each laboratory (field or fixed-lab) that will be employed in the analyses is fully identified. Otherwise this information should be added to another appropriate section of the QA-CMIP.**

Response to Comment 22:

The laboratories have been identified and pertinent laboratory-specific information is now included in the appropriate sections of the CMIP. In particular, laboratory-specific information or changes to laboratory references have been added to Section 2.0 (including Table 2-1 and Figure 2-1), Section 3.0 (including Tables 3-4 and 3-5), and Section 4.0 (including Tables 4-2 and 4-3).

Per the teleconference of April 4, 2006, monitoring of natural attenuation parameters will be conducted every third round beginning with Round 1. This will ensure that the geochemical conditions are updated periodically without being too frequent. The natural attenuation data will be useful when updating the conceptual site model.

**Comment 23:**

**Table 3-4: Footnote 2 should reference section 4.3.1.**

Response to Comment 23:

The following text has been added to the end of footnote 2 in Table 3-4:

“See also Section 4.3.1.”

**Comment 24:**

**Section 5.3.1, p.5-7: “Chemical oxidation”? Will a Fenton’s reagent-type process be proposed as a contingency backup?**

Response to Comment 24:

Use of an oxidative treatment was not anticipated and prudence dictates that speculation about potential treatments at this time is not warranted. Therefore, the parenthetical phrase providing example active treatments has been deleted from the first sentence of page 5-7.

**\*Comment 25:**

**Lab SOPs should be included for each of the MNA parameters to be performed, including ethene/ethane, and methane.**

Response to Comment 25:

**Laboratory SOPs are now included in Appendix C of the CMIP.**

**References:**

TtNUS, 2004. Resource Conservation and Recovery Act Facility Investigation Report for SWMU 01 - Mustard Gas Burial Ground, Naval Surface Warfare Center Crane, Crane, Indiana, prepared for Southern Division, NAVFAC, North Charleston, South Carolina, September.

TtNUS, 2005. Resource Conservation and Recovery Act Corrective Measures Study Report for SWMU 01 - Mustard Gas Burial Ground, Naval Surface Warfare Center Crane Division, Crane, Indiana, prepared for Southern Division, NAVFAC, North Charleston, South Carolina, August.

**RESPONSES TO INDIANA DEPARTMENT OF ENVIRONMENTAL PROTECTION (IDEM) COMMENTS  
(DATED 14 MARCH 2006) REGARDING THE CORRECTIVE MEASURES IMPLEMENTATION PLAN  
(CMIP) FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 01, NAVAL SURFACE WARFARE  
CENTER (NSWC) CRANE, CRANE, INDIANA**

The comments below reflect agreements among U.S. EPA Region 5, Indiana Department of Environmental Management (IDEM), and NSWC Crane, Navy Southern Division, and Tetra Tech NUS, Inc. (TtNUS) representatives regarding changes to be made to render the CMIP for SWMU 01 acceptable to EPA. The agreements were reached during a teleconference held on April 4, 2006 at 10:00 AM Eastern Daylight Time.

Attendees of the teleconference were:

<b>Name:</b>	<b>Affiliation:</b>
Peter Ramanauskas	EPA Region 5
Allen Debus	EPA Region5
Doug Griffin	IDEM
Tom Brent	NSWC Crane
Bill Gates	Navy Southern Division
Ralph Basinski	TtNUS
Tom Johnston	TtNUS

**Comment 1:**

**Is there a specific target for monitoring that will trigger additional action, and what action?**

Response to IDEM Comment 1:

There are specific targets for monitoring that will trigger additional action. Multiple decision rules are included in Section 1.5.4 of the CMIP. Media cleanup standards (MCSs) are identified at the end of Section 1.5.2 as numerical limits (i.e., the targets) that will be used to determine attainment of the ultimate goal of having no unacceptable risk associated with SWMU 01 groundwater.

Per the teleconference of April 4, 2006, several changes have been made to the Decision Rules. The revised text for those changes is provided below:

The following additional text has been inserted immediately before Decision Rule 1 to clarify that the quarterly monitoring would include only those wells that needed to be monitored for closure:

*"Note: A data review will be conducted in Sampling Round 10 or at the first time that COC concentrations throughout the plume appear to be less than MCSs in all wells, or within 60 days of deciding that the land use will change, whichever occurs first. If COC and COC degradation product concentrations appear to be less than MCSs in all wells at that time, the data review will determine which wells must be monitored quarterly to demonstrate that the site is suitable for unrestricted use. The data review will consider that perimeter wells are likely to have had COC concentrations less than MCSs for a period of time prior to that point. Such perimeter wells may not require quarterly monitoring. This Decision Rule 1 will apply only to those wells selected for demonstrating that the SMWU is suitable for unrestricted use. At a minimum, this evaluation will be conducted in the tenth sampling round and every 7 years thereafter or within 60 days of deciding that land use will change. "*

In addition, sentences 3 and 5 of Decision Rule 1 have been deleted.

In addition, Decision Rules 2, 4, and 5 have been changed as follows:

#### "Decision Rule 2

If COC concentration trends for monitored wells begin to increase at any well location by the first 7-year review and subsequent 7-year reviews, re-evaluate the remedy. This evaluation requires that at least six data points are available since, and including, the year 2000 for any individual well. Factors to consider for this evaluation include the following:

- Potential for imminent threat to human health and the environment. If threats are not imminent, there may be little reason to implement a change to the remedy (see next bullet).
- Expected future concentration trends. If a transient spike causes a trend line to appear to be increasing, but the overall trend is expected to be decreasing to MCS levels, the need to implement change to the remedy is lessened. If the trend appears to be increasing, consideration should be given to the amount of increase expected during the next 7-year monitoring period. Larger increases will be stronger evidence than smaller increases that a change is warranted.
- Potential for increasing trends to represent an impact to media other than groundwater.
- The changes likely to be considered for implementation include enhanced natural attenuation and other measures that can reverse increasing concentration trends.

#### Decision Rule 4

If SWMU 01 land use changes in a manner that will cause increased potential for exposure of humans or the environment to SWMU 01 groundwater, consider changes in LUCs and/or re-evaluate the remedy to determine whether the rate of VOC concentration decrease can be enhanced. Changes in LUCs might, for example, limit the rate of groundwater usage. Further detail concerning implementation of LUCs is provided in Section 6.0.

#### Decision Rule 5

If LUCs are determined to be ineffective at preventing human exposure to groundwater, improve the effectiveness of the LUCs by adding more LUCs or changing existing LUCs. If changes in LUCs will not prevent human exposure to groundwater, alter the remedy to be more protective of human health and the environment. Examples of such alterations include enhanced natural attenuation in the most highly contaminated areas of the VOC plume. Further detail concerning implementation of LUCs is provided in Section 6.0."

#### **IDEM Comment 2:**

**Frequency of sampling and reporting: Reports should include analysis of progress of the measure - i.e: does the data to this point support plume stability? At the beginning stability analysis should take place annually. I don't want to wait years to find out the plume isn't stable after all.**

**An example:**

**At Newport they have MODFLOW models at two sites that predict there won't be a problem. I have them use their model to make predictions for the results for the groundwater and surface water**

**for the next sampling event. Then when they do the sampling they discuss how their measured values compare to the predicted values, and then update the model with the current data and predict the next set of concentrations. When the model predictions hold up for several rounds we start discussing reducing sampling frequency.**

Response to IDEM Comment 2:

Analysis of the plume stability is required by the CMIP and this analysis will be included in scheduled reports. Participants in the April 4, 2006 teleconference agreed that biennial sampling is supported by the available body of evidence. Per the teleconference of April 4, 2006, groundwater contaminant modeling at SWMU 01 is not anticipated to be required.

No change was made in response to this comment.

Ser PRCR4/6157

31 May 2006

The letter Ser PRCR4/6157 was for the submittal of the final Corrective Measures Implementation Plan (CMIP) for Mustard Gas Burial Ground SWMU 01. This final report replaces the draft Corrective Measures Implementation Plan (CMIP) for Mustard Gas Burial Ground submitted on 12/14/05 and is replaced by the revised final report dated 12/1/06.