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NSWC CRANE
5090.3a

DEPARTMENT OF THE NAVY

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

5090/S4.7.5
Ser RP3/3414

10 DEC 2003

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
ATTN: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NSWC Crane) submits Responses to U.S. EPA comments on the Draft Quality Assurance Project Plan (QAPP) Addendum for Corrective Measures Study (CMS) sampling at the Mustard Gas Burial Ground (MGBG), Solid Waste Management Unit 01. Two copies are provided as enclosure (1). The permit required Certification Statement is provided as enclosure (2).

NSWC Crane point of contact is Mr. Thomas J. Brent, Code RP3-TB, telephone 812-854-6160.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Manager, Environmental Protection
By direction of the Commanding Officer

Encl:
(1) Draft Comment Responses on MGBG CMS QAPP Addendum
(2) Certification Statement

Copy to:
ADMINISTRATIVE RECORD
SOUTHNAVFACENGCOM (Code ES32) (w/o encl)
IDEM (Doug Griffin)
TTNUS (Tom Johnston) (w/o encl)

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.

James M. Hunsicker

SIGNATURE

Environmental Protection Department Manager 12/8/03

TITLE DATE

RESPONSES TO U.S. EPA REGION 5 COMMENTS DATED 11-19-03 ON THE DRAFT QAPP ADDENDUM NO. 1 FOR NAVAL SURFACE WARFARE CENTER CRANE SWMU 1 (MUSTARD GAS BURIAL GROUND)
11-20-03

Note: additional comments on radiological topics were not received prior to generating these comment responses.

Comment 1:

The Phase III RFI Report has not yet been approved. The text of the second paragraph on page 1-1 states otherwise.

Response 1:

The Navy anticipated that the RFI report would be approved before the CMS QAPP Addendum was approved, hence the reason for the statement that the RFI report has been approved. The phrase "which was approved by U.S. EPA Region 5" has been deleted from the second sentence of page 1-1, paragraph 2. The remaining text of the QAPP Addendum No. 1 was searched for additional references to an approved RFI report but none were found.

Comment 2:

Referring to Figure 1-9, why isn't data/information from the newly installed well (01T05) included?

Response 2:

During planning the Navy considered the current figures to be sufficient, hence the reason they were included in the QAPP Addendum No. 1. Upon consideration of this comment the Navy has changed Figure 1-8 (potentiometric surface map) and Figure 1-9 (TCE isoconcentration contours) to include well 01T05 and the 2002 RFI data rather than the 2001 RFI data.

Comment 3:

Referring to test pitting/trenching mentioned Sections 1.5 and throughout Section 3.0, would continuing test trenching into the bedrock to look for potential stained/contaminated fractures be useful? Will you be checking for bedrock staining?

Response 3:

It would be difficult to dig with the backhoe into the bedrock which caps the ridge and this not the focus of the trenching operation. The purpose of trenching is to determine if soils are present which contain sorbed VOCs or DNAPLs. The Navy agrees that if staining is observed (from outside the trench) on the excavated soil, soil on the sides of the trenches, or the bedrock surface, these observations will be recorded on the appropriate trench log sheet(s). However, the Navy does not feel that it would be useful to dig into the bedrock. No changes have been made to the QAPP in regard to this comment.

Comment 4:

Referring to Page 1-12: In the 3rd paragraph from the end of the page, it is mentioned that 4 other VOCs were previously analyzed using a method other than 8260B. If these 4 compounds are run using 8260B, the data will be relatively useless.

Response 4:

The navy agrees that analysis of these four compounds by method 8260 will be relatively useless. Rejection of some of the data is anticipated during data validation because of poor anlaytical performance, especially poor calibration responses. Despite this, there is a logical reason for including the four chemicals that exhibit poor analytical performance using SW-846 method 8260B. An attempt is being made to preserve consistency with the original QAPP regarding the analyte lists and associated analytical fractions (e.g., VOCs) so that questions do not arise later concerning why some chemicals were analyzed and others were not. These kinds of questions have caused confusion in the past. Using the proposed analyte lists will maintain 100% correspondence between the RFI and the QAPP Addendum No. 1. There is no additional cost incurred for analyzing the four compounds in question by SW-846 method 8260B except for the insignificant cost associated with the data validation and rejection of data for these four compounds will not compromise the CMS. The paragraph in question has been rewritten to better reflect this logic. The revised paragraph is presented below:

" - Four other VOCs (1,4-dioxane, acetonitrile, 2-butanol, and propionitrile) were quantified during the RFI by using SW-846 method 8015B. This is a separate analysis from SW-846 method 8260B, which is the method used for the main list of volatile organic compounds (VOCs). Use of method 8015B was driven by the desire to achieve lower detection limits than is possible by using method 8260B. None of these four VOCs were detected in any MGBG RFI sample using the more sensitive method 8015B. Because of this, these four chemicals are not considered to be chemicals of concern. To avoid the additional costs associated with analysis of samples by two different methods, but to maintain the same list of analytes for the volatile organic compound (VOC) analytical fraction, these four chemicals will be analyzed by the (less sensitive) method 8260B. The data for these chemicals may be rejected during data validation but this strategy will avoid questions concerning the differences in analyte lists for the various analytical fractions.

Comment 5:

Referring to Table 1-4: A new detection limit term appears here - 'minimum detectable activity,' (or 'MDA'). Is this intended to be synonymous with 'MDL.' If so, delete the confusing term - 'MDA.'

Response 5:

"MDA" refers to the minimum detectable activity for a radiochemical analysis. This is analogous (but not identical) to the MDL used in chemical analyses. To make this clearer, the affected acronym definitions at the bottom of Table 1-4 have been changed to read as follows:

"MDA = Minimum detectable activity (for radiochemical analyses)
MDL = Minimum detection limit (for chemical analyses)"

Comment 6:

Referring to the phrase "up to 10" in the first bullet on page 3-1, what decides how many trenches will be created?

Response 6:

The following text has been inserted after sentence 1 in the last paragraph on page 3-4:

> *"A day of trenching will occur, starting near soil boring 01SB09 because 1,1,2,2-PCA was detected in that boring (chlorinated VOCs were not detected in any other soil boring). The intent will be to find a DNAPL source(s) in the soils. If no elevated PID or radiation readings are observed during the first day of trenching, and at least five trenches have been dug, then trenching activities will be terminated. However, if elevated readings are measured, or fewer than five trenches have been dug, then up to five more trenches will be excavated during a second day to delineate the extent of contaminated soil or to satisfy the FOL that no DNAPLs can reasonably be found in this manner."*

Comment 7:

Referring to Sections 3.1, 3.4.1, and 3.5.1: The second bullet on page 3-1 seems to imply that there will be no soil sampling unless there is an elevated PID reading. Is this the case? Digging test pits may release VOCs from disturbed soil. It may be better to use the OVA to screen the soil along the undisturbed surface of each newly excavated test pit and then sample with an EnCore directly from the test pit cavity as opposed to the piled up detritus. Also, because there is no way to compare detection concentrations detected by the OVA to contaminants concentrations in soil (in situ), but also because the detection limit of the OVA is far less sensitive than method 8260B would be, it may be advisable to collect at least one 'confirmation' sample from a test pit for lab analysis if all the pits turn out to be negative based on the field screen.

Response 7:

The trenches will be about five to ten feet deep and the side walls will be **unshored**. In addition, the trenches are considered to be **confined spaces**. Hence, personnel will not be allowed to enter the trenches for safety reasons. The trenching exercise is being done to locate a significant VOC source (high VOC concentration or large areal coverage of lesser concentrations), therefore, screening the soils removed from the trenches should be sufficient.

The Navy agrees that if no PID readings are above background, a soil sample will be collected from soil near the bottom of the first trench (01TP01), which will be located near soil boring 01SB09, and from soils near the bottoms of two other trenches. These samples will be analyzed for VOCs. The following text has been inserted at the end of paragraph 5 on page 3-5:

> *"If PID readings remain at background levels during the trenching activities, then soil samples will still be collected from near the bottom of the first trench (01TP01), which will be located near soil boring 01SB09, and from two other trenches selected to yield the greatest chance of finding DNAPL, based on field observations. These three samples will be analyzed for VOCs to verify whether VOCs are absent in the excavated trench areas."*

Comment 8:

Referring to the 4th paragraph on page 3-5, it may be useful to examine and/or sample the water seeping into the trench for presence of VOC or NAPL.

Response 8:

In the RFI, the sampling plan was designed to require collection of water from the overburden-bedrock interface in several soil borings, but no water was found. Because none of the selected borings yielded a saturation condition, encountering saturated soils or water flowing into the trenches is not anticipated during this investigation. As stated in the response to Comment 7, entering the trenches will be prohibited for this field effort because of safety reasons. No change was made to the QAPP Addendum No. 1 in response to this comment.

Comment 9:

The last paragraph of page 3-5 states that "up to six" soil samples are expected to be collected for VOC analysis? What if you see elevated PID at all 10 trenches? Also as stated in Comment 7, it may be advisable to collect at least one confirmation sample from the test pits.

Response 9:

During the RFI, only one soil sample showed a very minor trace of chlorinated VOCs. Therefore, it is very unlikely that VOCs will be detected in all of the soil trenches planned for this current investigation. Therefore, a maximum of six samples was specified for collection during trenching activities. An effort will be made to collect these samples from locations where the PID readings are highest. If no PID readings are above background levels, then the Navy agrees that a minimum of three soil samples will be collected and analyzed for VOCs (see also response to Comment No. 7). No change was made to the QAPP Addendum No. 1 in response to this comment.

Comment 10:

Referring to Section 3.4.1, dual references to 1,1,2,2 PCA should be changed to 1,1,2,2 TCA instead.

Response 10:

"1,1,2,2-PCA" has been used as an abbreviation for 1,1,2,2-tetrachloroethane so that it would not be confused with 1,1,2-TCA (1,1,2-trichloroethane), which has also been detected at the site in the past. "1,1,2,2-PCA" was used previously in the RFI report for the same reason. This is similar to using "PCE" as an abbreviation for tetrachloroethene. For these reasons, the Navy prefers to keep using "1,1,2,2-PCA" in order to avoid confusion. No change was made to the QAPP Addendum No. 1 in response to this comment.

Comment 11:

Referring to the MNA well discussion on page 3-7, why not include wells 1-25 (continuing to the northwest near the centerline of the plume) and 1-18 (south) for MNA parameter sampling?

Response 11:

The Navy agrees to add 01-25 to the list of wells analyzed for MNA parameters. In addition, well 01T05 has been added, and 01-22 has been deleted from the list because the addition of wells 01-25 and 01T05 will render the information from well 01-22 redundant. The Navy does not believe that adding well 01-18 to the list is beneficial because 01-18 is not in the directions of primary plume movement, which are to the northwest and north. The fourth paragraph on page 3-7 has been revised to:

> *"One of the remedial alternatives to be evaluated during the CMS is monitored natural attenuation (MNA). Chemical data from eight monitoring wells have already been collected during the RFI to evaluate MNA (TtNUS, 2003). During this CMS field effort, 11 monitoring wells will be evaluated for geochemical conditions related to MNA (Table 3-3). Two of the wells (01-02 and 01-05) are located immediately north of the PBA and have historically had the highest concentrations of VOCs. Five of the wells (01-11, 01-14, 01-15, 01-19, 01-25, and 01T05) to be sampled for MNA parameters lie in a line extending from the PBA to the northwest. These wells lie near the centerline of the plume and have had significant concentrations of VOCs in the past. Data from these eight wells will be used to evaluate the ground water geochemical conditions along the centerline of the plume and how these conditions vary with distance from the contaminant source. The other three monitoring wells to be sampled (01-01, 01-10, and 01-24) are located southeast, north, and northwest of the MGBG, respectively. These three wells are located near the periphery of the VOC plume and represent ground water geochemical conditions that exist surrounding the plume area."*

In the second sentence of the second paragraph in Section 3.5.7, the word "Ten" has been changed to "Eleven."

Tables 3-3 and 3-4 have been revised with the appropriate changes. Copies of the revised tables (which may require reformatting for inclusion in the final QAPP Addendum No. 1) are attached. Note that the number of duplicate samples has not been increased because the addition of the extra well samples provides more useful information than a replicate sample would.

Comment 12:

Referring to Section 3.5.1., some PID field data should be confirmed in the laboratory.

Response 12:

The Navy agrees with this comment. See also the response to Comment No. 7. Paragraph 2 of Section 3.5.1 has been revised to:

> *"If any soils are encountered that display an above-background reading with the PID, a soil sample will be collected for VOC analysis using three EnCore™ samplers (SOP CTO315-08). The VOC samples will be collected from the soil materials that display the highest PID readings. If no PID readings are greater than background, three VOC samples will still be collected in order to verify whether or not VOCs are absent in the MGBG overburden soils. These soil VOC samples will be collected from near the bottom of trench 01TP01, and two other trenches which will be selected by the field geologist. The lateral and vertical locations of any soil samples within a trench will be estimated and recorded on the soil sample log sheet and the test pit log sheet."*

Comment 13:

Referring to Section 3.5.3, will any borehole logging/geophysics be done on the new wells (e.g., caliper, downhole video, etc.)?

Response 13:

No geophysical or other downhole logging is planned for the new well boreholes. However, photographs of the cores will be taken, and the cored materials will be boxed, properly labeled, and archived. No change has been made to the QAPP Addendum No. 1 in response to this comment.

Comment 14:

Referring to Section 3.5.4., to what depth will the proposed well boreholes be driven and how will screened intervals be determined (e.g., what if multiple water bearing fractures are encountered)? What type of testing will be done to identify water producing fractures (e.g., packer tests)?

Response 14:

The two new wells are being drilled and installed within the MGBG. The first paragraph in Section 3.5.4 (bottom of page 3-10) will have the following text inserted after the first sentence:

> *"The well screens will be installed in the uppermost water-bearing sandstone, similar to nearby wells 01-02, 01-05, and 01-11 (see Figure 1-5). Therefore, the screens of the new wells will be at an elevation of approximately 645 to 655 feet above mean sea level. The rock cores will be examined in detail and any observed fractures and fracture density will be noted on the boring logs for each boring. The well screens will be positioned to intercept as many of the water-bearing fractures as possible."*

No testing, such as packer testing, is planned to identify water-producing fractures. However, the orientation and density of fractures in the rock cores will be described on the logs of the borings.

Comment 14a (originally identified as a duplicate Comment 14):

Referring to Section 3.5.7., groundwater should be 'stabilized' per U.S. EPA's 4/96 Groundwater Issue Paper, pp. 7-8. Three successive readings should be within plus or minus 0.1 pH units, plus or minus 3% for conductivity, plus or minus 10 millivolts for redox potential, and plus or minus 10% for turbidity and dissolved oxygen.

Response 14a:

These changes have already been incorporated into page 4 of SOP CTO315-14 Low-Flow Well Purging and Stabilization, which is located in Appendix B. Duplication of these details is not viewed to be necessary and could introduce a potential future conflict between the QAPP and the SOP. No change has been made to the QAPP Addendum No. 1 in response to this comment.

Comment 15:

Referring to Table 3-4, in the column for 'volatile fatty acids,' what is meant by the '#REF' notation?

Response 15:

The "#REF!" is a typographical error that arises from having an invalid reference in a Microsoft Excel formula. This has been corrected and "#REF!" has been replaced by "!".

Comment 16:

Referring to Table 3-9, under the 'acceptance limit' column, change the statement to read 'See Table 7-1.'

Response 16:

It was not clear from this comment which text in the table is in question. A review of the table did not indicate that a change is required. No change has been made to the QAPP Addendum No. 1 in response to this comment.

Comment 17:

Referring to Table 7-3, note that no surrogate data was listed here even though 'surrogate' appears in the title to this table.

Response 17:

The reference to "SURROGATE SPIKES" in the title of Table 7-3 is an error and "SURROGATE SPIKES" has been deleted.

Comment 18:

Referring to Section 8.0, is the Navy considering accelerated bioremediation as a potential remedy (perhaps this is what is meant by 'enhanced')? Also, referring to the third bullet on page 8-2, additional evaluation criteria include: state acceptance and

community acceptance (see attached EPA Fact Sheet #3 - Final Remedy Selection for Results-Based RCRA Corrective Action - March 2000).

(See attached file: Final Remedy Selection Fact Sheet.pdf)

Response 18:
Regarding accelerated bioremediation: Yes, the term "enhanced" is analogous to "accelerated" remediation. For clarity, enhanced refers to the addition of chemicals and/or microbes to accelerate the rate of biochemical destruction of the contaminants.

Regarding the bullets on page 8-2: *"State acceptance and community acceptance"* has been added as an additional bullet to the category of "other pertinent factors" located on page 8-2.

Regarding the inclusion of the "Final Remedy Selection Fact Sheet.pdf" file: Thank you.

Additional Technical Changes

Change ATC-1:

Second to last sentence of paragraph 9, Section 3.4.1 (page 3-6) has been restaed to read:
"It is estimated that soil sampling will occur over a 1- to 2-day period and that all samples designated for VOC analyses will occupy the same cooler; therefore, one trip blank will be sent to the laboratory and analyzed for VOCs.

Change ATC-2:

The second-to-last paragraph on page 3-7 has been changed to read (change shown in bold text):

"The geochemical parameters... (**Tables 3-1 and** 3-3).

Change ATC-3:

The following sentence has been inserted as a new second sentence in Section 3.10:

"The backhoe bucket will be decontaminated after excavating at each location and prior to starting a new excavation. This will be accomplished by scraping and brushing as much dirt and debris as practicable from the bucket."

Change ATC-4:

The second sentence of paragraph 3 under "Waste Soils from Soil Borings and Trenche on page 3-19 has been changed to read (change shown in bold text):

"If all readings...ground surface **or returned to the excavation in the case of trench soils**, smoothed and tamped for compaction."

Change ACT-5:

The contact information for Mr. Tom Brent has been changed in Table 2-1 to read (changes shown in bold text):

Tom Brent Environmental Site Manager NSWC Crane	NSWC Crane Code RP3-**TB** Bldg 3245 300 Highway 361 Crane, IN 47522-5001	(812) 854-6160 FAX: (812) 854-**3981**

RESPONSES TO:
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 5 COMMENTS (DATED DECEMBER 1, 2003) CONCERNING NAVAL SURFACE WARFARE CENTER (NSWC) CRANE MGBG, QAPP ADDENDUM NO. 1, SECTIONS 1 & 3.

(03 December 2003)

General Comments

1. It is very important that the excavation methods do not churn the soil to the extent that actual radioactivity is lost by dilution. To the extent possible, methods that minimize or eliminate handling before measurements are made should be used.

Response to General Comment 1:

Please see the responses to Specific Comments 9 and 11.

2. The method for measuring and setting radiation background levels should be more specific.

Response to General Comment 2:

Please see the response to Specific Comment 7.

3. Protocol conflicts in the trigger levels for gamma spectrometric analysis should be resolved.

Response to General Comment 3:

Please see response to Specific Comment 7.

4. Laboratory methods for measuring Ra-226 and Eu-155 should be selected so that problems noted in past measurements are resolved, namely, concentrations should be correct and radionuclide identity should be conclusively established.

Response to General Comment 4:

Please see the response to Specific Comment 8.

5. The core length of soil over which a sample is taken is critical. If too long, actually radioactivity may be diluted and, possibly, lost.

Response to General Comment 5:

Soil cores are not actually being collected for this field work. Please see the response to Specific Comment 11.

Specific Comments

6. **Section 3.1, page 3-1, para. 1, Sentence 5**—This sentence notes that there is a "remote possibility, some thorium or thorium compounds may still be present at the MGBG."

Response to Comment 6:

It is not clear whether EPA is citing the referenced statement for the benefit of understanding later comments or whether they disagree with the statement. The statement is true. The absence of thorium at the MGBG cannot be proved, however, if no elevated readings are encountered, the field screening will add more confidence to the notion that the site is now at background levels. No change has been made in response to this comment.

7. **Section 3.1, page 3-2, bullet 2**—There is no specific description of where and how the background level will be established. SOP CT0315-05, Section 6.2, states that the background measurement should be "...in close proximity to the area being surveyed but outside the MGBG boundary and well enough removed to represent background radiation levels." This is a reasonable general statement but there should be a specific location designated for this project.

   There are several conflicts between this bullet and statements in SOP CT0315-05. This bullet states that gamma spectrometric analysis will be made when the radiation levels exceed background radiation levels. In the SOP, Section 6.4.4, it says "If a single or average backhoe soil radiation measurement does not exceed background levels...take no action." Section 6.4.5 states a single backhoe measurement must exceed 10 times the average background level to be submitted for gamma spectrometric analysis. It is unclear whether the bullet refers to a single or an avenge reading. It is unclear whether the trigger for gamma spectrometric analysis is exceeding background or exceeding 10 times background.

   With regard to measurement of background, SOP CT0315-05, Section 6.2.1, states that the measurement should be made at "less than 1 foot from the background soil to be screened." This distance is vague and could be set more specifically. As a result, in Section 6.4.1 it is directed that the same distance should be used for backhoe bucket measurements. It would be much better if these measurements were made as close to the soil as possible so that maximum sensitivity is obtained and so that hot spots will not be missed. Thus, it is recommended that a specific distance, rather than "less than 1 foot" be used so that the backhoe bucket measurements will find any radioactivity if it is present.

Response to Comment 7:

The bullet number 2, which is in question, is in error. The bullet should not specify that the gamma screening will be conducted on soil in the backhoe bucket. This erroneous bullet was evidently the basis for remaining Comments 9 and 10. The phrase "in the excavation backhoe bucket" has been deleted from the bullet in question. In addition, the heading of SOP CTO315-05 Section 6.4 has been changed to:

"Gamma Screening Procedure for Soil Samples from Excavations."

Regarding the background locations for radiation screening and how to establish background levels, SOP CT0315-05, Section 6.2 has been changed to read as follows:

"6.2.1 Holding the probe a fixed distance (4 to 6-inches) from the background soil to be screened, take a reading in three separate background locations and record these three background values on Radiation Log Sheet 1 (Attachment A). The background locations shall be outside the West, South, and East MGBG boundaries and near the midpoint of the imaginary line connecting MGBG corner posts. When using the gamma meter only, indicate this by crossing out the □ symbol on the applicable lines of Attachment A.

Regarding how field screening results will be evaluated, if the average of three results is >2X Mean BG levels, a sample will be collected for gamma spec analysis at Pace Analytical. If any single result is >10X BG levels (which is also >2X Mean BG levels) a sample will be selected for gamma spec analysis AND the sample shipment will be screened for shipping purposes to satisfy DOT regulations for radioactive shipments. If any first result or the average of the first result plus two more results is not >2X Mean BG levels (which is also <10X Mean BG levels), no sample will be taken and any shipment containing only samples in this radioactivity category will not be screened to meet DOT regulations (i.e., no action will be taken). This is explained in the SOP Section 6.4. No change has been made in response to this part of the comment.

Regarding the distance between gamma detector and soil for field screening: Because gamma radiation is a very penetrating radiation, it should not be greatly affected by the distance of the detector from the source. This is especially true if the distance is less than 1 foot unless the source is very close to the soil surface. This is said, in part, because the measurements will be made at the same distance from the soil for both site and BG locations. The Navy also wishes to keep the detector far enough from the soil surface that inadvertent contact with the soil, which would require decontamination of the detector, is not likely to occur. This having been said, a distance of 4" to 6" between detector and soil surface is now specified in SOP CTO315-05, as describe below.

SOP CTO315-05, Section 6.2.1, sentence 1, has been changed to read as follows:

> *"Holding the probe a fixed distance (4 to 6 inches) from the background soil to be screened, take a reading in three separate background locations and record these three background values on Radiation Log Sheet 1 (Attachment A)."*

SOP CTO315-05, Section 6.4.1, sentence 1, has been changed to read as follows:

> *"Hold the gamma probe 4 to 6 inches from the soil to be screened as was used for the background measurements."*

8. **Section 3.1**—Since additional soil sampling will be done in this project, any gamma spectrometric measurements made should eliminate the problems discussed in Response to Comments. If Ra-226 and U-235 energy lines are so close that the Ra-226 may be falsely elevated, then methods that eliminate this problem should be selected. Eu-155 measurements should be made so that it can be determined conclusively if Eu-155 is present or not. Consideration should be made of the potential that the detection width for the energy peak is too wide so that other emissions are being attributed to Eu-155.

Response to Comment 8:

The following heading has been inserted before the first paragraph of Section 8.0:

> "8.1 General Data Reduction"

Regarding radium-226 quantification, the following text will be inserted after the existing third paragraph of Section 8.0:

> "8.2 Corrective Measures Evaluations"
>
> "Because uranium-235 quantified at 183.7 keV (yield = 54%) cannot be differentiated from Radium-226 (186.2 keV) in the gamma spectrometric analysis, the Ra-226 results will be corrected in the following manner:
>
> > Uranium-235 will be quantified using the peak at 143.7 keV (yield = 10.5%) and this result will be subtracted from the radium-226 value that is quantified using the 186.2 keV energy (yield =3.28%). This correction will yield a corrected Ra-226 activity reflective of Ra-226 activity in the absence of uranium-235."

Regarding europium-155 quantification, the laboratory has been requested to re-evaluate the minimum detectable activity for europium-155. Recall that the detected europium-155 results reported for the MGBG RFI were equal to the minimum detectable activity (MDA). Because europium-155 is a fallout radionuclide with a relatively short half-life (= 4.96 years), this radionuclide detection is interpreted to be a false positive when reported at the detection limit. The laboratory will strive to eliminate false positive by re-evaluating the MDA.

9. **Section 3.3**—The sampling protocol is very important to finding radioactive material if it is actually there. Removing soil with a backhoe is likely to mix soil to the extent that actual radioactive soil may be diluted and its emissions become unmeasurable, even though it is present. Therefore, in addition to direct measurements of soil in the bucket, the area where the soil was excavated should be measured as well (in situ).

Response to Comment 9:

Field personnel are not planned to enter excavations for safety reasons. Such entry constitutes a confined space entry. Entering the excavations should also not be necessary given the current stage of this project. The basis for EPA's desire to take in-situ measurements is that small hot spots could go undetected. However, the Navy is not looking for small radiation hot spots. If the soil has been mixed to the point that a small hot spot would have been found in situ but it isn't found after removal from the trench, then the "hot" spot is considered to be insignificant and is not a concern. The screening is proposed as a health and safety precaution for an area known to have once been radioactive and also to ensure that the Navy has not overlooked any significant radioactive deposits in past investigation. Shipping of potentially radioactive material was also a consideration when developing this screening strategy. This investigation is being conducted under the premise that all significant radioactive contamination at the MGBG has been removed (based on USACE and TtNUS findings over the past two decades) with only a remote possibility that above-background radiation is still present. Recall that radionuclides were not risk drivers for the RFI. No change has been made in response to this comment.

10. **Section 3.4.1, para. 2**—Same comment as for Section 3.3.

Response to Comment 10:

Please see response to Comment 9.

11. **Section 3.4.1, page 3-5, para. 2**—It is unclear if a second gamma measurement will be made after the soil is dumped out of the backhoe bucket. It appears that a measurement will be made in the bucket before it is dumped and then another measurement will be made after it is dumped, however, that is not entirely clear. If the only measurement to be made is after the bucket dumps its soil, then an objection must be made. The more times the soil is handled, the more actual radioactive soil is likely to be mixed and diluted to the point it is no longer measurable. See comment for Section 3.3.

    para. 3—The depth over which the soil sample is taken is critical. If the radioactive contaminant was only 2 inches thick and the core was 4 feet long then there could be a tremendous dilution of sample that would obscure the presence of contamination. Generally, reliance has been made to 6 inches because this is the depth found in the uranium mill tailings standards in 40 CFR 192. A 6 inch depth is advocated because it has a sound justification.

Response to Comment 11:

Regarding where radiation screening will occur (Section 3.4.1, page 3-5, para. 2), the screening is only planned for soils that are dumped beside the trench (See response to Comment 7). The Navy does not intend to locate all radiation hot spots (if any exist), rather the Navy included the radiation screening for health and safety purposes, potentially for sample shipping, and as an overall good practice for an area known to have been previously contaminated with radioactive material. No change has been made in response to this portion

of the comment.

Regarding the soil sampling depth being critical (para. 3), soil cores are not being collected. The radiation screening will be done on soil dumped along side the trench. The soil will be collected in lifts (approximately a 1-foot to 3-feet depth for each lift per SOP CTO315-05, Section 5.3.2). To comply with this comment, SOP CTO315-05 has been changed to limit the depth of each lift to approximately 1 foot in SOP CTO315-05. Any smaller depth increment would conflict with the Data Quality Objectives which require test pitting of as many trenches as possible in a short amount of time with emphasis being on the location of a VOC (not a radiation) source. Also, because very small hot spots are not of interest, there is no need to limit the soil excavation lifts to a smaller depth.

12. **Section 3.5.1, para. 1**—This procedure is in conflict with that discussed in Section 3.1 where soil will be scanned in the bucket. The less the sample is mixed before it is scanned the more likely contaminant present will be found. The method proposed here, is more likely to mix the sample.

Response to Comment 12:

Radiological field screening is planned only for soils dumped next to the excavation. See responses to Comments 9 and 11.

13. **Section 3.7.4**—When radiation samples are shipped, even when the radioactivity identity and concentration are not known, Department of Transportation regulations require a statement in the shipping container. See Title 49, Part 173.422(a)(1, 2, 3, 4), Code of Federal Regulations.

Response to Comment 13:

Steps 6.7.13 and 6.7.14 of SOP CTO315-05 delineate the process required for labeling radioactive shipments, including the labeling of the outside of the package as "Radioactive" and requiring the inclusion of a statement of conformance with conditions and limitations specified in 49 CFR 174.421 (UN2910). This process is the same process used in the original, EPA Region 5-approved, radiation screening procedure that was implemented during the RFI. No change has been made in response to this comment.

14. **Section 3.10**—Does SOP CT0315-19 deal with radioactive materials, including screening protocols, criteria to be met, and disposal of contaminated material (swipes, wash water, etc.)?

    SOP CT0315-19 does not specifically address radioactive materials in decontamination waste. Results for gamma spectrometry of IDW during the RFI yielded no radiation levels in excess of background levels. This was attributed to the lack of detecting radiation levels greater than background levels. No change has been made in response to this comment.

15. **Section 3.12.1**—Does the Health and Safety Plan include radiation? For example, does it require dosimeters?

    The Health and Safety Plan did not include dosimetry for the reasons that have been described throughout these comment responses, namely that the expectation of receiving any measurable radiation does is extremely low at this time, based on past investigations. However, the HASP has been revised to include a requirement for personnel involved in test pitting and well installation to wear thermoluminescent detectors (TLDs) during these activities. Well sampling and MNA analyses will not require the use of TLDs.