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Secretary for
Environmental Protection



Department of Toxic Substances Control

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NAVSTA LONG BEACH
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Edmund G. Brown Jr.
Governor

November 10, 2014

Mr. James T. Callian
BRAC Environmental Coordinator
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92180-4310

FINAL SUPPLEMENTAL RADIOLOGICAL ASSESSMENT INSTALLATION
RESTORATION SITES 1 AND 2, LONG BEACH NAVAL COMPLEX, LONG BEACH,
CALIFORNIA

Dear Mr. Callian:

The Department of Toxic Substances Control (DTSC) has received and reviewed the *Final Supplemental Radiological Assessment Installation Restoration Sites (IR) 1 and 2, Long Beach Naval Complex*, dated May 19, 2014 (Final SRA).

Comments provided in a memorandum by Dr. Sheetal Singh and her associates at the California Department of Public Health (CDPH) are attached. The comments provided by CDPH suggest that the information provided in the Final SRA indicates that IR Sites 1 and 2 remain impacted with radiological wastes, and are not suitable for a Radiological Unrestricted Release Recommendation (RURR).

Please provide DTSC with a written response to the comments (RTCs). DTSC and CDPH staff are available to discuss or provide clarification via conference call, if needed. We look forward to continuing to work with the Navy and moving this project forward. If you have any questions and concerns, please contact me at (714) 484-5395 or Alan.Hsu@dtsc.ca.gov.

Sincerely,

Alan Hsu
Remedial Project Manager
Brownfields and Environmental Restoration Program

Enclosure

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California Department of Public Health
MEMORANDUM

DATE: November 10, 2014

TO: Alan Hsu
Remedial Project Manager
Department of Toxic Substances Control (DTSC)
5796 Corporate Avenue
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FROM: Sheetal Singh, Ph.D.
Senior Health Physicist
Department of Defense Program
Environmental Management Branch (EMB)
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(916) 449-5691

SUBJECT: EMB response to DON comments of FINAL **Supplemental Radiological Assessment (SRA), Installation Restoration (IR) Sites 1 and 2**; Long Beach Naval Complex, Long Beach, California. Final IR Site 1 and 2 SRA issued 19 May 2014.

The California Department of Public Health (CDPH)-EMB has reviewed the subject document and has comments to submit. Please see attached for review comments. This review was performed by Robert Wilson (Associate Health Physicist), in support of the Interagency Agreement between DTSC and CDPH.

If you have any questions concerning this review, or if you need additional information, please contact Robert Wilson at (916) 449-5688.

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General Comments:

I. While EMB is aware this document has been issued in its “final” iteration, EMB would like to express its appreciation to have the opportunities to review and comment at this later date.

II. EMB is aware the “main objective of the Radiological Assessment was to collect sufficient data to evaluate potential radiological risks to receptors, industrial workers, on the surface at IR Sites 1 and 2.” (Section 1.6; “Report Objective”, page 9.) Since the Navy’s estimates of dose and risk for the Radionuclide(s) of Concern (RCOCs) have been applied to an industrial worker exposure scenario and limited to no greater than 12 inches below ground surface (bgs) , it is EMB’s conclusion that the Navy will not pursue an unrestricted release of IR Sites 1 and 2.

The task of determining if the information within this Radiological Assessment is sufficient to address State of California radiological licensing issues and assess restricted release compliance with a non-Federal transferee is not within the purview of EMB. Such a task is the responsibility of CDPH-Radiologic Health Branch (RHB) upon transfer of property to a non-Federal entity. Therefore, it would be prudent for the Base Realignment and Closure (BRAC) office of the Department of Navy (DON) to include CDPH-RHB to determine if sufficient data has been collected to evaluate potential risks to industrial worker receptors, as this would potentially facilitate the forward movement of activities related to property transfer with restrictions on land use.

III. It is EMB’s conclusion that the information provided in the Radiological Assessment of IR Sites 1 and 2 indicates IR Sites 1 and 2 remain radiologically “impacted”, and not suitable for a Radiological Unrestricted Release Recommendation (RURR).

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Specific Comments:

I. Main Document:

1. Section 4.1; “Instrument Selection”; Pages 27 – 30:

There is no mention of the “Micro-Rem” or Ludlum Model 2360 instruments and their use. Please explain their omission from the main document.

2. Section 4.3; “Instrument Operational Checks”, pages 31 -32:

The reference to Appendix D as including records of daily response checks is incorrect. Appendix D appears to be related to dose modeling and not instrument operational checks. Please see Comment (II)(1)(a) below.

3. Section 6.4; “Identification and Removal of Radioactive Items”, page 51:

a. Table 6.4-1 (“Radioactive Articles (Point Sources) Removed During Soil Sampling”); Page 51:

i. Survey Unit (SU) 05 in Figure 6.4-1 [“Locations of Articles (Point Sources) Found in Survey Units”], indicates two locations, 17 and 18, but Table 6.4-1 only lists “Location Number” 17 twice. While the information given in Section 6.4 (“Identification and Removal of Radioactive Items”) states that “two radioactive items were removed” from Location #17, Location #18 is not listed in Table 6.4-1 and no information specific to Location #18 is given in Section 6.4. Please explain why Location #18 in SU 05 has been excluded from Table 6.4-1, and Section 6.4, even though Location #18 is indicated in Figure 6.4-1.

ii. Please check accuracy of DON response to EMB comment 4b (Appendix F, page 7). For example, in Table 6.4.1, Survey Unit

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(SU) 05, has two sample sites identified as “017” in the final document. This contradicts the DON RTC where sample site “018” (500 μ R/hr) was used. Please correct, as needed.

- iii. “SU 06” in the DON RTC document (Appendix F, page 7) is listed in both tables, but “SU 06” is missing in Table 6.4.1 in the final document. Please correct, as needed.

b. Last paragraph; page 52:

Please provide signed copies of manifests used for disposal of Low-Level Radioactive Waste (LLRW) generated and directly related to the work performed for this Supplemental Radioactive Assessment and the six B-25 boxes containing LLRW which were manifested and shipped offsite as LLRW, as per Section 1.2 (“Site Histories”, page 4) of the final document. The manifests will provide EMB with documentation that the aforementioned LLRW was received at an appropriate off-site permitted disposal facility.

II. Appendices:

1. Appendix E, “QC Charts”, “Instrument QC Charts”;
Table/Spreadsheet: “Cabrera Alpha-Beta Counting Instrument”;
Ludlum Model 2360 (s/n 184952); Ludlum Probe 43-93 (s/n PR 199836):
 - a. The Instrument QC Chart for the given hand-held Ludlum Model 2360 (s/n 184952) survey instrument does not appear to be in compliance with the information in Section 4.3.1 (“Hand-held Instruments), page 32, of the main document. Information that source response and background response checks were performed before and after each use to ensure the instrument “was responding properly to radiation... was not contaminated...” is not evident. All the entries appear to indicate that survey instrument operational checks were performed on the next day of work, which is before each use, but the source and background response checks were not performed after each use.

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Since it is apparent the spreadsheet provided is a compilation, please provide copies of the original QC documentation used and signed by the "H.P. Technician" with the following initials/dates: "JR/CC"/"9/19/2008", "Chuck"/"10/30/2008", "chuck"/"10/23/2008" and "SG"/"11/13/2008". EMB review of these copies will encompass survey instrument operational, source response and background response checks.

- b. Results of QC checks of instrument functions, such as, battery check, audio, meter returns to zero indication after initial start-up, timer, etc. are not evident.
- c. Please identify or provide a copy of a control chart used for this instrument (Ludlum Model 2360, s/n 184952).
- d. The "Control Chart bkg Average α/β cpm" value given as "1.40" does not match the average α/β cpm value of "1.2" given in the "Instrument Efficiency Calculator" for Ludlum Model 2360 (s/n 184952). Please clarify this conflict of information, amend the α/β cpm value and correct "MDA" calculations, as needed.
- e. The "Control Chart Source-bkg Average α/β cpm" value given as "4157.8" for α cpm does not match the average α cpm value of "3883.7 α cpm"(3884.9 – 1.9) as implied in the "Instrument Efficiency Calculator" for Ludlum Model 2360 (s/n 184952). Please clarify this conflict of information and correct the " α cpm" value, as needed.
- f. The "Control Chart Source-bkg Average α/β cpm" value given as "2282.5" for β cpm does not match the average β cpm value of "2237.9 β cpm"(2352.1 – 114.2) as implied in the "Instrument Efficiency Calculator" for Ludlum Model 2360 (s/n 184952). Please clarify this conflict of information and correct the " β cpm" value, as needed.
- g. It is not clear how the one sigma values were calculated for "Control Chart bkg 1 sigma, cpm" and "Control Chart source 1 sigma, cpm". Please explain where such summary statistics are located in the Supplemental Radiological Assessment document.

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- h. Define the acronym “MDA” (Minimum Detectable Activity) as it is used in the spreadsheets for Ludlum 2360 (s/n 184952). Include this acronym and its definition in the “Acronyms and Abbreviations” section of Appendix C.

Note: As per E.W. Abelquist: “The MDC (or minimum detectable activity for those who are more comfortable with MDA) corresponds to the smallest activity concentration measurement that can be achieved with a specified survey instrument and type of measurement procedure”. See Decommissioning Health Physics – A Handbook for MARSSIM Users (E.W. Abelquist), 2001; Section 9.1, page 176.

- i. It is apparent that the MDA (MDC) values for alpha and beta emitters did not incorporate ISO-7503-1 source efficiencies (ϵ_s).

For example, in the “Cabrera Alpha-Beta Counting Instrument spreadsheet/log sheet (see Appendix E; “Instrument QC Charts”), the first result in the “MDA α (dpm)” column is “16.57”. Given a background (Bkg) count equal to zero (“0”), a count time of “1” (minute), an instrument efficiency of “0.181”, a detector active area of “100”, and ϵ_s is not applied:

$$MDC = \frac{3 + 4.65\sqrt{B}}{\epsilon_i \epsilon_s \left(\frac{Wa}{100}\right)T}$$

$$MDC = \frac{3 + 4.65(0)}{0.181(1)(1)}$$

$$MDC = 3 / 0.181 = 16.57 \text{ dpm}$$

In addition, it is apparent that the instrument efficiency for alpha emitters was based upon the total activity (21,500 dpm) of the thorium-230 alpha emitter calibration source (Eberline Services s/n 4005-02) whereas, application of ISO-7503-1 would have the instrument efficiency calculations based upon the 2π alpha emission rate (10,900 cpm).

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For example:

Using results from the Appendix E Instrument Efficiency Calculator for alpha and Ludlum Model 2360 (s/n 184952):

$$3883.7 / 10,900 = 0.356$$

If the source efficiency (ϵ_s) for alpha emitters is applied (0.25), then the 4π total efficiency (ϵ_t) (ϵ_s) = (ϵ_t) = (0.356) x (0.25) = ("0.089".), then the MDA (MDC) = 33.7 α dpm.

The result of "33.7 α dpm" above compared to the given result of "16.57 α dpm" in the spreadsheet/log sheet would indicate that the results have been underreported by approximately 51%.

- j. Using the premise in Comment (i) above and using beta emitters instead of alpha emitters:

It is apparent that the instrument efficiency for beta emitters was based upon the total activity (21,700 dpm) of the Tc-99 beta emitter calibration source (Eberline Services s/n 4004-02) whereas, application of ISO-7503-1 would have the instrument efficiency calculations based upon the 2π beta emission rate (13,600 cpm).

For example:

Using results from the Appendix E Instrument Efficiency Calculator for beta and Ludlum Model 2360 (s/n 184952):

$$2237.9 / 13,600 = 0.165$$

If the source efficiency (ϵ_s) for beta emitters is applied (0.5), then the total efficiency (ϵ_t) x (ϵ_s) = (ϵ_t) = (0.165) x (0.5) = ("0.082".), then the MDA (MDC) = approximately 629 β dpm.

The result of "629 β dpm" above compared to the given result of "501 β dpm" in the spreadsheet/log sheet would indicate that the results have been underreported by approximately 20%.

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- k. Regarding the “Cabrera Alpha-Beta Counting Instrument” spreadsheet/log sheet for Ludlum Model 2360; s/n 184952:

Some of the MDA (MDC) “ α dpm” results exceed the “Required MDA (DPM/100 cm²) of “100”. For dates with alpha “Daily Bkg Counts” of “2” and “3”, the calculated MDA (MDC) results using ISO-7503-1 criteria are “108” and “124”, respectively. Please explain if the “Daily Bkg Counts” are a result of a single background measurement within one minute, or the mean background count.

- l. The results in Comments (i) and (j) above indicate the MDA (MDC) values given in the Appendix E, “Instrument QC Chart”, “Cabrera Alpha-Beta Counting Instrument” have been underreported by approximately 51% for alpha emitters and underreported by approximately 20% for beta emitters.

Therefore, the MDA (MDC) results given throughout the Radiological Supplemental Assessment, its appendices and all other results where misuse of total activities of calibration sources to calculate survey instrument efficiencies and total efficiencies will require re-calculation and correction using ISO-7530-1 criteria.

It is within the purview of CDPH-EMB that total efficiency calculations based on ISO-7503-1 criteria are technically defensible due to the use of particle emission rate measurements, given in the certificate of calibration documents, are measurements provided by a calibrated instrument and a NIST traceable calibrated alpha or beta source. However, it is also the understanding of CDPH-EMB that total activities used for calculating instrument efficiencies in the subject document and its appendices are based upon calculations, which in turn, are based upon assumptions and are, therefore, not NIST traceable and not technically defensible.

2. Appendix E, “QC Charts”, “Instrument QC Charts”:

- a. Charts of “QC Daily Source” and “Initial Source Readings” for the following instruments have been duplicated:

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- i. Ludlum Model 2221r (s/n 81308)/Ludlum Model 44-20 (s/n PR269985);
 - ii. Ludlum Model 2221r (s/n 125457)/Ludlum Model 44-20 (s/n PR269983).
- b. Some instrument QC charts with “Pass/Fail” results are illegible. Please provide copies of affected instrument QC charts with contrast sufficient to readily determine “Pass” or “Fail” result.