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From: Commanding Officer, Engineering Field Activity, West, Naval Facilities Engineering Command

To: Distribution

Subj: RESPONSE TO COMMENTS ON THE PHASE III RADIATION INVESTIGATION DRAFT FIELD WORK PLAN, ENGINEERING FIELD ACTIVITY, WEST, NAVAL FACILITIES ENGINEERING COMMAND, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Encl: (1) Response to U.S. Environmental Protection Agency and the Department of Health Services Comments on the Phase III Radiation Investigation Draft Field Work Plan, Hunters Point Annex, Engineering Field Activity, West, Naval Facilities Engineering Command, San Francisco, California, dated 30 September 1996

1. Enclosure (1) is forwarded as the Navy's response to comments on the Phase III Radiation Investigation Draft Field Work Plan. We expect to issue the Phase III Radiation Investigation Draft Final Field Work Plan next week

2. Please contact Ms. Luann Tetrick at (415) 244-2561, FAX (415) 244-2654 as soon as possible if you do not feel that our responses adequately address your comments.

Original signed by:

RICHARD E. POWELL
By direction of
the Commanding Officer

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**ENGINEERING FIELD ACTIVITIES WEST,
NAVAL FACILITIES ENGINEERING COMMAND,
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA**

**RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY AND
THE DEPARTMENT OF HEALTH SERVICES COMMENTS
ON THE PHASE III RADIATION INVESTIGATION DRAFT FIELD WORK PLAN**

Prepared By

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September 30, 1996

Enclosure ()

**RESPONSE TO CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY (CAL/EPA),
DEPARTMENT OF HEALTH SERVICES (DHS)
COMMENTS ON THE PHASE III RADIATION INVESTIGATION
DRAFT FIELD WORK PLAN**

The following are the Navy's responses to DHS and Department of Toxic Substances Control's (DTSC) comments on the phase III radiation investigation draft field work plan dated February 15, 1996. Radiological information and survey data provided in the field work plan noted above are based on the files from the U.S. Naval Radiological Affairs Support Office (RASO) that were submitted to Engineering Field Activity West, PRC, and the appropriate state and federal agencies overseeing the work at Hunters Point Shipyard (HPS).

GENERAL COMMENTS:

- Comment 1** **Page 6, Section 2.1: This work plan does not provide enough detail to explain for documentation purposes, for workers or for plan evaluators how the survey will be performed. On Page 6, Section 2.1, NUREG/CR-5849 does not contain procedures to be used or the field work plan. NUREG/CR-5849 does not contain the "procedures detailed," but only offers guidance to design a plan specific to the site, for the conditions present and for the radionuclides of concern.**
- Response** The field work plan will be revised to include sections detailing standard operating procedures (SOP) for performing surface radiation surveys, surface soil sampling, instrumentation calibration, detector specific minimum detectable activity, efficiency calculations, and survey data record keeping and reporting. The SOPs will be submitted to the regulatory agencies upon receiving them from the subcontractor that the task order is awarded; however, only subcontractors familiar with NUREG/CR-5849, American Society for Testing and Materials (ASTM), and related radiological survey guidance documents will be encouraged to submit bids.
- Comment 2** **For most of the surveys recommended, gamma count rates with possible gamma spectroscopic analysis of soil are the only types of radiation detection/analysis recommended. Additional discussions and clarification should be added to explain why the presence of other types of radionuclides (alpha and beta emitters) are not suspected or monitored for in these areas.**
- Response** The radioactive material licenses associated with former Naval Radiological Defense Laboratories (NRDL) and formerly used defense (FUD) sites at HPS have been reviewed by Commander Lino Fragoso of RASO. Strontium-90 (⁹⁰Sr) is the only nongamma emitting radionuclide being evaluated at HPS. The two sites currently being investigated for ⁹⁰Sr and gross beta activity are building 351A piping and the soils surrounding former building 506. The two scenarios that required additional work to be performed were: 1) when little or no information is available to confirm that a decontamination and decommissioning survey had been performed (e.g. Building 351A, Room 47 sink area), or 2) when the buildings were demolished and there was anecdotal information or a documented spill or release outside the

building (building 506 ⁹⁰Sr spill in former parking lot).

Tritium was another radionuclide used at some of the sites at HPS (buildings 816 and 506); however, as the Navy and DHS discovered during the building 816 tritium investigation, due to its high solubility characteristic in water the likelihood that tritium could be detected in soils is minimal at best.

Comment 3a

In order to adequately evaluate this plan the following information is needed:

A) Copies of PRC Environmental Management, Inc.'s standard operating procedures used for sampling, laboratory analysis, instrument calibrations and checks, and laboratory QA/AC procedures; (Reviewer requested these documents in October, 1995 for earlier reviews, but has not received a response.)

Response

PRC is following NRC guidance, ASTM guidance, and standard industrial practices when performing radiological sampling. The contractor will use ASTM guidance for collecting surface soil samples at radiological sites. Laboratory analysis will be performed by a State of California certified laboratory. Instrument calibration and operational checks will be performed by contractor according to standard industrial practices. Laboratory QA/QC procedures are contained in PRC's Quality Assurance Project Plan (QAPP) which includes an evaluation of the contracted laboratory's quality assurance procedures. The Navy will include in the final draft of the field work plan a copy of PRC's QAPP and the selected contractors SOPs for performing radiological investigations. Due to the use of a variety of SOPs from PRC and the previously subcontracted consulting firms, PRC was not able to provide the previously requested documents and apologizes for any problems it may have caused.

Comment 3b

MDA's used to determine that no further radiation surveys were needed.

Response:

The radiological data associated with former NRDL and FUD sites is incomplete. Therefore, not all the MDA's established during each decommissioning and decontamination survey are available; however, based on the limited information available (radionuclide inventories, discussion of past operations at the site), RASO in coordination with the DHS, determined that the MDA for each building met NRC's criteria to determine acceptable surface contamination levels for each radionuclide of concern. Based on the fact that detectable activity was below acceptable surface radioactivity values, the five radioactive material licenses issued to HPS were terminated. MDAs, efficiency calculations, and other radiological data are provided as an attachment to these responses.

Comment 3c

U.S. EPA. 1994. Petrographic analysis of Surface Soils in IR-02 (Parcel E), Hunters Point Annex, San Francisco, California.

Response

A copy of the petrographic analysis of surface soils in IR-02 will be provided

as an attachment to this document.

SPECIFIC COMMENTS:

Comment 1 **Page 7, Section 2.8. Explain how background exposure levels were averaged. How many readings were taken? What was the range of background exposure levels? Ten microrentgen per hour ($\mu\text{R/hr}$) is about two times the average background found in other areas of California.**

Response Over 100 background exposure measurements were collected during phase I and II of the radiation investigation at HPS. Background exposure levels were averaged using all exposure measurements collected in the field during the surface confirmation radiation survey (phase I of the radiation investigation at HPS) and the subsurface radiation investigation in Parcels B and E (phase II). The background exposure levels ranged between 1 and 20 $\mu\text{R/hr}$. The instrument used to evaluate exposure levels at HPS was a Victoreen 450P (pressurized ion chamber). The average background found in other areas would be affected by factors such as the sensitivity of the instrument, the geology of the location [which in California ranges from granites which contain higher levels of naturally occurring radioactive material (NORM) bound in the mineralogy of the rock relative to basalts and serpentines which have much lower NORM levels], and the elevation of the site. Instrument sensitivity, low exposure levels at background locations, and an uncharacteristically heterogenous mix of soils likely account for the increased background exposure levels relative to other areas in California.

Comment 2 **Page 7, Section 2.3. Explain how "all background measurements will be used to identify areas of potential concern"?**

Response Background measurements will be collected to evaluate the site specific background activity for each instrument used at the site. Federal regulations for acceptable surface radioactivity values will be used to identify areas of elevated activity (NRC Regulatory Guide 1.86). Background activity will be evaluated to determine its contribution to the gross activity at each site. The sentence "all background measurements will be used to identify areas of potential concern" will be modified to read, "background measurements will be collected to determine the background radiation contribution at a site."

Comment 3 **Page 9, Section 2.5. Information regarding the detector sensitivity (MDA and efficiency) for each detector (specify model and serial numbers) must be documented with the specific survey data collected to assure that quality data is collected. This information will be crucial to the interpretation of survey results. (See NUREG/CR-5849, Section 8.)**

Response The MDA and efficiency for each detector will be determined using NUREG/CR-5849, section 8, guidance for determining MDA and efficiency values for radiological instrumentation. The equations used to determine these

values will be included in the final draft of the field work plan.

Comment 4

Page 15, Section 3.1.1.2, Building 113A. Provide the MDA and or the aggregate activity from the 1978 RASO survey.

Response

Building 113A has already been cleared for release by DHS and DTSC according to a letter dated October 30, 1995. This letter was in response to the Navy's request for regulatory concurrence that all former NRDL buildings in Parcel B at HPS be released for unrestricted use. Reasons for their release was either due to documentation that indicated no radioactive material was used or stored at a building, or that a decontamination and decommissioning survey had been performed and met current release criteria. The agencies agreed and reaffirmed at several radiological technical meetings held over several years (1993-1995) that that RASO's review of the radiological surveys performed at the site, if any were performed, was sufficient. Representatives from DHS, DTSC, EPA, RASO, PRC, and EFA West participated in these meetings. In late 1994 or early 1995 Lino Fragoso of RASO met with DHS personnel and reviewed any existing data to evaluate each site and determine if additional surveys are required for unrestricted use.

Comment 5

Page 20 and 21, Section 3.1.3.2, Building 313. Describe in more detail "little or no decontamination efforts"? What radionuclides were found, and what were the required surface decontamination levels? At what levels were the decontaminated areas considered clean? What were the minimum detectable levels for surveys done after decontamination?

Response

Minor decontamination efforts were required at several sites on an ongoing basis due to general handling of radioactive materials. When all NRDL operations moved to Building 815, radiological decontamination and decommissioning surveys were performed at all buildings that handled radioactive material and were performed in accordance with procedures for termination of radioactive material licenses. There is no radiological survey data available for building 313; therefore, there is no information available on the radionuclides of concern or minimal detectable activity levels at the site. The only information available related to this site was documented in the 1955 NRDL Radiological Safety annual report that was included in RASO's files and was submitted to DHS for their records. Page three of the report states, "little or no decontamination effort was required to effect the final clearance of Buildings 313, 351, 351B, and 508." The sentence, "little or no decontamination efforts were required", will be modified in the final draft of the phase III radiation investigation field work plan to read, "little or no decontamination effort was required to effect the final clearance of building 313."

All surface activity levels were required to be below the criteria provided in NRC Regulatory Guide 1.86.

Comment 6

Pages 22 and 23, Section 3.1.3.5, Building 351B. Is there any documentation describing the move to building 815? Was there any documentation indicating whether the X-ray unit and sealed check sources were moved or left at that time? Has anyone attempted to locate the building, other than by reviewing "old engineering drawings of the building"?

Response

There is documentation showing that the x-ray unit was properly shipped to another command within the Navy. The unit or the check sources were not left in the building after the move to building 815.

Building 351B is now known as building 366 and is currently occupied by a civilian metals fabrication company, Christian Engineering. They occupy the entire building and a site visit confirmed that the x-ray unit had been removed from the building.

Comment 7

Page 23, Section 3.1.3.6, Building 365. Provide results of the radiation survey performed. What were the MDA values that the survey results were less than?

Response

The only information available was in a 1965 inspection of the building 365 by NRDL personnel. The inspector found that the radioactive check sources were stored and labeled properly. The only documentation available discussing a surveys being performed was found in several letters from the NRC, Region V and NRDL. These letters provided survey dates and listed the building as one of the many buildings released for unrestricted use. These letters are provided as an attachment. Because only sealed check sources were used for calibration of radiation detection equipment and calibration development activities, no residual surface contamination would be expected to be encountered.

Comment 8

Page 29, Section 3.2.1.1, Building 351A. Provide more documentation about the radiation survey that was performed on August 15, 1974. The activity remaining after decontaminations described as 200 cpm removable activity may not be acceptable depending on the radionuclide(s) present and the efficiency of the detector used for the survey.

NRC Reg. guide 1.86 was referenced to determine acceptable contamination levels for removable activity. Table 1, page 1.86-5 of the referenced guide shows these levels in units of dpm/100 cm² not in "counts per minute" as specified in the work plan. The California Department of Health Services' "Acceptable Surface Contamination Levels" are also reported in units of dpm/100cm². The highest acceptable removable surface contamination levels are 1,000 dpm/100cm² for some beta-gamma emitters.

If the efficiency of the detector used was 17% (typical) then a 200 cpm reading would actually be interpreted as 1,176 dpm, which may exceed the

applicable surface contamination limits. If this is the case or there isn't adequate documentation to prove otherwise, we suggest that these areas be resurveyed. There may also be a need to look for alpha contamination if lack of alpha emitter use is not well documented in the survey report or other documents.

Response

The radiation survey performed by the Navy met the release criteria for the specific radionuclides after decontamination efforts were completed. NRDL determined that 200 counts per minute (cpm) was the maximum removable activity for the radiation detection equipment used at the site (presumed to be a Geiger-mueller detector). The decontamination was due to a known spill during normal operations in the building that was immediately decontaminated and resurveyed. RASO has reviewed the survey information regarding this site and determined that the residual surface contamination met release criteria for license termination and that the residual contamination meets current release criteria. The file has been reviewed for all possible source terms prior to termination of the radioactive material license. The piping in the building was the only area NRDL did not decontaminate and resurvey. The Navy intends to collect wipe samples to determine if any residual beta contamination exists in the piping.

A naval contractor performed a cursory health and safety survey of the building in 1994 so that contractors and other civilian personnel could enter the building to perform asbestos surveys and other activities not associated with the remedial investigation at HPS. Instruments used during the survey were a Victoreen 450P Exposure meter, Geiger-Mueller, and gamma scintillation detector. No elevated activity was noted during the survey.

All surface contamination surveys to be performed in phase III of the radiation investigation at HPS will use Table 1 in Reg. guide 1.86-5, Acceptable Removable Surface Contamination Limits and the activity will be reported in dpm/100cm². Table 1 in Reg. guide 1.86 will be included in the final draft of the phase III radiation investigation field work plan.

Comment 9

Page 30-33, Section 3.2.1.2, Building 364 (exterior). It is not clear to the reviewer why further analysis of soil, wipes, and water are being recommended to identify any other alpha, beta or gamma emitting radionuclides in the area.

Response

If elevated alpha or beta count rates are observed in the field, a wipe sample(s) will be collected and analyzed for gross alpha or beta activity. If necessary isotope specific analysis will be performed to identify the source of the elevated count rates. Additional text will be included in the work plan that will read, "Wipe sampling and analysis for alpha or beta-emitting radionuclides will be performed if elevated gross alpha/beta count rates are observed in the field. If necessary, isotope specific analysis will be performed to identify the contributors to the elevated gross activity." There are no exposed soils in the

area surrounding building 364. Only surface contamination on relatively impermeable surfaces (asphalt and concrete) is expected to be encountered at the site.

Comment 10

Page 33, Section 3.2.1.2, Building 364 (exterior). Verify that "Exposure rate measurements will be collected at the surface and at 3.0 ft. Above the surface at various locations...."

Response

The sentence was incorrectly stated. No surface exposure measurements will be collected. The field technician performing the radiation survey in the secondary containment and utility vaults, and the area surrounding the vaults will measure the distance from the surface to the exposure meter when collecting an exposure level measurement. Notes will be made by the field technician if any circumstance arises that prevents the measurement from being collected at 1 meter above the surface. The sentence will be modified to read, "Exposure rate measurements will be collected at 1 meter above the surface at all sample locations and other potentially effected areas at the site."

ATTACHMENT A

**RADIOLOGICAL INFORMATION AND SURVEY DATA FROM FORMER NRDL
BUILDINGS**

**RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
COMMENTS ON THE PHASE III RADIATION INVESTIGATION
DRAFT FIELD WORK PLAN**

The following are the Navy's responses to the EPA's comments on the phase III radiation investigation draft field work plan dated February 15, 1996. Radiological information and survey data provided in the field work plan noted above and these responses to regulatory agency comments are based on the files from the U.S. Naval Radiological Affairs Support Office (RASO). RASO provided this information to Engineering Field Activity West, PRC, and the appropriate state and federal agencies overseeing the work at Hunters Point Shipyard (HPS).

SPECIFIC COMMENTS:

Comment 1 **Section 2.2, Page 7. The Navy is considering establishing an isotopic inventory of gamma emitting isotopes in the surface soils at Hunters Point Annex and storing the information electronically on a computer disk for later analysis. Will the EPA have access to the information on computer disk?**

Response The Navy has established an isotopic inventory of gamma-emitting isotopes in soils at HPS. The Navy does not have this information in an electronic format at this time. If the Navy does convert this radiological data to an electronic format, the data would be made available to the EPA.

Comment 2 **Section 2.2, Page 7, third paragraph. It is unlikely that strontium 90 (⁹⁰Sr) devices can be successfully identified by detecting bremsstrahlung x-rays being generated in the soil surrounding the devices. EPA does not regard the method described in this section as an acceptable method of field screening for ⁹⁰Sr.**

Response The Navy requested Joel Cehn, a certified health physicist, determine if ⁹⁰Sr used in association with deck markers could be detected using a gamma scintillation detector. Under certain conditions, bremsstrahlung x-rays (300 keV) could be detected using a two inch by two inch sodium iodide (NaI) detector. One of the main criteria that must be met of course is that the ⁹⁰Sr must be in contact with the metallic portion of a deck marker so that bremsstrahlung x-rays could be produced. However, this method has been recommended only as a screening tool, not a characterization tool. Soil sampling is the Navy's method of investigating ⁹⁰Sr when it is a concern. So far the Navy has not encountered ⁹⁰Sr at HPS.

The area that was unsurveyed during phase I and II of the radiation investigation at IR-02 is no longer proposed for surveying. This area was inaccessible during the first two phases of the investigation due to construction debris and dense vegetation. The area that was not previously surveyed was included in the soil volume estimates for the site. This data is provided in the subsurface radiation investigation in Parcels B and E final draft report and Appendices A-D (PRC, 1996). The Navy believes that it is not necessary to survey the remaining areas in IR-02. Since it would not significantly add to the understanding of the nature and extent of radiation in this area. An estimate of

the number of point sources, their distribution, and the aggregate activity has been calculated. Approximately 2,700 point sources are randomly distributed in 5,500 cubic yards of soil. This would give a ratio of sources per soil volume of approximately 1 source per 2.2 cubic yards of soil. Measuring surface activity in the unsurveyed areas would not render additional information that would enhance the Navy's understanding of the site conditions. The Navy believes that IR-02 has been characterized adequately enough to evaluate feasible remedial options for IR-02. Because of the minimal benefit from collecting additional surface measurements, a radiation survey is not proposed; therefore, the paragraph that discusses gamma detection equipment to be used to identify ⁹⁰Sr will be deleted from the final draft of the phase III radiation investigation field work plan. When appropriate, soil sampling will be the method used to establish whether ⁹⁰Sr exists in soils at HPS.

Comment 3

Section 2.5, page 9. The gamma rays emitted from Cesium 137 (¹³⁷Cs) are primarily 662 keV energy. The most detectable gamma ray for radium is only 182 keV. Thus, radium gamma rays have 30% less penetrating power than cesium gammas. The 2-inch by 2-inch sodium iodide (NaI) detector is unlikely to detect a one microcurie radium source buried deeper than 12 inches.

Response

It has been the Navy's experience that a one microcurie radium source could be detected from 12- 18 inches below the surface using a 2-inch by 2-inch NaI detector. Of course the detectors response depends on soil and material densities, soil moisture, and other parameters influencing the ability to detect radioactive material in the field. The work done at HPS found that a one microcurie radium point sources could be detected up to 14 inches below the surface. Radiation surveys performed at Alameda Naval Air Station found that they could detect a 0.87 microcurie radium dial up to 18 inches below the surface.

Comment 4

Section 3.1.4.6, page 28, Buildings 830 and 831. No information is provided on previous investigations and decontamination activities, including confirmation sampling of any floor drains and sanitary piping, in and around the buildings. Please provide a justification, including background investigative information, for recommending that no confirmation survey be performed.

Response

RASO provided radiation survey recommendations after review of the phase III radiation investigation draft field work plan and their files on each former NRDL building. RASO recommended that no survey be proposed after a thorough review of their files to identify radionuclides used, phase type, activity, and locations where radioactive material was used, stored, or disposed of. Anecdotal information was provided by individuals who worked for the NRDL and have knowledge of operations at the sites. Most of the experiments performed in the late 1950s and 1960s dealt with establishing "death curves" by irradiating animals with high doses of gamma-emitting sources. In addition, radionuclides that may have been injected or ingested as part of NRDL experiments were likely "tracer isotopes"; therefore, any residual radioactive material would no longer be able to be detected.

Buildings 830 and 831 were evaluated and released by the AEC as part of terminating

the radioactive material licenses issued to HPS and no additional surveys are proposed in the phase III radiation investigation field work plan. Currently the sites are owned and operated by UCSF.

Comment 5

Section 3.2.1.2, page 33. The international standard for waist high exposure rate measurements is one meter above the surface rather than three feet as stated.

Response:

The text has been changed to read, "Exposure rate measurements will be collected at 1 meter above the surface at all sample locations and various locations throughout the site".

Comment 6

Section 3.2.2.1, page 35. An NaI detector is not appropriate for detecting ⁹⁰Sr. See comment #3 above.

Response

The NaI detector is to detect gamma-emitting material only. It was not intended to be used at this site to investigate for ⁹⁰Sr. The soil samples to be collected in the area surrounding former building 506 are being analyzed specifically for ⁹⁰Sr. Although ⁹⁰Sr is the radionuclide of concern, a gamma radiation survey is proposed as a precautionary measure due to a lack of available data.