APPENDIX E
PARCEL D RADIATION INVESTIGATIONS
HUNTERS POINT SHIPYARD

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1.0 INTRODUCTION

The investigation of radiation sites at Hunters Point Shipyard (HPS) have consisted of three phases (I, II, and III). Phase I of the investigation was a surface confirmation radiation survey (SCRS), conducted in 1991, that included air and soil sampling. Phase II of the investigation was conducted in (year) and evaluating the subsurface distribution of radioactive point sources detected during the SCRS. This document summarizes phase III of the radiation investigation, which addressed the radiological issues associated with former operations at Naval Radiological Defense Laboratory (NRDL) sites at HPS and the licensing of radioactive material by the Nuclear Regulatory Commission (NRC) in support of NRDL activities.

1.1 HISTORY OF NRDL AT HPS

HPS was a center of shipbuilding and ship repair during World War II. Pure and applied radiological research also played a major role in HPS's history. In 1948, a group of scientists at HPS formed the NRDL as a subgroup of HPS. The mission of the NRDL was to study the effects of nuclear weapons and, based on those findings, develop effective countermeasures against radiation. HPS was selected as the preferred West Coast site for NRDL because of its proximity to the University of California's (U.C.) Clocker Radiation Laboratory and other Navy facilities, and its drydock capacity. NRDL activities at HPS required the use of a cyclotron, a Van de Graaff generator, X-ray machines, radiological laboratories, support offices, and kennels for animals used in radiological studies.

In late 1946, a small group of personnel composed of U.C. and Navy scientists was tasked to identify methods of decontaminating ships that had returned from nuclear weapon tests near Bikini Atoll in the Marshall Islands. In 1951, the laboratory became a separate Navy command. To support its mission to study the effects of nuclear weapons and develop countermeasures for them, staffing was increased to more than 100 military and almost 600 civilian personnel.

During the early years of the NRDL, and until about 1955, laboratory operations were conducted at various buildings and sites throughout HPS. These former NRDL sites are within the four areas currently designated as Parcels B, C, D, and E.

On April 25, 1969, the Navy announced the disestablishment of NRDL with a closure date of about December 31, 1969. Part of the disestablishment of the NRDL was the termination of the radioactive material licenses that had been issued to the Navy by the Atomic Energy Commission (AEC), which was the original agency responsible for tracking radioactive material, and later by the NRC. Radioactive material licenses issued to HPS included three byproduct material licenses (numbers 04-00487-03, 04-13488-01, and 04-00487-09); a source material licence (number SNB-376), authorizing possession of natural uranium and thorium; and special nuclear material license (number SNM-35) that authorized possession of plutonium and other radionuclides. All licenses issued to by the AEC and NRC have been terminated.

1.2 HISTORY OF RADIATION INVESTIGATIONS AT PARCEL D

Radiation surveys performed during the 1991 SCRS at HPS identified several areas that contained elevated gamma activity. Two survey sites were identified in Parcel D in an area just outside and adjacent to Buildings 364 and 351A. This area was formerly used for the subsurface containment of low-level radioactive waste generated in Building 364. Gamma count rates collected from the asphalt and concrete surfaces in the area were measured at greater than 1.5 times the expected facility-wide background (PRC 1993). One asphalt sample collected at the location of a Cesium-137 (^{137}Cs) spill in the area contained 232 pCi/g ^{137}Cs, which was the highest gamma count rate measured in the field.

2.0 PHASE III RADIATION INVESTIGATION AT PARCEL D

The purpose of phase III of the radiation investigation in Parcel D at HPS was to address radiological concerns regarding the former use, storage, and disposal of radioactive material associated with past NRDL operations at HPS. The goal this phase of the radiation investigation is the eventual release of all remaining buildings and sites in Parcel D for unrestricted use.

Based on the recommendations of RASO's representative LCDR, Lino Fragoso, radiation surveys were conducted under phase III at sites where residual contamination was known to exist or where radiation surveys had not been performed as part of the radioactive material license termination process (for example, outside buildings where radioactive material was used or stored). Buildings and sites that met the following conditions were excluded from the phase III investigation:

- The building or site was surveyed by NRDL, RASO, AEC, or NRC personnel and released for unrestricted use
- The radioactive material license for the building or site has been terminated

Of the eight sites in Parcel D proposed for radiological surveys in phase III, it was determined during the preliminary data gathering stage that surveys were not required at six sites because either no radioactive material was ever used or stored at the site or a radiation survey had already been performed and the site was subsequently released for unrestricted use by the AEC or NRC. The NRDL sites and buildings that were to be investigated in Parcel D for potential radiological contamination are listed in the table below.

Site	Building	Former or Current Use	Proposed Investigation
IR-33	Bldg. 364	Concrete subsurface secondary containment and utility vaults formerly housing an NRDL low-level radioactive waste tank and associated piping (outside of building). The tank and piping were removed by NRDL personnel. Building currently being used by a private tenant performing precious metal smelting	Surface contamination survey of vault, utility trenches, and the asphalt area adjacent to the vault outside of the building Water sampling of secondary containment vault (rainwater) Surface radiation survey and wipe sampling of secondary containment vault, utility trenches and other areas exhibiting elevated radioactivity
	Bldg. 365		
	Bldg. 366 (Formerly Bldg. 351B)	Former boat plastics facility and administrative functions. Only contained x-ray unit. Used check source (^{60}Co). Currently occupied by Christian Engineering, Inc.	No survey required
IR-34	Bldg. 351	Administrative offices (unoccupied)	No survey required
	Bldg. 351A	Former radiac repair facility. Beta contamination in drain pipe of sink area in Room 47.	Survey and wipe sampling of drain pipe for residual beta contamination (sink has been removed)

Site	Building	Former or Current Use	Proposed Investigation
IR-35	Bldg. 274	Former decontamination training building (unoccupied)	No survey required
	Bldg. 313	Former NRDL storage site (building in ruins)	No survey required
	Bldg. 313A	Former NRDL photographic film laboratory (unoccupied)	No survey required

The preliminary data gathering for potential radiological contamination is summarized in the following subsections. Section 2.1 summarizes the results of investigation for the six sites where no radiation survey is proposed, and Section 2.2 summarizes the results of investigation for the two sites where radiation surveys are proposed.

2.1 INVESTIGATION RESULTS FOR SITES WHERE NO SURVEY IS PROPOSED

This section summarizes the results of preliminary data gathering for potential radiological contamination at sites in Parcel D where the data indicated that no radiation survey was required. The site background, current site conditions, radiation survey results, and the rationale for not surveying the site are presented.

2.1.1 IR-35 Building 274

Site Background

Building 274, located in the site currently designated as IR-35, was formerly used for decontamination training. This building was included in the radiation investigation when a "radioactive materials" sign was found in the building during a site assessment survey. RASO's records showed that Lanthanum-140 (^{140}La), with a half-life of 1.6 days, was the only radionuclide used in the training exercises. No records were located discussing the use or storage of radioactive material in this building, or indicating that a decommissioning radiation survey had been performed.

Site Reconnaissance

Building 274 has numerous small, partitioned rooms and a general work area. Other than a small plastic "radioactive materials" sign found on a ledge of a wall, there is no documentation that suggests that radioactive material was used or stored in this building.

Radiation Survey Results

The Navy performed a health-and-safety cursory survey of Building 274 to measure the exposure levels in the building so that naval personnel, contractors, and civilian tenants could safely enter the building. No elevated exposure levels were observed.

Recommendation

Only a very short lived radionuclide, 140 La, may have been used in Building 274. The half-life of this radionuclide is 1.6 days. Any residual contamination remaining in the building after operations ended in the late 1960s would no longer exist; therefore, a radiation survey is not recommended for Building 274.

2.1.2 IR-35 Building 313

Site Background

Building 313 was formerly designated by the NRDL as Annex G. The building was located near the intersection of Manseau and Morrell Streets. The foundation of the building is currently located within the controlled area surrounding Drydock No. 4, maintained by Mare Island Naval Shipyard. There is no evidence that radioactive material was used or stored in this building.

Site Reconnaissance

Building 313 has been demolished and only the foundation remains.

Previous Radiation Survey Results

During transfer of operations from Building 313 to Building 815, the building was surveyed and minimal decontamination efforts were required (AEC 1954-1970, 1959-1970a, and 1959-1970b).

Rationale for No Further Survey

No survey is required at Building 313 since there was little radioactive material used or stored at the site and only a minimal decontamination effort was required during the relocation of operations from Building 313 to Building 815. In addition, there is no evidence that suggests the potential for residual contamination in soils surrounding the former building. As a result, a radiation survey is not recommended.

2.1.3 IR-35 Building 313A

Site Background

Building 313A was formerly designated by the NRDL as Annex G. The building is located near the intersection of Manseau and Morrell Streets. The foundation of the building is located within the controlled area surrounding Drydock No. 4, maintained by Mare Island Naval Shipyard. There is no evidence that radioactive material was used or stored in the building.

Site Reconnaissance

Building 313A has been demolished and only the foundation remains.

Rationale for No Further Survey

No radioactive material was used or stored in Building 313A; therefore, a radiation survey is not recommended.

2.1.4 IR-34 Building 351

Site Background

Building 351, which is located in IR-34, was used for administrative support to NRDL operations. There is no evidence of radioactive material use or storage by NRDL personnel in this building.

Site Reconnaissance

Building 351 is currently unoccupied.

Previous Radiation Survey Results

The Navy performed a cursory survey of Building 351 to evaluate the radiation exposure levels in various areas in the building. The survey was conducted as a precaution because Navy contractors and other personnel needed access to the building. No elevated exposure levels were observed during the cursory survey of the building.

Rationale for No Further Survey

Since there was no radioactive material used or stored in the Building 351, a confirmation survey is not recommended.

2.1.6 IR-33 Building 366 (Formerly Building 351B)

Site Background

Building 366, formerly known as Building 351B, is located in IR-33 on Cochran Street. The building was primarily used as a boat plastics facility that included administrative operations. An X-ray unit was also housed in the building.

Site Reconnaissance

The X-ray unit that was housed in Building 366 (351B) was removed when NRDL operations were moved to Building 815. The X-ray unit was relocated to another NRDL facility. The building is currently leased to Christian Engineering, Inc., a privately owned metal fabrication business.

Previous Radiation Survey Results

No decontamination efforts were required at the time operations were moved to Building 815.

Rationale for No Further Survey

A confirmation survey is not recommended for Building 366 (351B).

2.1.5 IR-33 Building 365

Site Background

Building 365, the former NRDL photographic film and calibration laboratory, is located at the southern end of Cochrane Street in Parcel D, in the site currently designated as IR-33. The building was used by NRDL personnel as a laboratory to develop dosimetry film and calibration. Later the building was used by the Navy as a pipe fitters support office, after NRDL operations were relocated to Building 815.

Site Reconnaissance

Building 365 is currently unoccupied and is surrounded by chain link fencing.

Previous Radiation Survey Results

A radiation survey was performed prior to the decommissioning of Building 365. Survey results found activity to be lower than minimum detectable levels (AEC 1954-1970, 1959-1970a, and 1959-1970b).

The Navy also performed a health and safety cursory survey of the building in 1993 to assess the potential for exposure to residual radioactive contamination. The survey was conducted so that Navy personnel and contractors performing work at HPS could safely enter the building. No elevated exposure levels were observed.

Recommendation

A confirmation survey is not recommended at Building 365.

2.2 INVESTIGATION RESULTS FOR SITES WHERE SURVEY IS PROPOSED

Based on recommendations provided by RASO, two sites will require a confirmation radiation survey because of the nature of former NRDL operations at the site or because the site was not surveyed as part of the decommissioning of the disestablishment of the NRDL and license termination process. This section summarizes the site background, current site conditions, previous radiation survey results, survey recommendations, and proposed survey methods for each site.

2.2.1 IR-34 Building 351A

Site Background

Building 351A, located on Cochran Street on the boundary of IR-34, is immediately adjacent to Building 364. NRDL records indicate that a portion of Building 351A was used as a radiac repair facility. Beta contamination was detected by NRDL personnel in the piping during decontamination and decommissioning surveys that were performed as part of the license termination process at HPS.

Site Reconnaissance

Building 351A is are currently unoccupied, and all equipment and instrumentation has been removed. Piping from a former sink area is located inside the room numbered 47. This area was labeled "work area" on AEC radiological survey drawings (AEC 1954-1970, 1959-1970a, and 1959-1970b).

Radiation Survey Results

On August 15, 1974, a radiation survey was performed at building 351A that included collection of wipe samples and direct reading measurements. The maximum acceptable removable surface radiation count rate was established at 200 cpm. Beta contamination was discovered by NRDL personnel in portions of the drain pipe, and there is no record of any decontamination effort. The remaining areas of the building were surveyed by shipyard personnel prior to decommissioning of the NRDL (AEC 1954-1970, 1959-1970a, and 1959-1970b).

The Navy performed a cursory survey of the building to evaluate exposure levels. No elevated exposure measurements were observed during the cursory survey of the building.

Recommendation

Wipe samples will be collected from Building 351A, the room 47 sink area piping, and other areas surrounding the piping to determine whether the residual beta contamination detected in the plumbing during the 1974 survey by NRDL personnel is still present. Additionally, if possible, a modified Gieger-Mueller (GM) detector will be used to obtain direst surface readings inside the piping.

Proposed Investigation

One wipe sample will be collected at Building 351A from the first 2 inches of the pipe associated with the work-area sink. Additionally, one wipe sample will be collected from the first cleanout of the pipe. Additional wipe samples will be collected if conditions allow. Wipe samples from Building 351A will be submitted to an off-site laboratory for gross beta analysis. As a supplement to the Navy's investigation at this site, a modified GM detector will be used to measure surface radioactivity in the piping.

2.2.2 IR-33 Building 364 (Exterior)

Site Background

Building 364 was known under the NRDL program as the "Hot Cell" and chemistry laboratory. The building was decontaminated to AEC criteria and the radioactive material licenses issued to HPS were terminated (AEC 1954-1970, 1959-1970a, and 1959-1970b).

A low-level radioactive waste (LLRW) storage tank was housed in a subsurface concrete vault on the east side of Building 364. This tank stored radioactive effluent from the laboratory until it was disposed of off site. A pump immediately next to the LLRW containment vault pumped the effluent from the building to the LLRW tank. The pump was removed and the pump house demolished during the decontamination and decommissioning of the site, prior to the relocation of operations to Building 815. Two utility trenches constructed just outside the building housed the piping that transferred the radioactive effluent from Building 364 to the LLRW tank. Figure E-1 is a map of the site. Areas of potential concern at the site are the utility trenches, the LLRW tank vault, and the asphalt area surrounding the trenches and vault. The vault was previously surveyed by NRDL personnel prior to the relocation of all operations to Building 815. The building and the LLRW storage area (utility trenches and vault) met the AEC criteria for free release (AEC 1954-1970, 1959-1970a, and 1959-1970b).

Site Reconnaissance

The LLRW storage tank has been removed from the concrete vault. The vault is approximately 30 percent filled with what appears to be rainwater. A wooden cover prevents access into the vault. No odors or oily sheens were observed. The pump and the shed housing the pump no longer exist. The area around the vault and utility trenches have been fenced to limit access to authorized personnel.

PRC was unable to confirm whether the piping leading from Building 364 to the storage tank has been removed. The utility vaults have steel covers that prevented access.

Building 364 is currently used as a metallurgy shop by a civilian tenant.

Previous Radiation Survey Results

RASO conducted a radiation survey at Building 364 from September 30 through October 31, 1978. Radioactive contamination was found in the LLRW storage tanks housed below ground in a concrete secondary vault, the pump shed from which liquid waste was pumped into the LLRW tanks, and the piping leading from the pump shed and Building 364. These areas were either decontaminated to acceptable levels or the materials were disposed of off-site. The LLRW tanks and associated plumbing were disposed of off-site as radioactive material (AEC 1954-1970, 1959-1970a, 1959-1970b). All contaminated concrete associated with the secondary containment vault was chipped away, packaged, and sent offsite for disposal.

During the SCRS performed in 1991, a walkover radiation survey was performed in the area surrounding the tank and utility vaults. Elevated alpha, beta, and gamma count rates were observed in a small area where the utility trenches meet Building 364 (See Figure E-1).

The Navy performed a second surface walkover survey in 1993 that identified a second area exhibiting elevated gamma count rates (to a maximum of 40,000 cpm). The elevated activity was detected within a peanut-shaped area approximately 8 feet by 20 feet. This area is located approximately 15 feet from the east side of the tank vault (See Figure E-1). Gamma spectroscopic analysis of an asphalt sample collected from the area exhibiting the highest count rate contained 232 pCi/g of ^{137}Cs.

Recommendation

Based on the former operations within Building 364 and the associated LLRW storage tanks and piping; the elevated alpha, beta, and gamma count rates observed in the field; and the detection of a ^{137}Cs spill in the area, a 100 percent surface radiation survey is recommended for the utility trenches, the tank vault, and the area surrounding the tank vault.

Proposed Investigation

A water sample will be collected from the tank vault at Building 364 to characterize the water for radiological constituents. Based on the analytical results, the water will be pumped and properly disposed of offsite. A 100 percent surface survey of the utility vaults and the associated steel covers will be

performed using a G-M detector, an alpha scintillation detector, and a NaI detector. Areas that exhibit elevated count rates will be delineated, recorded, and a wipe sample will be collected. Water and wipe samples from Building 364 will be sent to an off-site laboratory for gamma spectroscopic analysis.

Exposure level measurements will be collected at 3 feet above the surface at various locations at the site. Additional measurements will be collected above and within the utility and LLRW tank containment vaults and any areas that exhibit elevated activity.

The field work is expected to be completed by the end of November 1996.

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