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SUPERVISOR OF SHIPBUILDING, CONVERSION AND REPAIR, USN
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:
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From: Supervisor of Shipbuilding, Conversion and Repair, USN, San Francisco
To: Commander, Naval Sea Systems Command (07014), Department of the Navy, Washington, D. C. 20362
Via: Officer in Charge, Naval Nuclear Power Unit, Port Hueneme, CA 93043

Subj: Use of Radioactive Materials at the U.S. Naval Radiological Defense Laboratory

Ref: (a) Meeting between J. J. Rush, Jr., and N. Kinsinger, NAVSEA, F. Stivender, SUPSHIP and A. Smith, NOSC on 16 Oct 78.

Encl: (1) Radiological History of the Naval Radiological Defense Laboratory

1. In accordance with the agreement reached per reference (a), the history of the usage of radioactive materials at NRDL is submitted as enclosure (1).

A. F. WARDWELL

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RADIOLOGICAL HISTORY OF THE

NAVAL RADIOLOGICAL DEFENSE LABORATORY

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ENCLOSURE (1)

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Appendix A: NRDL Instruction 5100.10A dated 8 December 1966 with enclosed USNRDL Radiological Safety Manual.

Appendix B: San Francisco Bay Naval Shipyard ltr R200-58 dated 2 January 1970 with enclosed Health Physics Report.

Appendix C: USAEC ltr CO:V:RFF dtd 25 February 1970, with enclosed Memo to File.

Appendix D: Copies of three Resurveys of NRDL buildings.

Appendix E. U.S. Nuclear Regulatory Commission Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use (Draft).

1. BACKGROUND

In late 1946, at the San Francisco Naval Shipyard, Hunter's Point, a small group of civilians and officers and enlisted personnel were detailed to arrange for the decontamination and disposition of several ships that had returned from nuclear weapons tests (Operation Crossroads-Baker) at the Bikini Atoll in the M-rshall Islands. Shortley after formation, the group was designated as the Naval Radiological Defense Laboratory. In 1951 the laboratory became a separate command. The Laboratory mission was the study of nuclear weapons effects and the development of counter measures. Eventually, Laboratory staffing grew to nearly 600 civilians and over 100 military. Laboratory housing expanded from temporary occupancy of Shipyard buildings to new construction of major structures designed to house all personnel and equipment.

Building 815, designed to serve as Laboratory Headquarters and to house the majority of the staff, was completed and occupied in 1955. At this time, most of the Shipyard buildings were vacated, although several were retained for special purpose needs. Later, other special purpose buildings were constructed and occupied. Among these were buildings to house animal facilities, a Van de Graaff accelerator, a 1-MEV X-ray unit and cyclotron.

In the late 1950's, a test station was established at Camp Parks included a hot cell and laboratory, office apaces and land and street accessed in the test program.

In 1969 the Laboratory was disestablished, and Hunter's Point buildings were returned to the Shipyard. Camp Parks facilities were transferred to the control of the Stanford Research Institute, Menlo Park, California.

2. FACILITIES AND EQUIPMENT

During the early years of the Laboratory (before 1955) Shipyard buildings occupied were:

Building 351 - Office type functions
Building 351A - Electronic laboratory
Building 351B (now designated Bldg 366) - Office
Building 364 - Hot cell, chemistry laboratory
Building 365 - Office, film laboratory
Building 506 - Chemistry laboratory
Building 507 - Biological laboratory
Building 508 - Health Physics and general office

2. FACILITIES AND EQUIPMENT(Cont'd)

Building 509 - Animal irradiation studies
Building 510 - Radiation physics
Building 529 - Radioisotope storage - later housing Cockraft-Walton generator
Building 707 and adjacent fenced area - Animal Breeding/ Waste storage

After 1955 and until Laboratory closure the following buildings were occupied:

Continued occupancy at Bldgs. 364, 365, 506, 529, and 707
Building 815 - Main laboratory and headquarters
Building 816 - 2 MEV Van de Graaff
Building 820 - Cyclotron
Building 821 - 1 MEV X-ray facility
Building 830/831 - Animal facilities

Camp Parks facilities occupied were:

Building 310 - Office and headquarters
Building 131 - Hot cell and laboratory
Building 331 - Shop and change house
Building 305 - Greenhouse laboratory
Plant uptake area
Explosives test pond
Surface roughness area
Target complex area
Radiation range
Animal farm

At Hunters Point, radionuclides were used in Building 364, 506, 507, 508, 509, 510, 529, 815, 816 and 830/831. At Camp Parks radionuclides were used in Buildings 131 and 305 and in all the areas above.

3. RADIONUCLIDE QUANTITIES

At the time of closure, the Laboratory was licensed by the AEC (later NRC) for the possession and use of a wide variety of radionuclides. The quantities actually possessed were considerably less, in most cases, than those permitted under the licenses. The actual inventory information is not available but the licensed quantities were:

A. By-product Material License No. 04-00487-03:

Material	Form	Quantity
Any radionuclide of Atomic Numbers 1 to 84 inclusive	Any	5 Ci each
AM-241	"	100 m Ci

A. By-product Material License No. 04-00487-03:

Material	Form	Quantity
AM-241	Sealed Source	2 Ci
AM-243	Any	1 m Ci
Ba-140	Any	100 Ci
Cf-252	Any	1 m Ci
Cm-244	Any	1 m Ci
Co-60	Sealed Sources	5,000 Ci
Cs-137	Sealed Sources	2,000 Ci
Au-198	Any	200 Ci
H-3	Accelerator targets	500 Co
La-140	Any	100 Ci
Np-237	Any	10 m Ci
Po-210	Sealed Po-Be Sources	100 Ci
Sr-90	Any	300 Ci
Pm-147	Any	200 Ci
Tm-170	Alloy Pellets	8,000 Ci
Tm-171	Alloy Pellets	4,000 Ci
Cr-51	Any	20 Ci
Ta-182	Any	10 Ci
Cs-137	Any	20 Ci
Y-90	Any	15 Ci
Pm-147	Oxide Pellets	10,000 Ci
Mixed Fission Products	Any	100 Ci
Sr-85	Plant uptake, Camp Parks	4 m Ci
Zr-95	"	1.5 m Ci

B. By-product Material License No. 04-000487-09, authorizing possession and use of 66,000 curies of strontium-90 incorporated in two radioisotopic thermoelectric generators (RTG's) implanted in the ocean.

C. By-product Material License No. 04-00487-08, authorizing possession and use of 15,000 curies of cobalt-60 as five sealed sources to be used in a radiation range at Camp Parks.

D. Special Nuclear Material License No. SNM-35:

Material	Form	Quantity
Pu-239	Any	982 grams
Pu-239	Sealed source of PuF_4	760 grams
Pu-239	Sealed source of Pu-Be	259 grams
Pu-238	Any	55 grams
Pu-238	Sealed sources of Pu-Be	22 grams
U-235	Any	1 Kilogram
U-233	Any	30 grams

During the 1950's the disposal site was an ocean area west of the Farallon Islands. A former garbage scow, towed by a Navy tug (AFT) was used to transport the waste to the disposal site. In addition to NRDL waste, waste from Lawrence Radiation Laboratory, Berkeley, Lawrence Radiation Laboratory, Livermore and Mare Island Naval Shipyard were disposed of in this manner. Later, in the 1960's, the sea disposal site was discontinued and a commercially operated land burial site near Beatty, Nevada was used for all waste disposal.

5. RADIONUCLIDE USE LOCATIONS

Building 815 use locations and types of usage were as follows:

Floor	Room(s)	Type of Material/Usage
1	174	Receiving packaged materials
	1109	Storage
	126,106,180,182	Chemistry, unsealed forms
	135,139,165,176,177 and 185	Sealed source usage
	195	Decontamination laundry
2.	218,218A,260,270	Health Physics laboratory
	222	Health Physics counting room
	271,2125	Physics laboratory
	2153	Air Filter room
4.	410,418,424,426,430, and 432	Physics laboratories
	436, 438, 440, 442, 446, 448, 465,471,474,480,482, 485,488,4101,4109	Sealed source usage
	4125/4181	Radiation Source Range Sealed source usage
5.	517,523,524,525,526, 527,528,529,530,534, 535,536,537,538,539, 540,541,542,545,546, 566,569,570,574,575, 576,577,583,589,595, 5105,5109,5113,5117, 5125,5129,5133,5149, 5157,5173,5181	Biological/medical laboratories and animal rooms. Primarily carbon-14 and hydrogen-3 usage.