



**DEPARTMENT OF VETERANS AFFAIRS**  
**Veterans Health Administration**  
**National Health Physics Program (NHPP)**  
**2200 Fort Roots Drive**  
**North Little Rock, AR 72114**

In Reply Refer To: 598/115HP/NLR

**MAY 25 2012**

Kevin G. Null  
Division of Nuclear Material Safety  
Nuclear Regulatory Commission (NRC), Region III  
2443 Warrenville Road, Suite 210  
Lisle, Illinois 60532-4352

Re: NRC License 03-23853-01VA

Dear Mr. Null:

We are enclosing a memorandum from the Radiation Safety Officer for VA Palo Alto Health Care System, Palo Alto, California. The memorandum provides supplemental information for our earlier request dated September 19, 2011, and supplemented by a letter dated December 9, 2011, two facsimiles dated December 22, 2011, a facsimile dated February 3, 2012, and a letter dated March 2, 2012, to release Wings A and B of Building 2 for unrestricted use. The enclosed memorandum provides additional justification that residual radioactivity in any inaccessible areas of the building is and has been well below unrestricted release levels in 10 CFR 20.1402.

As further justification, we reference information contained in Enclosure 1 of the original request, dated September 19, 2011, and note the facility identified no significant radioactive material spills affecting areas of use in the building, where significant spills are defined as those "spills that were not readily cleaned up by the researcher and/or caused contamination to be found during follow-up or routine contamination surveys in excess of regulatory limits." Furthermore, surveys performed as part of the final decommissioning survey revealed no areas where residual radioactivity of specifically licensed materials exceeded action levels based on 0.5 mrem per year (i.e., 2% of the unrestricted use limit stated in 10 CFR 20.1402).

If you have any questions, please contact Thomas E. Huston, Ph.D., at 501-257-1578, or you may reach me at 501-257-1571.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Williams".

Gary E. Williams  
Director, National Health Physics Program

Enclosure

**DEPARTMENT OF  
VETERANS AFFAIRS**

**Memorandum**

**Date:** May 17, 2012

**From:** Radiation Safety Officer, VA Palo Alto Health Care System, Palo Alto, California

**Subj:** VHA Permit Number 04-23242-01, Supplemental Information for Decommissioning Request for Building 2 at VA Palo Alto Healthcare System

**To:** Gary Williams, Director, VHA National Health Physics Program (NHPP) (115HP/NLR)

1. This memorandum provides supplemental information related to use of radioactive materials in former restricted areas of Wings A and B of Building 2 at VA Palo Alto Health Care System, Palo Alto, California. This information, along with previous submittals, supports our request to release Building 2 for unrestricted use.

2. We have reviewed inventory receipt records for Building 2. The NRC radioactive materials license was first issued to VA Palo Alto on August 11, 1986. Based on inventory records, receipts of radioactive materials in Building 2 ended prior to April 2000. We were able to retrieve the records for calendar years 1986 through 2000. The total activities received in these years are shown in Table 1, Column 2, for those radionuclides of concern for decommissioning purposes.

**Table 1: Activity Received in Building 2**

Column 1: Radionuclide	Column 2: Activity (uCi) Received from 1986 through 2000 (15 years)
H-3	229850
C-14	25600
Ca-41	5

uCi = microcurie

3. The values in Table 1, Column 2 have been used to estimate a bounding surface activity resulting from a postulated contamination event involving 1% of the total activity received over the entire 15 year history of the facility, spilled onto a nominal 10 ft x 10 ft (100 ft<sup>2</sup>) surface area. This scenario is believed to be extremely conservative since the total activity was used in multiple research labs over many different timeframes and with containment and cleanup techniques generally very effective at reducing resulting surface contamination. Table 2 provides the projected surface activity as compared to the screening level value for building surfaces based on the 25 mrem/year dose criteria in 10 CFR 20.1402. The total sum of fractions 0.2 (<1) indicates that it is extremely unlikely that residual contamination in inaccessible areas would exist at levels approaching unrestricted use release limits. We further emphasize that surveys which were completed in areas adjacent to inaccessible areas indicated no residual radioactivity approaching any levels near 2% of the unrestricted use release limit (i.e., we interpreted our surveys for beta-gamma emitters based on a 0.5 mrem/year release level as compared to the 25 mrem/year release level provided for in 10 CFR 20.1402,  $0.5/25 = 2\%$ ).

**Table 2: Projected Contamination for Spills in Inaccessible Areas**

Radionuclide	Activity (uCi) received in Bldg. 2 (1986-2000)	Residual activity (uCi) on lab surfaces at time of release (assume 1% of activity received)	Calculated average surface concentration (dpm/100 cm <sup>2</sup> )*	Unrestricted Release Screening Value** (dpm/100cm <sup>2</sup> )	Fraction of Screening Value
H-3	229850	2298.50	5.49E+06	1.20E+08	4.58E-02
C-14	25600	256.00	6.12E+05	3.70E+06	1.65E-01
Ca-41	5	0.05	1.19E+02	5.80E+06	2.06E-05
<b>Sum of fractions:</b>					<b>2.11E-01</b>

\*Assumes residual activity on surface was spread over a nominal surface area of 10 ft x 10 ft (100 ft<sup>2</sup> = 9.29E+04 cm<sup>2</sup>)

\*\*Values for H-3 and C-14 are from NUREG-1757, Vol. 1, Table B.1. Value for Ca-41 was calculated based on a building occupancy scenario (with default parameter values, a "constant" distribution, and an "unlimited" area of contamination) using 25 mrem/y limit and D&D Version 2.1.0.

4. We also reviewed sewer discharge records for Building 2. We were able to retrieve these records for calendar years from 1992 to 2000. Based on historical records, sewer discharges in Building 2 ended prior to April 2000. The activities received are shown in Table 3, Column 2, for those radionuclides of concern for decommissioning purposes. For years prior to 1992, we are not able to retrieve specific disposal data without excessive effort due to compatibility issues between our current software and historical database. However, we believe that the disposals were similar on an annual basis. Consequently, we have annualized the 1992-2000 values and show these in Table 3, Column 3. The NRC radioactive materials license was first issued to VA Palo Alto on August 11, 1986. So as a conservative timeframe, we estimate use in Building 2 from 1986 to 2000 by multiplying Column 3 by 15 years to yield values in Table 3, Column 4.

**Table 3: Activity Discharged to Sewer in Building 2**

Column 1: Radionuclide	Column 2: Activity (uCi) Discharged to Sewer from 1992 through 2000 (9 years)	Column 3: Annualized Sewer Discharge (uCi/year)	Column 4: Estimated Activity (uCi) to Sewer from 1986 through 2000 (15 years)
H-3	1619	180	2700
C-14	22	2.4	36
Ca-41	5	0.56	8.4

5. As a bounding scenario for doses from sewer discharges, the values in Table 3, Column 4 have been used to estimate a hypothetical committed effective dose equivalent (CEDE) from a postulated ingestion of 1% of the estimated activity discharged to sewer. This scenario is believed to be extremely conservative because: (a) radiological surveys performed in the sink drains of former restricted areas revealed no detectable activity in sewer lines and (b) it assumes that 1% of the activity would be retained in the sewer piping and that a single individual would somehow ingest all of this activity from untreated sewer pipes. Table 4 provides the projected

CEDE in millirem (mrem). The estimated CEDE is less than 2 mrem for this extremely improbable scenario and is well below the annual limit of 25 mrem for unrestricted use in 10 CFR 20.1402.

**Table 4. Sewer Ingestion Scenario**

Radionuclide	Total activity (uCi) discharged to sewer in Bldg. 2 (1992 to 2000)	Assumed Ingestion Intake (uCi) by a member of public (assume 1% of discharged activity Ingested)***	Ingestion: Committed Effective Dose Equivalent (CEDE) per Intake (mrem/uCi)****	CEDE (mrem) from Ingestion
H-3	2700	27	6.40E-02	1.728
C-14	36	0.36	2.09E-01	0.075
Ca-41	8.4	0.084	1.27E+00	0.107
<b>Sum:</b>				<b>1.910</b>

\*\*\*A nominal value of 1 percent of activity released to sewer is assumed to be ingested.

This value is believed to be extremely conservative, because no activity was identified in sewer drain traps during final status surveys and it is extremely unlikely that any residual activity exists in other down-stream sewer piping in the building.

\*\*\*\*Dose factors are based on values in Table 2.2 in EPA Federal Guidance Report No. 11 (9/1988).

6. The sewer scenario above also serves as a bounding surrogate scenario for build-up in other inaccessible areas such as ventilation ducts because these radionuclides were not likely to have been dispersed at levels higher than those that were authorized to be disposed of via the sanitary sewer. So doses associated with any other pathways would also be expected to be well below the 25 mrem per year limit.

7. In conclusion, we believe that these bounding calculations demonstrate that inaccessible areas in former restricted areas of Building 2 do not contain residual radioactivity that could cause a member of the public to exceed the 25 mrem annual dose limit in 10 CFR 20.1402.



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