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June 14, 1989

Mr. Andrew Wallo
FUSRAP/Surplus Facilities Group
Division of Facility & Site
Decommissioning Projects
Office of Nuclear Energy
U.S. Department of Energy
Washington, D.C. 20545

Subject: LETTER REPORT - VERIFICATION ACTIVITIES AT
UNIVERSITY OF CHICAGO

Dear Mr. Wallo:

Enclosed is the report for the recent ORAU verification activities involving facilities at the University of Chicago, remediated and/or surveyed by Argonne National Laboratory.

If you have any questions concerning this information contact me or Jim Berger at FTS 626-2908 or 626-3305, respectively.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Michele R. Landis for'.

Michele R. Landis
Health Physics Team Leader
Environment Survey and
Site Assessment Program

MRL:jls

cc: D. Harbert, BNI

VERIFICATION ACTIVITIES
UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

Prepared by

M. R. Landis

I. Introduction

Between 1942 and 1952 facilities at the University of Chicago were used by the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC) (predecessors of the Department of Energy) (DOE) for development of separation and verification techniques involving uranium and plutonium. These activities were conducted in Jones Chemical Laboratory, Kent Chemical Laboratory, Ryerson Physical Laboratory, and Eckhart Hall. In 1952, operations were transferred to the new Argonne National Laboratory (ANL) in DuPage County, and the University of Chicago facilities were decontaminated to levels for unrestricted release in effect at the time. A search of records during the 1970's indicated that the documentation of the decontamination efforts was inadequate and ANL performed additional radiological evaluations of the facilities in 1976 and 1977⁽¹⁻⁴⁾. At this time, these University of Chicago facilities were included in DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP).

Limited areas of these facilities were identified as having residual contamination in excess of the current (mid 1970's) guideline levels and during the early 1980's ANL performed further remedial actions. The cleanup was completed in 1984; surveys and remedial actions are described in Argonne reports ANL-OHS/HP-83-107, ANL-OHS/HP-84-105, and ANL-OHS/HP-84-108.⁽⁵⁻⁷⁾ These reports indicated that the cleanup was effective in reducing all identified areas of residual contamination to guideline levels.

Prepared by the Energy/Environment Systems Division of Oak Ridge Associated Universities, Oak Ridge, Tennessee, under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

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It is the policy of DOE to perform independent verification of the effectiveness of remedial action activities conducted within FUSRAP. The Environment Survey and Site Assessment Program of Oak Ridge Associated Universities was designated by DOE as the organization responsible for this task.

II. Procedures

Radiological survey reports and the post-remedial action reports were reviewed for general thoroughness and accuracy, and to assure that areas exceeding criteria were identified and remediated.

The largest areas of contamination, requiring remediation, had been located in the 4th floor attic area of Jones Laboratory, and the potential for plutonium - the radionuclide contaminant with the most restrictive guideline level - was considered the greatest in this building, based on use history and previous survey data. Therefore, this attic area was selected for an abbreviated independent survey on May 24, 1989. Measurements and samples were referenced to pertinent building features. Surface floor scans were performed with a gas-proportional monitor. Locations of elevated direct radiation were noted for further investigation. Measurements of total and removable alpha and beta-gamma contamination were performed at randomly selected locations and at an area identified by the surface scan.

III. Results and Discussion

Document Reviews

Review of the radiological survey data and decontamination reports, prepared by Argonne National Laboratory for Kent Chemical Laboratory, Jones Chemical Laboratory, Ryerson Physical Laboratory, and Eckhart Hall, indicated that the majority of the contaminated areas were small ($<1 \text{ m}^2$) and isolated. In some cases the radionuclides identified were other than those that would have been associated with the early MED/AEC activities and the source of such contamination was likely ongoing educational and

research activities of the University. Some areas of elevated direct radiation were the result of small sealed or encapsulated radioactive sources. The Argonne documents address remediation or resolution of identified contamination, with exception of drain systems and Jones Laboratory ventilation systems; these latter areas were addressed in 1987 by Bechtel National, Inc.⁽⁸⁾ and ORAU⁽⁹⁾. Information presented indicates that contaminated surfaces were either removed or cleaned. In several areas, building renovations by the University, occurring between the initial surveys and the remedial action activities, had resulted in elimination of the contaminated surface or item. Results of Argonne's post-remedial action surveys in the majority of locations indicated that residual contamination levels were below the detection limits of the procedures. In all cases the data were adequate to demonstrate that the DOE radiological guidelines had been satisfied.

Independent Survey

Surface scans of the 4th floor attic section of Jones Chemical Laboratory identified one small area on the floor (location 9 on Figure 1). Total contamination levels, at this location, were approximately 1,000 dpm/100 cm² for alpha and 11,000 dpm/100 cm² for beta-gamma. No removable contamination was detected. The contaminated area is about 400 cm².

Results of total and removable contamination are summarized in Table 1. Total contamination levels, excluding measurements from location 9, ranged from <27 to 85 dpm/100 cm² for alpha and <360 to 2400 dpm/100 cm² for beta-gamma. Removable contamination levels were ≤3 dpm/100 cm² for alpha and <6 dpm/100 cm² for beta-gamma.

Data for the attic, described in the Argonne report⁽⁷⁾ and in the previous ORAU report⁽⁹⁾, indicates that the contaminant present is primarily uranium. This is substantiated by the presence of significant beta radiation which would accompany uranium, but not plutonium contamination. The contamination levels measured, therefore, satisfy the DOE surface contamination guideline levels of:

5,000 dpm/100 cm², averaged over 1 m²
15,000 dpm/100 cm², maximum in 100 cm²
1,000 dpm/100 cm², removable

IV. Summary

At the request of the U.S. Department of Energy's Division of Facility and Site Decommissioning Projects, ORAU performed independent verification activities, related to remedial actions at the University of Chicago, conducted by Argonne National Laboratory. These activities included document reviews and limited independent surveys. Based on the results and findings of these activities, it is ORAU's opinion that remedial actions at these facilities at the University of Chicago, as described in the Argonne documents, have been effective in satisfying the established DOE guidelines for release without radiological restrictions.

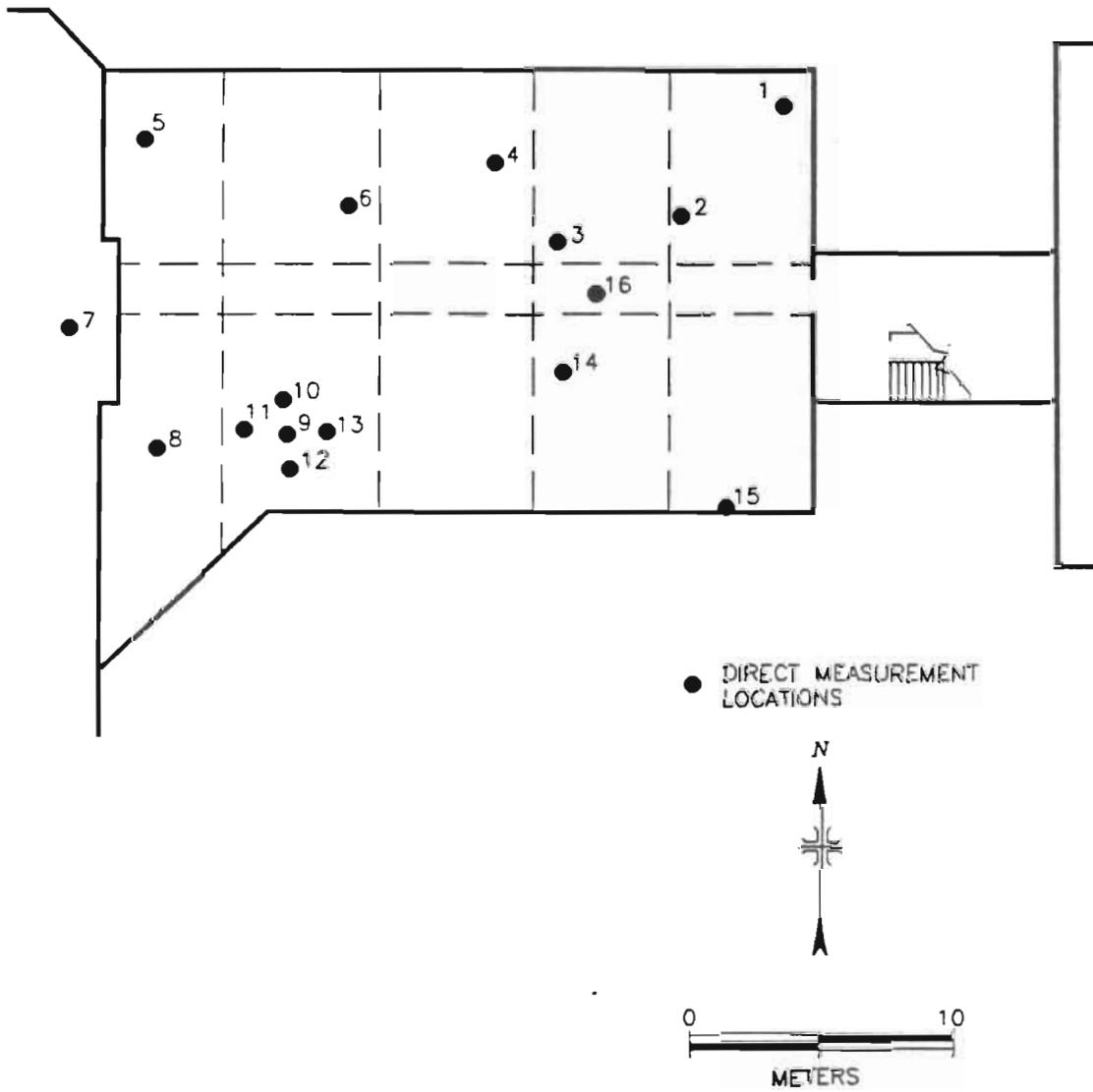


FIGURE 1: Jones Laboratory Attic Showing Locations of Direct Measurements

TABLE 1

SUMMARY OF SURFACE CONTAMINATION MEASUREMENTS
 JONES CHEMICAL LABORATORY - ATTIC SECTION
 UNIVERSITY OF CHICAGO
 CHICAGO, ILLINOIS

Location ^a	Total Contamination		Removable Contamination	
	Alpha (dpm/100 cm ²)	Beta-Gamma (dpm/100 cm ²)	Alpha (dpm/100 cm ²)	Beta-Gamma (dpm/100 cm ²)
1	<27	760	<3	<6
2	38	2400	<3	<6
3	47	<360	3	<6
4	<27	<360	<3	<6
5	38	<360	<3	<6
6	27	390	<3	<6
7	38	730	<3	<6
8	56	460	3	<6
9	1,000	11,000	<3 ^b	<6
10	56	<360	-	-
11	<27	390	-	-
12	<27	<360	-	-
13	<27	1,300	-	-
14	<27	360	<3	<6
15	85	1,600	<3	<6
16	56	520	<3	<6

^aRefer to Figure 1.

^bDash indicates measurement not performed.

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REFERENCES

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3. Argonne National Laboratory, Radiological Survey of Eckhart Hall, The University of Chicago, Chicago, Illinois, September 14, 1976, March 22, 1977 (ANL-OHS/HP-82-102), Argonne, Illinois, May 1982.
4. Argonne National Laboratory, Radiological Survey of Ryerson Physical Laboratory, The University of Chicago, Chicago, Illinois, September 11-25, 1976 (ANL-OHS/HP-82-103), Argonne, Illinois, May 1982.
5. Argonne National Laboratory, Formerly Utilized MED/AEC Sites Remedial Action Program Post-Remedial Action Radiological Survey of Kent Chemical Laboratory, The University of Chicago, Chicago, Illinois, (ANL-OHS/HP-83-107), Argonne, Illinois, December, 1983.
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7. Argonne National Laboratory, Formerly Utilized MED/AEC Sites Remedial Action Program Report of the Decontamination of Jones Chemical Laboratory, Ryerson Physical Laboratory, and Eckhart Hall, The University of Chicago, Chicago, Illinois, (ANL-OHS/HP-84-108), Argonne, Illinois, August, 1984.
8. Bechtel National, Inc., Post-Remedial Action Report for the George Herbert Jones Chemical Laboratory at the University of Chicago Site, Chicago, Illinois, Oak Ridge, Tennessee, December 1988.
9. Oak Ridge Associated Universities, Verification of Remedial Action on Ventilation Systems, Jones Chemical Laboratory, University of Chicago, Chicago, Illinois, Oak Ridge, Tennessee, January, 1989.