U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 40-3296/82-01
40-2308/82-01

Docket No. 40-3296
40-2308

License No. STB-187
C-3991

Licensee: Martin-Marietta Corporation

Baltimore, Maryland

Facility Name: Martin-Marietta Corporation (The Martin Company)
Middle River Facilities
Middle River, Maryland

Inquiry Conducted: March 5 - June 15, 1982

Inspector: Jenny M. Johansen 8/2/82
Jenny M. Johansen, Radiation Specialist date

Approved by: John D. Kinneman 8/2/82
John D. Kinneman, Chief, Materials date
Program Section No. 1

Inquiry Summary:

This inquiry consisted of telephone discussions and review of records provided by Martin-Marietta Corporation and NMSS to determine whether the facility at Middle River, Maryland formerly used for development and production of thorium-magnesium alloys meets current criteria for unrestricted use.

Results: The Middle River (Chesapeake Park) facility meets current criteria for release for unrestricted use.

DETAILS

1. Persons Contacted

A. Paul Guinn, MLB, NMSS, USNRC
B. Paul Majewski, Safety Coordinator
Martin-Marietta Laboratories
1450 S. Rolling Road
Baltimore, Maryland 21227 (301-247-0700)
C. Joseph P. Alcarese, Division Counsel
Martin-Marietta Aerospace, Baltimore Division
103 Chesapeake Park Plaza
Baltimore, Maryland 21220 (301-338-5000)
D. Robert E. Corcoran, Chief
Division of Radiation Control
201 West Preston Street
Baltimore, Maryland 21201 (301-383-2744)

2. Background

Martin-Marietta Corporation, Baltimore Division, was authorized by License Nos. C-3991 and STB-187 during the late 1950's and early 1960's for the development and production of magnesium-thorium alloys and for possession and use of small quantities of uranium and thorium metal in connection with work under government contracts. License No. STB-187 expired on April 30, 1964. The authorized place of use was at Martin--Marietta's Middle River, Maryland facilities which are also called Chesapeake Park.

3. Telephone Discussions with Individuals

Individual A in paragraph 1 was formerly employed as the Health Physics Supervisor at Martin-Marietta and monitored the activities conducted under License Nos. C-3991 and STB-187. He stated that all work authorized by these licenses occurred in the basement of Building D at Chesapeake Park, Middle River, Maryland. Individual D also stated that a former Martin-Marietta employee had told him that Building D had been torn down and the site covered with grass after the building and the site were decontaminated.

Individual C searched Martin-Marietta records and found a close-out survey covering Building D and correspondence discussing the release of this facility for unrestricted use. He provided the correspondence and survey report in a letter dated June 1, 1982 (see Enclosure A) and confirmed that Building D had been torn down and the area where it stood is now covered with grass.

4. Review of Records

A letter from Martin-Marietta to the AEC dated September 21, 1970 (See Enclosure A) states that AEC License No. SNM-1192 was issued to Martin--Marietta Corpora..on to allow decontamination of their laboratory facilities and tha. a report of the decontamination was enclosed. The "Comprehensive Radiation Survey Report for the Release of Decontaminated Premises for Unrestricted Use," enclosed, provided the following points of comparison to the licenses and Individual A's statement:

a. The decontamination effort involved Building D at Chesapeake Park. Individual A stated that all work under License Nos. C-3991 and STB-187 occurred in this building.

b. Special nuclear material processes took place in Building D nuclear laboratories. The decontamination program consisted primarily of removal of U-235 and U-238 residual oxide forms. License No. C-3991 authorized use of uranium metal under government contracts while License No. STB-187 authorized the use of thorium.

Review of the close-out survey indicates that an extensive effort was made to remove all contamination according to AEC criteria and to protect the workers performing the decontamination. Contamination was removed from surfaces by use of high vacuum systems. Fixed contamination found on equipment such as hoods, ducts, glove boxes was allowed to remain fixed and the equipment was removed, properly packaged and shipped to Moorehead Kentucky for burial. Swipe tests were made and various kinds of radiation detectors were used during the decontamination. The report states that removable activities and radiation levels met AEC criteria for release for unrestricted use; however, no site diagram, showing where the swipes and measurements were taken, nor actual results of the measurements are provided.

The report states the average fixed alpha emitter contamination was less than 2000 dpm/100 cm^2, with no beta-gamma contamination, except for a small area of fixed Sr-90 contamination reading 0.5 mrad/hr. Except for the Sr-90 contamination, these results are within present NRC criteria of 5000 dpm/100cm^2 (average U-nat, U-235, U-238 and associated decay products) surface contamination. A fixed contamination level of 0.5 mrad/hr from Sr-90 does not meet the present NRC criteria; however, it is within the 2 mrem/hr limit for an unrestricted area in 10 CFR 20.105(b), and, since it was only a small spot, presented no hazard to personnel.

All water samples taken were stated to be less than or equal to 9.0 x 10^{-7} microcuries per ml compared to 10^{-5} microcuries per ml allowed for U-235 and U-238 in 10 CFR 20, Appendix B, Table II, Column 2. All soil samples were less than 10 pCi per gram U-238 or U-235 except for one sample having 24 pCi per gram of U-238. These results are consistent with the recent Uranium Fuel Licensing Branch position on disposal of uranium.

Residual activity in drains consisted of a total of 29 microcuries of U-235, which the licensee proposed to seal in place with cement.

5. Conclusion

Materials authorized by License Nos. C-3991 and STB-187 were used in Building D at Martin-Marietta's Middle River facilities which are also called Chesapeake Park. The Building D which was decontaminated and released for unrestricted use when AEC License SNM-1192 was terminated is the same facility where work authorized by License Nos. C-3991 and STB-187 was conducted. If any material remained from operations under these licenses it would have been detected and removed during that effort. No determination could be made if the drains containing residual U-235 activity were sealed with cement, however, since the building is now demolished and the site covered with grass this activity is unlikely to present a hazard.

Region I concludes the site meets current NRC criteria for release for unrestricted use and that no site survey is necessary.

Enclosure A Region I Report
40-3296/82-01 - 40-2308/82-01

MARTIN MARIETTA AEROSPACE

BALTIMORE DIVISION
103 CHESAPEAKE PARK PLAZA
BALTIMORE, MARYLAND 21220
TELEPHONE (301) 338-5000

June 1, 1982

Ms. Jenny Johansen
USNRC
Region 1
631 Park Avenue
King of Prussia, Pa. 19406

Dear Ms. Johansen:

In accordance with your request, I am enclosing, from the records of the Martin Marietta Corporation, a copy of the "Comprehensive Radioactive Survey Report For The Release of Decontaminated Premises For Unrestricted Use", prepared in accordance with U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

I am also enclosing a copy of correspondence showing that the Survey Report was furnished to the AEC Division of Materials Licensing at Washington, D.C. and the AEC Compliance Division at Newark, New Jersey. Also, a copy of a letter to the AEC Division of Materials Licensing advising that the decontamination program was near complete and requesting an inspection of the facility.

We are pleased to be able to assist you in this matter.

Very truly yours,

MARTIN MARIETTA CORPORATION

Joseph P. Alcarese
Division Counsel
Martin Marietta Aerospace
Baltimore Division

JPA:jd
enclosures

15 July 1970

Mr. Donald A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch
Division of Materials Licensing
United States Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Nussbaumer:

Please be advised that the decontamination program at the Martin Marietta Corporation Baltimore facilities is nearing completion and it is anticipated the program shall be completed tentatively on August 5, 1970.

We request that an inspection of the subject facility be conducted on August 6, 1970, by a representative of your office in conjunction with the writer and a health physicist from the Eberline Instrument Corporation. If the above date is not compatible with your assignee's schedule and if there are questions regarding the above request and/or program, please advise the writer.

I wish to express my corporation's thanks and appreciation for the excellent service provided by representatives of your office toward bringing this program to a successful completion.

Sincerely yours,

MARTIN MARIETTA CORPORATION

Elmer M. Chenault
Health Physicist

cc: G. W. Heineman
R. G. Macaulay
J. Stewart
F. F. Munez
R. Petrochko
E. Geiger
R. T. Woolsey

Decontamination

21 September 1970

Director of Division Compliance
United States Atomic Energy Commission
970 Broad Street
Newark, New Jersey 07107

Attention: Mr. W. Lorenz

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. G. Macaulay
J. Stewart

22 September 1970

Director, Division of Materials Licensing
United States Atomic Energy Commission
Washington, D. C.

Attention: Mr. R. T. Woolsey

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. C. Macaulay
J. Stewart

COMPREHENSIVE RADIATION SURVEY REPORT FOR THE RELEASE OF DECONTAMINATED PREMISES FOR UNRESTRICTED USE

CHESAPEAKE PARK, INC., BALTIMORE, MARYLAND
MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND

Prepared by

E. M. Chenault
Sr. Health Physicist
Martin Marietta Corporation

and

Stanley J. Waligora, Jr.
Consultant Health Physicist
Eberline Instrument Corporation
Santa Fe, New Mexico

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a. Positive Nose Swipes

b. Urine Analysis

I. INTRODUCTION

Purpose: This radiation survey report is prepared as one of the conditions provided for in U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

Since the subject nuclear laboratories are no longer used for radioisotopes operations and/or special nuclear materials processes and have been decontaminated in accordance with U.S.A.E.C. guidelines, it is requested the above named facilities be released for unrestricted use.

On June 3, 1970, the decontamination program at the Martin Marietta Corporation, Baltimore Division, commenced and it was completed on September 2, 1970. The radioactive materials involved in the decontamination program consisted primarily of U^{235} and U^{238} in a residual oxide form.

The work was performed by a crew consisting of 8 trained operators from the Martin Marietta Corporation, two health physicists from Eberline Instrument Corporation, and one health physicist from Martin Marietta Corporation. The removal of the radioactive material from equipment and facilities was achieved primarily through the use of high vacuum systems, with the operators wearing U.S. Bureau of Mines air supplied respirators. Full protective clothing and footwear were provided the workers.

Air samples were collected throughout the general area during the decontamination program and were counted for gross alpha emitters. The results of all air samples collected were below the MPC, with the exception of 4 samples. One sample was collected in the Radioisotopes Laboratory while chipping SR^{90} from a concrete wall. The result was reported as 2.4×10^{-10} uCi/CC. The second sample was collected in the Spheroidizing Room while removing ventilation ducts. The results of the a' - samples are given in Appendix C-1.

It should be noted that air supply respirators were worn by the operators during the time the air dust concentrations were measured. Urine specimens were submitted by personnel assigned to the program prior to working in the contaminated areas, in order to provide a base line study. Nasal swipes of all men working in the contaminated areas were performed twice daily. The results of all nasal swipes were low to negligible and did show proper use of respiratory protective equipment.

Water samples were collected of all liquid effluent, analyzed prior to release, and records of all sample analysis and personnel dosimetry reports are maintained in the office of the Martin Marietta Corporation's health physicist.

II. LOCATION AND IDENTIFICATION OF FACILITIES

The subject nuclear laboratories that were decontaminated are located at Chesapeake Park and are owned by Martin Marietta Corporation at Baltimore, Maryland. The decontaminated laboratories encompass an area of approximately 40,000 FT^2, located in the basement area of building "D". The total area was subdivided into small separate rooms where various types of nuclear activity were performed. Most of the small rooms were of the laboratory-type, and equipment included ventilation hoods, glove boxes, filtration medias, laboratory benches and laboratory glassware. False ceilings were also a part of some laboratories, and each ceiling was surveyed and removed, where necessary.

For the most part, the radioactivity was confined to glove boxes, ventilation hoods, ducts and filtration medias contained in each laboratory. The radioactive materials removed were in the form of residual uranium oxides, with the exception of a minor amount of SR^{90} found on a wall.

Some of the laboratories contained sinks, floor drains and sumps used to control liquid effluent containing radioactive materials. The floor drains, traps and sumps were carefully monitored to determine the contamination level, if any, and the termination location of each drain line and sump line.

III. HEALTH PHYSICS TECHNICAL APPROACH

The removal of residual contamination was accomplished through the direction and guidance of three health physicists, two from Eberline Instrument Corporation and one from Martin Marietta Corporation. The work crew consisted of eight qualified workers trained in the radiological health aspect of nuclear decontamination.

The contamination, for the most part, was not found to be tightly bonded or sealed to the surfaces of the facilities and therefore most of it was removed by the use of high vacuum systems with absolute filters. One wall and several floor areas showed evidence of bonded alpha activity and, therefore, it became necessary to use pneumatic tools to remove the contamination and reduce radiation levels to acceptable levels. Contamination that was found to be fixed on equipment, such as ventilation hoods, ducts and glove boxes, was allowed to remain fixed, and the equipment was properly packaged, identified and shipped by truck carrier to burial grounds in Moorehead, Kentucky. The transportation and burial of all contaminated equipment was provided by the Nuclear Engineering Company, Moorehead, Kentucky.

IV. SCOPE OF SURVEY AND GENERAL PROCEDURES FOLLOWED

Radiation detection equipment used during the effort included several gas proportional alpha counters, one floor alpha monitor, RM-15 (soft gamma measurement), one beta plus gamma counter, TLD badges and film badge dosimetry.

Swipe samples by the use of whatman filter paper were collected from all surface areas where it was thought to be necessary. The filter paper samples were then counted for any gross alpha contamination. All loose radioactive material was removed from the facilities. Equipment that was heavily contaminated, such as glove boxes and ventilation hoods, were properly packaged and shipped by carrier truck for burial.

There were no areas detected whereby radioactive materials had been sealed by painting or by other means, and there was no attempt to seal any areas containing fixed radioactive materials.

The general procedure followed to accomplish the decontamination effort is entitled "The Health and Safety Procedure for the Decontamination of Building "D", Martin Marietta Corporation, Baltimore, Maryland." The procedure is presently on file in the office of the U.S.A.E.C. Division of Materials Licensing. The procedure provided the basic guidelines for performing the decontamination in a safe manner. "The Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" was closely adhered to by the Martin Marietta Corporation decontamination work crew.

V. FINDINGS OF THE DECONTAMINATION SURVEY

The floors, walls and ceilings of all laboratories where nuclear activity was conducted were monitored and recleaned. Some areas did not show evidence of contamination. Those areas where contamination was found were vacuumed and sprayed with a jet-x cleaning device to remove any material that could not be vacuumed. The use of water was controlled and kept to a minimum to prevent water contamination and pollution.

During the initial phase of the decontamination inspection survey, six items or areas were found which required correction (letter to E. M. Chenault from S. J. Waligora, Jr., dated September 3, 1970) and all, with the exception of the floor drains, were corrected.

All floor drains were monitored and decontaminated as much as possible. Water samples were taken from the five drains indicating residual activity and all results showed low concentrations. (See Appendix C-2) The residual activity remaining in the six drains was estimated through the use of a 2" x 2" NaI(TR) crystal in conjunction with a single channel analyzer. With the detection system calibrated for ^{235}U gamma rays, the following estimates were established:

Drain No.	^{235}U(uCi)
39	1.0
46	1.0
52	15.0
55	6.0
56	6.0
Total	29.0

Water samples taken from these drains showed very low concentrations. As a further check, water was flushed continuously through these five drains while a two liter water sample was taken from the sanitary sewer sump servicing that portion of the building. Samples were submitted for analysis and showed 0.003 pCi/ml (MPC 30.0 pCi/ml).

All drains have been left open for inspection. With approval from the U.S. Atomic Energy Commission, we propose to seal the five drains with cement, thereby permanently inactivating the total of 29 uCi of ^{235}U. This measure would appear to be a feasible alternative to tearing out the concrete floor in order to remove the drains and associated pipe.

As a result of the final survey, all other areas were reduced to within limits prescribed by the U.S. Atomic Energy Commission. All walls, ceilings, and floors had been washed thoroughly or removed. The average alpha emitter contamination (^{235}U and/or ^{238}U only) is much less than 500 dpm/100 cm^2. Areas with remaining fixed alpha emitter contamination average less than 2,000 dpm/100 cm^2. Beta-gamma contamination is essentially nonexistent; ^{90}Sr-Y contamination which had been present in the Radioisotopes Laboratory has been completely removed with the exception of one minute area with fixed contamination measuring 0.5 mRad/hr.

This area of Building "D" will soon be renovated by Chesapeake Park and any remaining fixed contamination will be further enclosed with replastering, retiling of floors, and repainting. Following the renovation, any fixed residual contamination should be so well fixed that there should be no evidence of even trace quantities during the remaining life of the structure.

VI. PACKAGING, TRANSPORTATION AND DISPOSAL OF CONTAMINATED EQUIPMENT

All contaminated equipment, such as glove boxes, ventilation hoods and duct work, were properly packaged and identified in accordance with the Department of Transportation rules and regulations and sent by truck carrier to Moorehead, Kentucky, for burial. A total of nineteen (19) truckloads of equipment were sent to the burial grounds, with each truckload encompassing approximately 1,920 cubic feet.

APPENDIX B - SUMMARY OF DECONTAMINATION OPERATIONS

The following is a chronological task summary of decontamination operations from June 1 through September 3, 1970, and represents approximately 2400 man hours of labor.

1. Organization of people, equipment, supplies, and facilities; establishment of procedures and policies.
2. Removal of exhaust ducts from furnace room.
3. Samples taken from areas with potential for tritium and for cobalt 60 contamination.
4. Machinery and equipment removed from furnace room.
5. Areas expected to be clean were monitored and any anomalies entered to the work plan.
6. Arrangements were made for special disposal of nonradioactive but hazardous wastes (acids, alkalis, solvents, nitrates, peroxides, etc.)
7. Removed parafin shielding from neutron generator area.
8. Removed equipment from laundry area.
9. Surveyed dehydrator rooms and segregated areas and equipment.
10. Cleaned nine rooms which required general decontamination, but which posed no problems due to presence of contaminated equipment, exhaust ducts, absolute filters, etc.
11. Laundry area cleaned including removal of construction blocks and floor tiles.
12. Cleaned powder room - highly contaminated.
13. Discovered "contamination" in heat plant boiler room which analyses showed to be naturally occurring thorium.
14. Fire (primarily smoke) as the result of torches used during duct removal on outside of building by a local contractor. This duct work was past the absolute filter bands and there was no attendant radiation hazard.

15. General cleaning accomplished in five additional rooms.

16. Vault decontaminated and bird cages removed.

17. Chipped concrete walls contaminated with ^{90}Sr-Y in Radioisotopes Laboratory.

18. Ductwork removal and clean-up in two additional rooms.

19. Removed glove boxes and other contaminated equipment from Spheroidizing Room; proceeded with remainder of clean-up.

20. Removed installed casework in Inorganic Chemistry Laboratory.

21. contaminated restroom floors in supposedly clean area.

22. Cleaned contamination which resulted from clean-up of Spheroidization Room.

23. Inspected Oil Farm Building (remote to Building "D") and removed contaminated equipment that had been stored. Survey showed no further decontamination was necessary.

24. Proceeded with clean-up of Inorganic Chemistry Laboratory.

25. Removed ducts and proceeded with clean-up of Powder Metal Room.

26. Removed duct and proceeding with clean-up of three rooms.

27. Removed duct work and equipment in Ceramics Laboratory and Spheroidization Laboratory.

28. Steamed Pellet Room in preparation to clean-up in order to reduce airborne (resuspended) contamination. Proceeded with clean-up.

29. Powder Room was also steamed prior to clean-up.

30. Removed absolute filters associated with Pellet Room.

31. All drains monitored and cleaned. Five remain contaminated.

32. Removed vertical rolling mill (several tons) from Powder Room. Residual contamination forced removal of two walls, ceilings, and floor tiles.

33. Ceiling and floor tiles removed in Spheroidization Room.

34. Removed absolute filters associated with Vault Room.

35. Final blowers, filters and ducts removed at termination and ventilation exhaust equipment.

36. Removed absolute filters and remainder of equipment associated with the Radioisotopes Laboratory.

37. Proceeded throughout entire facility with final monitoring and removed any contaminated items including floor tile, miscellaneous fixtures. Washed down all remaining ceilings, walls, and floors several times. A detailed swipe survey was performed.

38. Sumps and chip tanks associated with Dehydrator, Laundry Room, and Cleaning Room were decontaminated.

39. Asphalt floor covering in Cleaning Room removed.

40. Final waste shipment (19th truckload) departed. Two additional barrels filled with remaining miscellany for future shipment.

APPENDIX C - SAMPLE ANALYSIS RESULTS

1. Environmental Air Samples

Location	Date	Concentration (uCi/ec)
Radioisotopes Laboratory	7/9/70	$92.3 \pm 0.6 \times 10^{-12}$
Radioisotopes Laboratory	7/9/70	$240.0 \pm 1.0 \times 10^{-12}$
Spheroidizing Room	7/14/70	$68 \pm 2 \times 10^{-12}$
" "	7/15/70	$413 \pm 10 \times 10^{-12}$
Dehydrator Room (during fire)	6/26/70	3.3×10^{-12}
Furnace Room	6/17/70	1.17×10^{-13}
" "	6/17/70	8.5×10^{-13}
" "	6/18/70	2.7×10^{-13}
" "	6/19/70	1.1×10^{-13}
" "	6/22/70	5.36×10^{-13}
" "	6/23/70	3.3×10^{-13}
" "	6/23/70	2.6×10^{-12}
" "	6/23/70	5.3×10^{-12}
" "	6/24/70	2.7×10^{-13}
" "	6/24/70	3.5×10^{-12}
Break Room	6/24/70	2.1×10^{-12}
Furnace Room	6/25/70	5.5×10^{-13}
" "	6/25/70	3.5×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/26/70	3.3×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/29/70	3.5×10^{-12}
" "	6/29/70	2.6×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room	6/30/70	1.75×10^{-12}
" "	6/30/70	3.6×10^{-13}
" "	7/1/70	1.4×10^{-12}
" "	7/1/70	5.5×10^{-13}
" "	7/6/70	3.5×10^{-12}
" "	7/6/70	1.75×10^{-12}
" "	7/6/70	6.6×10^{-13}
" "	7/7/70	3.3×10^{-13}
" "	7/8/70	1.6×10^{-13}
" "	7/9/70	2.7×10^{-13}
Spheroidizing Room	7/10/70	1.1×10^{-13}
Flame Room #12	7/10/70	2.6×10^{-12}
Inorganic Chemistry Lab	7/13/70	2.5×10^{-12}
" " "	7/13/70	6.2×10^{-12}
Spheroidizing Room	7/13/70	4.0×10^{-12}
Room #11	7/14/70	3.0×10^{-12}
* Spheroidizing Room	7/14/70	6.8×10^{-10}
Room #11	7/15/70	1.6×10^{-12}
* Spheroidizing Room	7/15/70	4.13×10^{-10}
Room #11	7/16/70	7.0×10^{-13}
Spheroidizing Room	7/16/70	6.6×10^{-11}
Spheroidizing Room	7/17/70	7.9×10^{-11}
Furnace Room	7/20/70	5.2×10^{-13}
Inorganic Chemistry Lab	7/21/70	4.4×10^{-12}
Inorganic Chemistry Lab	7/21/70	4.6×10^{-12}
* Spheroidizing Room	7/21/70	1.7×10^{-10}

Environmental Air Samples (Continued)

Location	Date	Concentration (u Ci/ec)
Furnace Room (Shipping Area)	7/22/70	3.9×10^{-13}
Inorganic Chemistry Lab	7/22/70	8.6×10^{-13}
" " "	7/22/70	1.7×10^{-12}
Room #32	7/23/70	1.75×10^{-11}
Room #32	7/23/70	2.6×10^{-12}
Room #57	7/23/70	7.0×10^{-12}
Spheroidizing Room	7/24/70	3.1×10^{-12}
Room #41 (Vault)	7/24/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/24/70	6.3×10^{-12}
Spheroidizing Room	7/27/70	1.47×10^{-11}
" "	7/27/70	2.2×10^{-12}
Room #41 (Vault)	7/27/70	6.0×10^{-12}
Spheroidizing Room	7/28/70	9.9×10^{-11}
Room #41 (Vault)	7/28/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/29/70	1.97×10^{-11}
" " " "	7/29/70	1.18×10^{-11}
Spheroidizing Room	7/29/70	2.1×10^{-12}
Ceramics Lab	7/30/70	7.0×10^{-12}
" "	7/30/70	2.9×10^{-12}
Spheroidizing Room	7/30/70	1.0×10^{-12}
Ceramics Lab	7/31/70	4.2×10^{-12}
Dehydrator Room	7/31/70	7.0×10^{-12}
Spheroidizing Room	7/31/70	4.4×10^{-12}
Furnace Room (Shipping Area)	8/3/70	3.5×10^{-11}
Corrosion Test Lab	8/3/70	1.6×10^{-12}
Spheroidizing Lab	8/4/70	2.2×10^{-11}
Pellet Room	8/4/70	7.0×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room (Shipping Area)	8/4/70	2.4×10^{-12}
Pellet Room	8/5/70	5.3×10^{-12}
" "	8/5/70	9.3×10^{-12}
Furnace Room (Room #11)	8/5/70	1.6×10^{-12}
Pellet Room	8/6/70	9.5×10^{-13}
Furnace Room (Shipping Area)	8/7/70	7.7×10^{-12}
" " " "	8/7/70	8.8×10^{-12}
Furnace Room (Room #11)	8/7/70	3.3×10^{-13}
" " " "	8/10/70	7.0×10^{-12}
Shower Room	8/10/70	1.9×10^{-11}
Furnace Room (Shipping Area)	8/10/70	3.0×10^{-12}
" " " "	8/11/70	2.2×10^{-12}
" " " "	8/12/70	1.1×10^{-12}
" " " "	8/13/70	1.1×10^{-12}
" " " "	8/13/70	1.9×10^{-12}
" " " "	8/14/70	1.1×10^{-12}
" " " "	8/15/70	1.6×10^{-12}
" " " "	8/16/70	1.1×10^{-12}
" " " "	8/17/70	4.5×10^{-12}
" " " "	8/19/70	7.6×10^{-13}
" " " "	8/19/70	2.5×10^{-12}
Dehydrator Room	8/21/70	4.9×10^{-13}
Block House (Mech.Equip.)	8/22/70	1.9×10^{-12}
Dehydrator Room	8/23/70	3.8×10^{-13}
" "	8/24/70	3.2×10^{-13}
Radioisotopes Lab	8/24/70	2.2×10^{-12}

2. Environmental Water Samples

Location	Date	Concentration(pCi/l)
^{60}Co Shielding Pool	6/4/70	> 5
Dehydrator Sump	6/17/70	15.6±2.0
Dehydrator Effluent	6/17/70	2.8±1.0
E. Tunnel Welding Shop (#58)	8/17/70	(236±10 (113± 8
Pellet Room Sump	8/17/70	(318±13 (376±13
Plating Room Chip Tank	8/17/70	(852±21 (916±20
Dyn.Corr.Lab Chip Tank	8/17/70	(112±8 (123±7
Summary Sump	9/1/70	
Summary Sump	9/1/70	

3. Environmental Swipe and Soil Analysis

a. Tritium Swipes (All in Neutron Generator Room)

Location	Date	uCi/100cm^2
Wall Mount	6/4/70	5.5×10^{-5}
Target Box	6/4/70	1.9×10^{-5}
Neutron Generator	6/4/70	1.4×10^{-5}
Lab Room 3	6/4/70	1.6×10^{-4}

b. Soil Samples From South Area Outside Bldg. D

Location	Date	pCi/gm ^{238}U	^{235}U
#1		0.38±0.07	0.13±0.04
#2		0.48±0.08	0.39±0.07
#3		0.56±0.07	0.27±0.05
#4		0.40±0.06	0.48±0.07
#5		24.5±0.12	9.14±0.87
#6		0.68±0.12	0.61±0.11

b. Soil Samples From South Area Outside Bldg. D (Continued)

Location	Date	pCi/gm ^{238}U	pCi/gm ^{235}U
#7		0.64±0.10	0.33±0.07
#8		1.13±0.14	5.27±0.41

c. Firebrick from Boiler Room (Not associated with contaminated area)

Fire Box Residue	6/25/70
Fire Box Bricks	6/25/70
Boiler Fuel	6/25/70

4. Bioassay Sampling

a. Positive Nose Swipes

Name	Date	Total dpm Both Nostrils
Sandoval	6/12/70 (AM)	200
Hysaw	6/15/70 (PM)	200
Keyser	6/16/70 (PM)	200
Sandoval	6/16/70 (PM)	200
Perry	6/17/70 (AM)	100
Craig	6/17/70 (PM)	100
Libby	6/17/70 (PM)	100
Perry	6/17/70 (PM)	100
Petrochko	6/17/70 (PM)	100
Hallowel	6/18/70 (PM)	100
Hysaw	6/18/70 (PM)	100
Keyser	6/19/70 (PM)	200
Sandoval	6/19/70 (PM)	100
Perry	6/19/70 (PM)	200
Harwood	6/19/70 (PM)	100
Hollowell	6/22/70 (AM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Cridlebaugh	6/22/70 (AM)	100
Harwood	6/22/70 (AM)	100
Sandoval	6/22/70 (PM)	100
Hysaw	6/23/70 (PM)	100
Cridlebaugh	6/29/70 (PM)	300
Hollowell	7/7/70 (AM)	100
Cridlebaugh	7/7/70 (AM)	100
Craig	7/7/70 (PM)	100
Libby	7/7/70 (PM)	100
Sandoval	7/10/70 (AM)	100
Sandoval	7/10/70 (PM)	100
Harwood	7/10/70 (PM)	100
Keyser	7/13/70 (AM)	100
Craig	7/13/70 (AM)	100
Craig	7/13/70 (PM)	100
Sandoval	7/13/70 (PM)	200
Harwood	7/13/70 (PM)	100
Libby	7/14/70 (AM)	100
Sandoval	7/14/70 (AM)	100
Petrochko	7/14/70 (AM)	100
Mericle	7/14/70 (AM)	100
Craig	7/28/70 (AM)	200
Libby	7/28/70 (AM)	200
Harwood	7/28/70 (AM)	100
White	7/28/70 (AM)	200
Hollowell	7/28/70 (PM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Keyser	7/29/70 (AM)	100
Craig	7/29/70 (AM)	200
Hysaw	7/29/70 (AM)	100
Keyser	8/11/70 (AM)	100
Keyser	8/15/70 (AM)	200

b. Urine Sample Results (24-hour sample)

	Name	Date	dpm/Sample ^{235}U
	R. Sandoval	6/20/70	0.00±0.05 dpm
	R. Cridlebaugh	7/4/70	0.00± 0.03 dpm
	H. Keyser	7/4/70	0.00±0.03 dpm
	W. Hollowell	7/4/70	0.00±0.03 dpm
	J. Craig	7/4/70	0.06±0.03 dpm
	J. Hysaw	7/4/70	0.00±0.03 dpm
	G. Libby	7/4/70	0.00±0.03 dpm
	R. Sandoval	7/4/70	0.00±0.03 dpm
	H. Perry	7/4/70	0.00±0.03 dpm
	W. Harwood	7/4/70	0.00±0.03 dpm
	R. Petrochko	7/4/70	0.00±0.03 dpm
	D. Mericle	7/4/70	0.00±0.03 dpm
* (Eberline)	D. Mericle	7/28/70	2.9±0.7 dpm
* (Eberline)	F. White	7/28/70	10±2 dpm
	W. Harwood	7/30/70	0.00±0.05 dpm

Results of Occupational Radiation Exposure Report

Film Badge No.	Participant's Name	Radiation Exposure Period June 8-Sept. 2, 1970 (MREM) Beta Gamma Neutron
00055	H. W. Keyser	.00
00056	W. Hollowell	.00
00057	J. Craig	.00
00058	J. Hysaw	.00
00059	G. Libby	.00
00061	B. Sandoval	.00
00062	H. Perry	.00
00063	R. Cridlebaugh	.00
00064	W. Harwood	.00
854014	E. M. Chenault	.00