

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee ALUMINUM COMPANY OF AMERICA ALCOA RESEARCH LABORATORIES Freeport Road New Kensington, Pennsylvania	2. Date of inspection January 18, 1961
	3. Type of inspection Reinspection
	4. 10 CFR Part(s) applicable 20 - 30

5. License number(s), issue and expiration dates, scope and conditions (including amendments)

<u>License No.</u>	<u>Date</u>	<u>Exp. Date</u>
37-7653-2	4/4/60	4/30/62
amend. 1 (amended in its entirety)		

SCOPE: A. 2 curies each of any byproduct material between Atomic Nos. 3 and 83, inclusive, except Strontium 90 10 millicuries. Total possession limit 10 curies of any byproduct material between Atomic Nos. 3 and 83, inclusive in any form;

B. 50 curies of Hydrogen 3 in any form;

C. 1 source of 13.5 millicuries of Strontium 90 as a sealed source (Tracerlab, Inc., Model No. S-2A) all to be used for Research and Development as defined by Section 30.4(k), Title 10, Code of Federal Regulations, Part 30, "Licensing of Byproduct Material".

CONDITIONS: #11-The licensee shall comply with the provisions of

(CONT'D)

6. Inspection findings (and items of noncompliance)

The Alcoa Research Laboratories perform research to produce better aluminum products. The Department of Physical Chemistry uses byproduct material obtained directly from ORNL or obtained as a result of the irradiation of special aluminum products in the OR or BNL reactors. John Lewis, a BS in Chemistry, is the RSO. An active isotope committee considers the use of all materials. A 13.5 mc Sr-90 beta gauge is used by a separate division of Alcoa at an aluminum foil mill to regulate foil thickness. Film badges and dosimeter pens are used for personnel monitoring. Surveys are performed. Records are maintained of receipt of sources, uses, surveys, personnel monitoring and waste disposal. The only items of noncompliance observed or noted during the course of the inspection are as set out below:

20.201 "Surveys"

- (b) - in that an inadequate evaluation has been made of the concentration of radioactive materials in the exhaust air released to the environments from the hood in the general chemistry laboratory caused by the evaporation to dryness of liquids containing radioactive waste materials. (See item 13B of report details.)

20.203 "Caution signs, labels and signals"

(b) "Radiation Areas"

- in that a radiation area, the radioisotope storage room, was not (CONT'D)

7. Date of last previous inspection July 21, 1959	8. Is "Company Confidential" information contained in this report? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (Specify page(s) and paragraph(s))
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DISTRIBUTION:

4 cys - Div of Comp, HQ.
2 cys - NYOO

Eugene Epstein
(Inspector)

Approved by: **Robert W. Kirkman, Director**
New York
(Operations office)

March 10, 1961
(Date report prepared)

If additional space is required for any numbered item above, the continuation may be extended to the reverse of this form using foot to head format, leaving sufficient margin at top for binding, identifying each item by number and noting "Continued" on the face of form under appropriate item.

ITEM 5 (CONT'D)

License No.

37-7653-2

amend. 1 (amended in its entirety)

CONDITIONS: continued-

Title 10, Code of Federal Regulations, Part 20, Chapter 1, "Standards for Protection Against Radiation."

#12-Byproduct material shall be used by, or under the direct supervision of, individuals approved by the Isotopes Committee, John E. Lewis, Chairman. #13-Byproduct material as sealed sources shall not be opened by the licensee.

#14-Each sealed source of licensed material to be used outside of a shielded exposure device shall be acquired from the supplier with a durable, legible and visible tag permanently attached. The tag shall be attached directly to the source or attached by a durable chain or leader. The tag shall be at least 1 inch square, shall bear a conventional radiation symbol and a minimum of the following instructions: "Danger - Radioactive Material, Do Not Handle, Notify Civil Authorities if Found". Repair or replacement of tags shall be accomplished by returning the source to the manufacturer. #15-Sealed sources containing byproduct material shall be tested for external contamination and/or leakage upon receipt from another person, except where the licensee receives certification from the supplier that the sources have been tested within 30 days prior to transfer and found free of surface contamination. Sources shall be tested for contamination and/or leakage at intervals of not more than 6 months thereafter. Sources semipermanently or permanently mounted in a device may be tested by checking accessible surfaces of the device for removable radioactive material. The test shall be sufficiently sensitive to detect 0.05 microcuries of radioactive material on the surface of sources or devices. Records of test results shall be maintained by the licensee.

If the test reveals removable radioactive material, the licensee shall take immediate action to prevent spread of contamination, initiate corrective action and shall notify the Manager of the nearest Atomic Energy Commission Operations Office listed in Appendix D of Title 10, Code of Federal Regulations, Part 20 within 10 days. The report shall include a statement of corrective action taken.

Leak tests shall be performed by the licensee in accordance with procedure described in letter from John E. Lewis dated April 21, 1958; or by other persons specifically licensed by the Commission to perform such tests. #16-Byproduct material shall not be used in or on human beings, in products distributed to the public or in field applications where such activity is released. #17-Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6,

ITEM 5 (CONT'D)

License No.

37-7653-2
amend. 1

CONDITIONS: continued-

7 and 8 of this license in accordance with statements, representations, and procedures contained in his application dated March 16, 1960 and letter from John R. Lewis dated April 21, 1958, and in related documents and amendments as follows:

A. Administrative instructions entitled "Radiation Protection Procedures, Alcoa Research Laboratories" submitted with application dated March 16, 1960.

#18-Written administrative instructions referenced in Condition 17 A. covering radiological protection, control, and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the administrative instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

ITEM 6 (CONT'D)

posted as required by this section.

- in that a radiation area about the Sr-90 beta thickness gauge was not posted as required by this section. (See item 13B and 17 of report details.)

20.206 "Instruction of personnel; posting of notices to employees"

(a)- in that Anthony Kurucker, a mill operator using a 13.5 mc Sr-90 beta thickness gauge in a restricted area, has not been instructed as to radiation hazards in the restricted area where he works, nor has he been instructed in safety problems associated with exposure to radiation, nor with the Commission regulations. (See item 13A of report details.)

(b) Neither a copy of the license, the regulations, or safety procedures have been posted at any location within the Alcoa Aluminum Foil Mill, nor is any file available for these employees to view these items. (See item 13A of report details.)

(c)- in that Form AEC-3 was not posted at any location within the Alcoa Aluminum Foil Mill. (See item 13A of report details.)

20.401 "Records of surveys, radiation monitoring, and disposal"

(b)- in that the licensee did not maintain records of surveys made by him under 20.201(b) of the area about the 13.5 mc Sr-90 beta thickness gauge. (See item 13B of report details.)

License Condition 10

- in that the 13.5 mc Sr-90 beta thickness gauge is used at an Alcoa Aluminum Foil Mill, a separate organization from the Alcoa Research Laboratories, located one mile from the Laboratories. (See item 11 of report details.)

License Condition 18

- in that no copy of the licensee's administrative instructions was given to Kurucker, the user of a 13.5 mc Sr-90 beta thickness gauge, or to any person in the Alcoa Aluminum Foil Mill. (See item 13A of report details.)

PART 30 INSPECTION

ALUMINUM COMPANY OF AMERICA
ALCOA RESEARCH LABORATORIES
Freeport Road
New Kensington, Pennsylvania

Date of Inspection: 1/18/61 (Announced)

Persons Accompanied By Inspector:

Andrew A. Mammarelli, Industrial Hygienist, Division of
Industrial Hygiene, Pennsylvania
Department of Health

Persons Contacted:

John E. Lewis, Chairman of Isotope Committee, Research Engineer and
RSO

Dr. L. M. Foster, Director of Physical Chemistry Research Division
Anthony Kurucker, Aluminum Mill Operator

REPORT DETAILS

9. Background Information

An initial inspection of the licensee's facilities was conducted on October 28, 1958 by B. L. Harless of this office and the following items of noncompliance were noted:

20.201 "Surveys"

(b)

- in that (1) no evaluation had been made of the concentration of radioactive material in the exhaust air from the hood in the isotope storage area or of the concentrations of radioactive materials in the air in the storage area during operations involving the evaporation to dryness of liquids containing radioactive waste material; and (2) the surface contamination surveys presently performed by the licensee were not sufficiently complete to detect the presence of contamination in the isotope storage room or in the chemistry laboratory in Building 44.

20.203 "Caution signs, labels and signals"

(e)(1) "Additional requirements"

- in that a laboratory containing approximately 10 millicuries of tritium, a laboratory containing 20 curies of tritium, and the isotope storage room containing millicurie amounts of radioisotopes were not posted with the words, "Caution - Radioactive Material" and the standard radiation symbol.

(f)(4) "Containers"

- in that a drum containing approximately 10 millicuries of radioactive waste material in one of the tritium laboratories, although labeled "Radioactive", was not labeled with the

words, "Caution - Radioactive Material", a standard radiation symbol, and the type, assay and date of assay of materials contained therein.

- in that the hood housing the tritium gas handling system containing approximately 20 curies of tritium, although labeled "Danger - Radioactivity" and displaying a standard radiation symbol, was not labeled with the words, "Caution - Radioactive Materials", or the type, assay and date of assay of materials contained therein.

- in that containers of radioactive materials stored in the isotope storage room, although labeled with the words, "Caution - Radioactive Material", the radiation symbol, the date, and type of material contained therein, were not labeled with the assay of materials contained therein.

- in that drums of radioactive waste material stored in the isotope storage room, although labeled with the word "Radiation", were not labeled with the type, assay or date of assay of materials contained therein.

- in that the 13 mc Sr-90 beta gauge, although labeled with the words "Radiation Hazard" and the radiation symbol, was not labeled with the words, "Caution - Radioactive Materials" and the type, assay, and date of assay of materials contained therein.

20.401 "Records of surveys, radiation monitoring, and disposal"

(b) "Records of survey results"

- in that the licensee had not maintained records of surveys conducted in the isotope storage room and isotope handling laboratory.

(b) "Records of waste disposal"

- in that the licensee maintained records of the shipment of radioactive materials, but did not show quantities of radioactive material.

The initial inspection report was transmitted to Division of Inspection on 12/15/58 with the recommendation that a follow-up inspection be conducted. The inspection report was forwarded to DL&R on 1/20/59.

An assist inspection was performed at the Research Laboratories of Alcoa at 3300 Missouri Avenue, East St. Louis, Illinois on 11/11/58 by R. C. Williams of the Chicago Operations Office and no items of noncompliance were noted.

DL&R, by letter dated 5/15/59, informed the licensee of the items of noncompliance noted in the initial inspection and requested notification of corrective action within 30 days. Alcoa, by letter dated 6/12/59, informed DL&R that they had corrected the items of noncompliance noted in the initial inspection. DL&R, by letter dated 6/19/59, informed the licensee that matters determined at the initial inspection would be reviewed at the next inspection.

On 7/21/59, a follow-up inspection was conducted by P. R. Nelson of this office of the items of noncompliance determined at the initial

inspection of 10/28/58. One item of noncompliance was found to be uncorrected as follows:

20.203 "Caution signs, labels, and signals"

(f)(4) "Containers"

- in that the waste drums in which were stored millicurie amounts of byproduct materials, although labeled with a sign "Caution - Radioactive Material" and prescribed symbol, failed to show the kind, quantity and date of measurement of the quantity of material each contained.

It was also reported that evaporation of liquid wastes had ceased, and if they were resumed, adequate evaluations would be made.

The follow-up inspection report was forwarded to DL&R on 8/10/59. DL&R, by letter dated 10/7/59, informed the licensee of the item of noncompliance, determined at the follow-up inspection.

No further correspondence follows.

10. Organization and Administration

The Alcoa Research Laboratories of the Aluminum Company of America is located in a separate building in New Kensington, Pennsylvania. The laboratories are exclusively devoted to chemical and physical research for the Aluminum Industry.

Mr. John L. Lewis is the RSO for both the research laboratories and an Alcoa Aluminum Sheet Mill producing aluminum sheeting, located one mile from the laboratories. Lewis has a B.S. in chemistry and is a Research Engineer at Alcoa in the Physical Chemistry Research Division where isotopes are used.

A formal isotope committee meets at each occasion that an application is made for a new use of isotopes. Approval of the isotope committee is necessary to authorize use of radioactive materials. The isotope committee consists of the following:

John L. Lewis RSO and Research Engineer, Chairman
Dr. L. M. Foster, PhD., Director of Physical Chemistry
Division
P. T. Stroup, PhD., Assistant Director of Research

Users of isotopes, approved by Lewis and the isotope committee, are the following:

A. S. Gillespie, Jr., Research Engineer
R. C. Geiger, Laboratory Technician
T. H. Jack, Laboratory Technician
W. W. Hill, Laboratory Technician
Dr. R. A. Kramer, PhD., Research Engineer
G. A. Seaman, Laboratory Technician

11. Facilities and Uses of Byproduct Material

An entire wing on the mezzanine of the research building is used

for isotope research. Five rooms are used and consist of a counting room, a tritium room, a general chemistry laboratory, an isotope storage room, and a high level chemistry laboratory. The high level chemistry laboratory has two inner rooms consisting of a metallograph preparation room and a dark room. (See Exhibit "A".)

A separate lathe, set aside exclusively for tool wear studies using Co-60, is located in one end of the machine shop in the research building.

A Tracerlab Beta gauge containing a 13.5 mc Sr-90 sealed source is located at rolling mill 150, in the main shoproom of an Alcoa Sheet Mill located one mile from the Alcoa Research Laboratories. Lewis stated that the plant is a separate organization (Alcoa Production Mill) from the research laboratories and that his only function is to conduct surveys and leak tests. The authorized user of the gauge (Kurucker) has been approved by the isotope committee. Dr. Foster, Chief Chemistry Division, stated that the research division has no control over the Aluminum Foil Mill operations.

License Condition 10 states: Unless otherwise specified, the authorized place of use is the Aluminum Company of America, Alcoa Research Laboratories, Freeport Road, New Kensington, Pennsylvania.

All laboratories are equipped with chemical type exhaust hoods, stainless steel sinks and table tops, seamless vinyl flooring, and remote handling equipment. Room 608, the tritium room, had a separate completely glass-enclosed case with a separate unfiltered exhaust system with an exhaust capacity of 750 cfm at the point of exit to an unrestricted area. All work with tritium gas is carried out within this glass enclosed case.

Byproduct materials are received directly as either processed isotopes from Oak Ridge or as isotopes produced as the result of irradiations either at ORNL or BNL reactors. There have been 28 irradiations of metal materials at ORNL and two at BNL. When irradiated materials are received at Alcoa, they are retained for 4 to 5 weeks when they are monitored and analyzed for activity before use.

On hand at the time of the inspection was the following byproduct material:

A. In Room 604, the radioisotope storage room, the following isotopes were stored behind a ceramic brick wall:

7 lead pigs containing irradiated tool bits in the form of Co-60

- (a) Co-60 - 115 mc as of 3/2/56
- (b) Co-60 - 125 mc as of 1/3/58
- (c) Co-60 - 2.6 mc as of 5/16/58
- (d) Co-60 - 15 mc as of 12/31/59
- (e) Co-60 - 70 mc as of 8/25/59
- (f) Co-60 - 350 mc as of 3/20/59

A lead pig containing 50 mc Cu-64 as of 8/29/60 as $\text{Cu}(\text{NO}_3)_2$
A lead pig containing 155 mc P-32 as of 11/8/60 as K_2HPO_4
A lead pig containing 80 mc P-32 as of 1/3/61 as K_2HPO_4
A lead pig containing 300 mc Ni-63 as of 4/24/55
A lead pig containing 50 mc Al-26 as of 10/12/59
A lead pig containing 16 mc Zn-65 as of 11/18/58
A lead pig containing 100 mc Cs-137-Ba-137 as of 2/3/59 (unsealed)
A lead pig containing 200 mc Cr-51 as of 6/29/60
A lead pig containing 20 mc Sc-46 as of 8/30/60
A lead pig containing 1 mc 65 as of 12/7/58
A glass bottle containing 5C of tritiated water
A lead pig containing irradiated HP #7075 aluminum plates
received from BNL on 6/29/60 with the following activities:

39 mc-Zn-65
0.4 mc-Sn-113
206 mc-Cr-51
1.7 mc-Fe-55-59

A lead pig containing 112 mc Ga-72 irradiated at ORNL and received 5/9/60.

A lead pig containing HP aluminum irradiated plates at ORNL, received 7/27/60, and containing isotopes with the following activities:

3.8 mc-Ag-110
106 mc-Au-198
0.2 mc-Fe-55
0.08 mc-Fe-59
0.09 mc-Zn-65
0.14 mc-Sn-113
2.5 mc-Zr-95

A large glass beaker covered by a watch glass containing two liters of waste solution with soluble wastes of P-32, Fe-55-59, Zn-65 and Hg-203 with amounts up to 30 mc of each isotope.

Four 15 gallon metal drums and one 5 gallon metal drum containing solid wastes.

B. Use

Lewis stated that isotopes are used in the following programs:

(1) Radioactive Tool Work Tests

Aluminum tools have been irradiated at OR with Co-60 as the principle activity. Each experiment involves the use of approximately 50 mc Co-60 released from each tool bit in wear studies is less than 1 mc and consists of contamination on turnings.

(2) Impurity Studies

Impurity studies in high grade aluminum by activation analysis using Zn-65, Fe-55-59, Hg-203 and Sc-46 are

conducted. Amounts up to 100 mc of each isotope may be used per experiment. Impurities are introduced into aluminum test plates, and the activities are induced by inserting the test plates into a reactor for activation.

(3) Surface Chemistry for Study of Surface Films

P-32 and Cr-51 are used in activation analysis of surface films on aluminum.

(4) Tritium Studies to Tag Compounds Found in Aluminum for Studying the Amount and Distribution of Hydrogen in Aluminum

These studies are being performed continuously in room 608 and Lewis stated that 23 curies of H-3 gas are used yearly. Modified Wilzbach techniques are used in each experiment. The strips are then heated and the tritium passes off into a sealed chamber for counting. Lewis stated that 5 runs using 50 mc H-3 are performed weekly for 52 weeks a year and that during each run 10 mc H-3 gas is released to the atmosphere through the hood by means of a separate exhaust to an unrestricted area at the point of exit. The hood has an exhaust capacity of 750 cfm and operates 24 hours a day, all year. The area surrounding the Research Laboratories is residential.

(5) Autoradiography Using Fe-59

Aluminum parts undergo radiography using 5 mc of Fe-59. Small iron plates 2" x 1" x 1/16" placed in plastic holders are used as a radiographic source. Radiography is performed on aluminum welds inside the locked darkroom in room 600, the high level chemistry laboratory. Exposures are made for a 10 day period. Light sensitive film is used. No entry into the darkroom could be made during the inspection without ruining an exposure which had been in progress for five days.

12. Instrumentation and Calibration

Lewis had on hand the following operable survey instruments:

- (a) Two Jordon Radector survey meters Model AGB-50SR, range 0-50 mr/hr.
- (b) One Tracerlab SUID Cutie Pie survey meter, range 0-1500 mr/hr.
- (c) One Nuclear Instruments Alpha survey meter Model 2112-2, range 0-1500 cpm.
- (d) One Atomic accessories TSM-91-A tritium air monitor.

In room 614, the counting room, Lewis had the following instruments:

- (a) Carey Model 31 vibrating reed electrometer for tritium analysis.
- (b) Atomic instruments Model 510 pulse height analyzer (single channel).
- (c) Two nuclear Chicago Model 1929 ultra scalers.
- (d) One Tracerlab Model SC-16 windowless flow counter.

All instruments are calibrated before use with either contained sources or sources on hand.

13. Radiological Safety Precautions and Procedures

A. Instructions

Written instructions entitled "Radiation Protection Procedures Alcoa Research Laboratories" are posted in the corridor on the mezzanine where radioisotopes are used within the Research Laboratories. A copy of the license and the regulations are also posted together with Form AEC-3, "Notice to Employees". The above items are open to view to all employees of the research laboratory. All users in the research laboratories have a copy of the written instructions.

Anthony Kurucker, operator of the Foil Mill where the 13.5 mc Sr-90 beta thickness gauge is used, stated that he has not received a copy of the administrative instructions.

License Condition 18 states: Written administrative instructions referenced in Condition 17 A. covering radiological protection, control, and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the administrative instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

Lewis stated he has not given any person in the Foil Mill a copy of the instructions. No copy of Form AEC-3 was posted at any location within the Foil Mill, nor was there any file or posting of the administrative instructions, the license or the regulations which would make these items available to employees of the Foil Mill. Kurucker stated that he received instruction on the operation of the Sr-90 beta gauge but did not receive instructions as to radiation hazards, safety problems, or the regulations of the Commission. Lewis stated that the area in and about the Foil Mill #150 where the Sr-90 beta thickness gauge is used, is restricted.

B. Surveys

Lewis stated that he has performed direct radiation surveys of all laboratories and areas within the Alcoa Research Laboratory as well as the Alcoa Aluminum Foil Mill. Lewis had maintained records of surveys performed at Alcoa Research but has not recorded the results of surveys performed in or about the 13.5 mc Sr-90 beta thickness gauge in the Aluminum Foil Mill. Lewis stated that at the time he went to survey the beta gauge, the particular Foil Mill (150) was not in operation.

Lewis has taken smears of the hood and of the laboratory room 606 when he evaporates to dryness approximately three liters of waste solution containing soluble isotopes of P-32, Zn-65, Fe-55 and Hg-203 with amounts of materials up to 30 mc of each isotope. The smears as recorded by Lewis, indicated counts of 35 cpm above background.

The evaporations are performed in a closed chemical type unfiltered exhaust hood with an exhaust capacity of 150 cfm, every two months by heating the beaker and allowing the vapor to escape to the environs. It was pointed out to Lewis that the exhaust hood in which evaporations of waste solutions were performed had a low air flow rate. Lewis verified the air flow rate of the exhaust hood at 150 cfm, by calling the plant maintenance engineer in the inspectors presence. Lewis stated he made no evaluation of amounts of radioisotopes released to the environs through the exhaust hood. It was pointed out to Lewis that this was the identical operation for which he had been cited during the initial inspection of 10/28/58 and that all he had done was to transfer the evaporation operation from the exhaust hood in room 604, the isotope storage room, to the exhaust hood in room 606 the general chemistry laboratory. Lewis had stated at the follow-up inspection performed on 7/21/59 that they were no longer performing evaporation of liquid wastes. The licensee's letter of 6/12/59 included as Exhibit "B" also stated that evaporation of soluble waste was discontinued and that when activity is resumed, air sampling apparatus supplied by Alcoa Industrial Hygiene group would be used to take air samples during evaporation so that an adequate evaluation could be made. Lewis stated that he resumed evaporation of liquid wastes after the follow-up inspection because he thought that by transferring the operation to room 606, which had a closed exhaust hood as contrasted with room 604 which had an open canopy type hood, and taking smear samples he was complying with the regulations. Lewis stated that the hood in room 606 is closed during evaporations which take several hours. Room 606 may be unattended during these evaporations. Lewis also stated that he had not to date requested the Industrial Hygiene Group to take air samples but that he would make such a request. Lewis stated he did not maintain a record of these evaporations, which occur approximately every two months.

An Atomic Accessories TM-3 tritium air monitor is always in operation during tritium runs. The results are recorded and indicate a maximum of $3 \mu\text{e H}^3 / \text{M}^3$ of air in the tritium room, a restricted area.

A direct radiation survey was performed by the inspector using a #1632 Juno survey meter calibrated 12/23/60 and a #5584 NMC GM survey meter calibrated 12/16/60 and the following radiation readings were noted:

- (1) In the isotope storage room
 - At the surface of the glass cover over the ceramic brick wall containing millicurie amounts of radioactive materials and 5c of H-3 - 180 mr/hr.
 - At 3 feet from the well - 10 mr/hr.
 - At the surface of the waste containers - 5 mr/hr.
 - At the stairwell and corridor - 1 mr/hr.

Lewis stated that users spend as high as 10 minutes within the isotope storage room.

- (2) In the tritium room
 - At the surface of the glass case where 10 c of H-3

gas was stored - 0.025 mr/hr. (instrument background),

(3) In the dark room

At the outside door of the darkroom where 5 mc Fe-59 was being used for radiography - 0.1 mr/hr. Lewis's records state that the radiation level inside the darkroom was 1 mr/hr at 12" from the Fe-59 source during radiography.

(4) In Room 606 the General Chemistry Laboratory, the hood in where evaporation had taken place approximately two months prior to the inspection - 0.025 mr/hr. (instrument background).

The hood in Room 606 and the available surfaces of the exhaust ducts were wiped by the inspector with filter paper. The filter paper was monitored with the NMC GM survey meter above and the radiation measurement of filter paper did not exceed 0.025 mr/hr (instrument background).

(5) In the Aluminum Foil Mill

(a) At the surface of the beta gauge with the window open and the rolling mill in operation with the beta window of the Juno survey meter open - 500 mr/hr. At 12" from the surface of the gauge - 90 mrad/hr. At 3 feet from the surface of the gauge, at the front and sides of the rolling mill and at waist high level to a height of 6 feet - 15 mrad/hr. Kurucker indicated the position where he stood for at least one hour a day while operating the rolling mill for 8 hours daily. The radiation level in this area, as measured by the inspector, was 15 mrad/hr. This dose rate existed from the top of his head to and including the gonadal region.

(b) with the Juno beta shield closed where Kurucker stood - 2 mr/hr.

(c) With the Sr-90 beta gauge window open and with rolling mill shut and all aluminum foil removed at 3 ft. distance - 7 mrad/hr.

Lewis stated that the radiation levels obtained by the inspector agreed with those he had made, but did not record.

C. Leak Tests

Lewis performs leak tests of the Sr-90 thickness gauge at 6 months intervals and records the results of these tests. Lewis removes the Mylar window from the beta gauge and wipes the Mylar window with moistened cellulose sponge. The cellulose sponges are monitored by a GM detector to determine contamination. All leak test results were recorded as less than 200 cpm, which Lewis stated indicates no leakage. Leak tests are performed in accordance with the licensee's letter dated 4/21/58 as required by License Condition 15.

D. Locking of Areas

All areas where isotopes are used or stored are locked when not in use. A security force patrols both the research laboratories and the Foil Mill.

14. Procurement Procedure and Control

Lewis is responsible for all procurement of radioactive materials. Shipments of radioactive materials are received unopened by Lewis.

15. Storage and Security of Material

All rooms where materials are located, are locked. The 13.5 mc Sr-90 beta gauge is permanently mounted to rolling mill 150. The gauge is mounted in the center of the rolling mill with the sealed source in the top portion of the gauge.

16. Waste Disposal

- (A) Lewis stated that no isotopes are released to the sanitary sewerage system.
- (B) Solid wastes are shipped to OR for disposal. A record is maintained of all shipments noting the type and quantity of materials. Awaiting shipment to OR were five metal drums in the isotope storage room containing the following:

- Drum #1 - glassware.
- Drum #2 - chemical residues from evaporations containing 100 mc Co-60, 30 mc Hg-203 and 30 mc Zn-65.
- Drum #3 - Irradiated aluminum chips.
- Drum #4 - Irradiated aluminum chips.
- Drum #5 - wipe cloths and gloves.

Shipments to OR were made on 1/26/59, 12/7/59 and 1/4/60.

- (C) Release to the atmosphere to unrestricted areas
 - (1) Evaporation is performed approximately every two months of approximately 3 liters of solution containing miscellaneous isotopes in millicurie quantities. Evaporations occur in an exhaust hood in Room 604. Lewis stated that no evaluation as to the amounts of materials released to the atmosphere has been made.
 - (2) Release of tritium to the atmosphere
 - As previously noted in Paragraph 11, B(4), Lewis stated that 10 mc H-3 gas are released to the atmosphere 5 times weekly for 52 weeks a year. This amount results in a concentration of 2.34×10^{-7} uc-H³/ml air when averaged for an entire year using the reported hood flow rate of 750 cfm. This amount meets the requirements for release of H³ to the atmosphere which is given in the old Part 20 under which these concentrations existed.

17. Posting and Labeling

Room 604, the radioisotope storage room, had a sign on the entrance door reading "Danger - Radioactive Materials" (with symbol).

The inside of room 604 where radiation levels of 180 mr/hr at the surface of the ceramic brick wall and where radiation levels of 10 mr/hr had been noted at three feet from the bin, was not posted. The five waste cans in the isotope storage room all had labels reading "Caution - Radioactive Materials" (with symbol) and indicated the kind, quantity and date of measurement.

All containers within the storage bin in Room 604 had labels reading "Caution - Radioactive Materials" (with symbol) and indicated the kind, quantity and date of assay.

The glass case in Room 608, the tritium room, was posted with a sign reading "Caution - Airborne Radioactivity Area" (with symbol). The glass case also had a label reading "Caution - Radioactive Materials" which also indicated the kind, quantity, and date of assay.

The entrance to Room 608, the dark room, where radiography with 5 mc of Fe-59 was being performed, was posted with a sign reading "Caution - Radioactive Materials" (with symbol).

The lathe used for tool wear studies was posted with a sign reading "Caution - Radioactive Materials" (with symbol).

The Sr-90 beta thickness gauge in the Aluminum Foil Mill had a label reading "Caution - Radioactive Materials" (with symbol), and indicated the kind, quantity, and date of assay. The rolling mill to which the gauge was attached was posted with a sign reading "Caution - Radioactive Materials". The area about the gauge where radiation levels of 15 mrad/hr exist, and where Anthony Kurucker, the operator of the rolling mill, stated he remains for one hour each day, was not posted as a radiation area.

18. Personnel Monitoring

St. Johns bi-weekly film badges and Victoreen self-reading dosimeter pens are used for personnel monitoring for personnel of the research laboratories. The film badge records were examined for 1959 and 1960. The highest 13 week cumulative exposure was 425 mrem received by [REDACTED]. Dosimeter readings are recorded after each day of use, and do not show any reading greater than 20 mr. Urine analysis for tritium is performed monthly on all users of H³. The highest concentration is reported for [REDACTED] who had average monthly concentrations of 9 uc/l H³. According to "LASL 2163" a continued assay of 9 uc/l H³ indicates a monthly whole body exposure of approximately 79 mrem.

Lewis stated that [REDACTED], who operates the aluminum foil roller with the Sr-90 beta gauge, has not been issued any personnel monitoring device because they did not wish to have any controversy with the labor union in the Aluminum Foil Mill. [REDACTED] as shown in item 13B of this report, is exposed daily to 15 mrad per hour beta gamma (Bremsstrahlung) of which 2 mr/hr is gamma (Bremsstrahlung). This would result in a quarterly exposure of 975 mrad beta gamma of which 130 mr is gamma. [REDACTED] wears prescribed thick lens safety glasses with side shields.

19. Records

Records are maintained of receipt of materials, use, and surveys, with the exception of surveys of the Sr-90 beta gauge, personnel monitoring and waste disposal.

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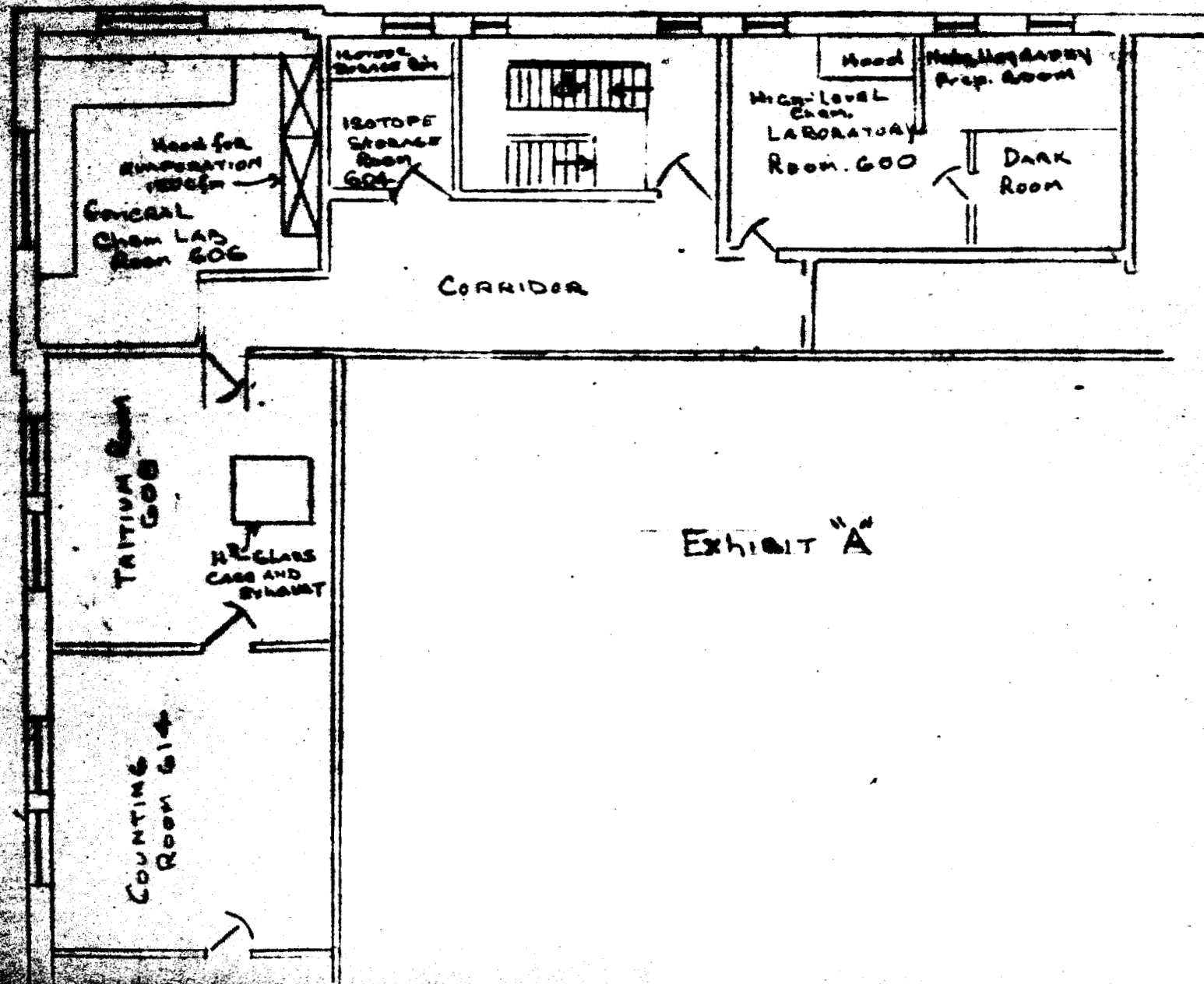


EXHIBIT "A"