

COMPLIANCE INSPECTION REPORT

COMPANY CONFIDENTIAL

<p>1. Name and address of licensee</p> <p>Aluminum Company of America Aluminum Research Laboratories Freeport Road New Kensington, Pennsylvania</p>	<p>2. Date of inspection October 28, 1958</p> <p>3. Type of inspection Initial</p> <p>4. 10 CFR Part(s) applicable 20 - 30</p>
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5. License number(s), issue and expiration dates, scope and conditions (including amendments)

Number	Date	Exp. Date	Scope and Conditions
37-7653-2	4/18/58	4/30/60	<p>Scope: A. 25 curies of <math>H^3</math>, any form; B. 10 mc of <math>Sr^{90}</math>, any form; C. 13.5 mc of <math>Sr^{90}</math> as sealed source (Tracerlab, Inc. Model No. S-2A); D. 2 curies each of any byproduct material between Atomic Nos. 3 &amp; 83, inclusive, except <math>Sr^{90}</math>. Total possession limit, 10 curies of any byproduct material between Atomic Nos. 3 &amp; 83, inclusive, except <math>Sr^{90}</math>, any form; all for research and development as defined in Section 11(q) of the AE Act of 1954.</p>

Conditions: #11-The licensee shall comply with the provisions of 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 supervision of individuals approved by the local isotope committee, John E. Lewis, Chairman.  
(CONT'D)

6. Inspection findings (and items of noncompliance)

Aluminum Company of America, Aluminum Research Laboratories, maintains an active radiation safety committee consisting of Mr. John Lewis, Dr. L. M. Foster, and Mr. W. T. Ennor. Instrumentation, personnel monitoring, procurement, and leak testing procedures are satisfactory. The following items of noncompliance were noted during the course of this inspection:

20.201 "Surveys"

(b) - in that (1) no evaluation has been made of the concentration of radioactive material in the exhaust air from the hood in the isotope storage area or of the concentration 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 are not sufficiently complete to detect the presence of contamination in the isotope storage room or in the chemistry laboratory in Building 44. (See Item 11.b, of report details.)

20.203 "Caution signs, labels, and signals"

(e)(1) "Additional requirements" - in that a laboratory containing approximately  
(CONT'D)

<p>7. Date of last previous inspection</p> <p>None.</p>	<p>8. Is "Company Confidential" information contained in this report? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>(Specify page(s) and paragraph(s))</p> <p>Entire report.</p>
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DISTRIBUTION:

4 cys.-Division of Inspection, Headquarters  
2 cys.-Inspection Division, NYOO

Bennett L. Harless  
(Inspector)

Approved by:

Robert W. Kirkman, Director  
New York  
(Operations office)

December 2, 1958

(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

<u>Number</u>	<u>Date</u>	<u>Exp. Date</u>	<u>Scope and Conditions</u>
37-7653-2 (Cont'd)			<p>Conditions (Cont'd)</p> <p>#13-This license supersedes license 37-7653-1 issued February 29, 1956. #14-Sealed sources fabricated or acquired under this license shall be tested for contamination. Sealed sources containing byproduct material (except solid metal <math>\text{Ir}^{192}</math>, <math>\text{Ta}^{182}</math>, <math>\text{Ce}^{60}</math> plated with gold or nickel; and gases) shall be tested for leakage at intervals of not more than 6 months and records of leak test results shall be maintained by the licensee. #15-Total amount of <math>\text{H}^3</math> (tritium) acquired under this license shall not exceed 50 curies. #16-Written administrative instructions ("Radiation Protection Procedures, Alocs Research Laboratories" dated March 14, 1958) covering radiological protection, control, and security of byproduct material shall be supplied to each individual using or having responsibility for use of such material. #17-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 one 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. #18-Byproduct material shall not be used in or on human beings; in products distributed to the public; or in field applications where activity is released.</p>

ITEM 6 CONT'D

10 millicuries of tritium, a laboratory containing approximately 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. (See Item 14 of report details.)

(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. (See Item 14 of report details.)

- 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. (See Item 14 of report details.)

- in that containers of radioactive material 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. (See Item 14 of report details.)

ITEM 6 CONT'D

- 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. (See Item 14 of report details.)

- in that the 13 millicurie strontium-90 beta gauge, although labeled with the words, "Radiation Hazard" and the radiation symbol, was not labeled with the words, "Caution - Radioactive Material" and the type, assay and date of assay of materials contained therein. (See Item 14 of report details.)

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

(b) "Records of survey results" - in that the licensee has not maintained records of surveys conducted in the isotope storage room and isotope handling laboratory. (See Item 16 of report details.)

(b) "Records of waste disposal" - in that although the licensee maintains records of the shipment of radioactive materials, these records do not show the quantities of radioactive material. (See Item 16 of report details.)

## PART 30 INSPECTION

Aluminum Company of America  
Aluminum Research Laboratories  
Freeport Road  
New Kensington, Pennsylvania

Date of Inspection: October 28, 1958

### Persons Accompanying Inspector:

Mr. Andrew Mammarella, Pennsylvania Department of Health, Division of Industrial Hygiene, Pittsburgh

### Persons Contacted:

Mr. John Lewis, Radiation Safety Officer  
Mr. L. M. Foster, Chief, Physical Chemistry Division

## DETAILS

### 9. Organization and Administration

Aluminum Research Laboratories of the Aluminum Company of America is engaged in basic research in the aluminum industry. The Research Laboratories maintain an active radiation safety committee called the Isotope Committee, composed of the following members:

Mr. John Lewis, R.S.O., who received a B.S. in chemistry and has five years of experience in radioactive tracer program work.

Mr. L. M. Foster, Chief, Physical Chemistry Division, who worked on the Manhattan Project with the University of Chicago from 1942 to 1944, the Manhattan Project in Los Alamos from 1944 to 1946, and completed the ORINS isotope techniques course. He has been associated with the radioactive tracer program at ALCOA since 1952.

Mr. W. T. Ennor, Assistant Director of Research of the Aluminum Research Laboratories. Mr. Ennor serves in an administrative role in establishing the radioactive tracer program at ALCOA and directing its research activities.

The Isotope Committee has complete responsibility for all radioactive tracer work carried out at the Aluminum Research Laboratories. Whenever a new use of isotopes is proposed, the Isotope Committee must meet to discuss and approve or reject the proposed use. Minutes of Isotope Committee meetings are not maintained.

### 10. Facilities and Uses of Byproduct Material

#### A. Uses of Byproduct Material:

Approximately six persons, including technicians, are engaged in the use of radioactive materials at ALCOA. At the time of this inspection, the licensee had on hand the following:

- (1.) Approximately 150 millicuries of cobalt-60 in the form of irradiated tool bits which are used in tool wear studies. Each experiment involves the use of approximately 50 millicuries of cobalt-60 in the form of an irradiated tool bit. The amount of cobalt-60 released from the bit in each wear study is considerably less than 1 microcurie per experiment and this material exists in the form of contamination on turnings produced during the study.

- (2.) Approximately 20 curies of tritium, which is used in aluminum fabrication studies. These studies, which are performed almost continuously, involve the use of approximately 5 curies of tritium at any one time, which is either contained as a gas or as HTO in a closed glass handling apparatus. During the course of a normal experiment, tritium gas passes over aluminum strips and is absorbed on the strips. An alternate means of contaminating the aluminum strips consists of evaporating tritiated water in a sealed system containing aluminum metal strips. The aluminum metal strips (contaminated with approximately 10 millicuries of tritium) are then placed in a sealed gas handling system and the strips heated to drive off the tritium, which is counted in an ionization chamber.
- (3.) Approximately 13 millicuries of strontium-90 used as a beta gauge on a foil mill. At the time of this inspection, the strontium-90 beta gauge was not in use. It was reported to be used infrequently.
- (4.) Approximately 300 millicuries of  $\text{Co}^{60}$  as scrap irradiated tool bits awaiting shipment to Oak Ridge for disposal.
- (5.) Approximately 10 millicuries of  $\text{S}^{35}$  which is not in use.

In addition to the above isotopes, which were on hand, several other isotopes are used on an intermittent basis. Phosphorus-32 is used in autoradiographic studies concerned with the general distribution of phosphorus-32 in aluminum alloys. Each experiment involves the use of approximately 200 millicuries of phosphorus-32. Sulfur-35 is used in various types of analytical studies in quantities up to 200 millicuries per study. Various other isotopes such as tungsten, zinc, calcium, cadmium, sodium, gallium, and antimony are used in various types of laboratory studies. These isotopes are usually obtained in the form of materials which have been irradiated in the Oak Ridge reactor.

#### B. Facilities:

Facilities for the use of radioactive materials consist of:

- (1.) A 10' x 15' laboratory in Building 29. This laboratory houses a gas handling system beneath a canopy-type hood. Waste tritium gas from this system is vented into the atmosphere at a maximum rate of 50 microcuries per day. Inside this laboratory, scrap aluminum contaminated with approximately 10 millicuries of  $\text{H}^3$  is contained in a metal can labeled "Caution - Radioactivity" and displaying a sub-standard radiation symbol.
- (2.) An unpested 20' x 25' laboratory in Building 29, equipped with a hood containing a gas handling vacuum system labeled with the words "Danger - Radioactivity" and a radiation symbol. The hood in this laboratory is separately exhausted to the roof of the building. The hood blower is operated during the entire working day but is turned off at night. At the time of this inspection, the gas handling system contained approximately 20 curies of tritium.
- (3.) A lathe in the press room of Building 29. This lathe has been set aside in the shop area for tool wear studies and no other work is done on this particular machine. During operations, the lathe is shielded on the sides where the operator and his assistant stand. The entire operational portion of the lathe is enclosed in a lucite and aluminum box. There is no forced ventilation in the lucite box or on the lathe. Following a tool wear study, the machined chips are collected and analyzed for activity. Lewis stated that the amount of activity on these chips is much less than 1 microcurie.

- (4.) A 12' x 20' chemistry laboratory in Building 44, equipped with an 8' unfiltered but separately exhausted hood, where radiochemical analyses are made. The door to the chemistry laboratory was posted with the words "Caution - Radioactivity" and a sub-standard radiation symbol. Laboratory benches were covered with diaper paper and the hood was coated with strippable plastic. This laboratory was equipped with a Jordan ionization chamber, Nuclear-Chicago alpha survey instrument, and a number of other radiation survey instruments.
- (5.) A counting room approximately 8' x 18' adjacent to the chemistry laboratory, equipped with a Tracerlab superscaler provided with automatic sample changer and an end window GM detector, an Atomic Instrument Company gamma ray spectrometer, and a Nuclear-Chicago ultrascaler with gas flow GM or proportional detector.
- (6.) A locked 9' x 12' isotope storage room where radioactive materials are stored behind a 12" thick brick wall. Containers of radioactive material behind this wall were labeled with the words "Caution - Radioactive Material", the radiation symbol, the type of material and the date of assay of materials contained therein, but did not specify the assay of material in each container. Waste radioactive materials are stored in large metal drums labeled with the word "Radioactive" but did not display the assay or assay date of materials contained therein.

This waste storage room also houses a bench on which a hot plate has been placed. Approximately 4' above the hot plate, a completely open canopy type hood is located. This hot plate is used for evaporating radioactive waste solutions to dryness in beakers. The beakers are then placed in a radioactive waste can. The general radiation level in the center of the isotope storage room is approximately 10 mr/hr. At the inlet to the hood, a radiation intensity of approximately 16 mr/hr was measured with the beta shield of the GM survey instrument open. One beaker, which contained the residue from radioactive waste material evaporated to dryness, was too hot to measure with the inspector's GM survey instrument. Lewis stated that the radiation intensity near the beaker was approximately 100 mr/hr. Several smear samples were taken in the isotope storage room and results of analyses of these samples are included as EXHIBIT "A" to this report.

- (7.) A Tracerlab BB-1 strontium-90 beta gauge (13 millicuries) installed on roller No. 150 in the ALCOA foil mill. The radiation intensity as measured at 3' from the beta gauge (area not accessible to personnel) with the shutter open was less than 5 mr/hr.

## 11. Radiological Safety Precautions and Procedures

### a. Instructions

Written radiation safety instructions are supplied to all persons working with radioactive materials at ALCOA. These instructions outline the responsibility of the Radiation Safety Officer, discuss survey and monitoring procedures, work area and personal cleanliness, internal radiation hazards, emergency procedures, and the storage, transportation and disposal of radioactive isotopes.

### b. Surveys

According to Lewis, monthly radiation safety surveys are performed using the Nuclear-Chicago count rate meter equipped with an end window GM detector. No smear sample surveys and no air surveys are performed. Records of surveys made around the Tracerlab beta gauge indicate that the maximum radiation level with the shutter open is less than 7 mr/hr at 3'.

c. Leak Tests

Leak tests have been performed on the strontium-90 beta gauge at regular intervals of approximately six months, and records of these leak tests indicate that the gauge is not leaking.

d. Locking of Areas

All areas where radioactive materials are stored are kept locked at all times in the absence of responsible personnel.

12. Procurement

Lewis is responsible for the procurement of all radioactive materials, and shipments of radioactive materials are received in an unopened condition by Lewis.

13. Waste Disposal

According to Lewis, no radioactive waste materials have been released to the sanitary sewerage system, and there has been no incineration of radioactive materials. All radioactive waste materials are shipped to Oak Ridge for disposal. Disposal of radioactive materials to the atmosphere consists solely of the release of tritium in quantities not exceeding 50 microcuries per day.

14. Posting and Labeling

The 10' x 15' laboratory housing a tritium gas handling apparatus which at times contains up to 10 millicuries of  $H^3$  was not posted and the gas handling apparatus was not labeled. In this same laboratory a can of radioactive waste material containing approximately 10 millicuries of radioactive waste was labeled with the words "Caution - Radioactivity" and a sub-standard radiation symbol.

The 20' x 25' tritium laboratory housing approximately 20 curies of tritium was not posted. The hood containing the tritium was labeled with the words "Danger - Radioactivity" and a standard radiation symbol.

Containers of radioactive material in the 9' x 12' isotope storage room were labeled with the radiation caution sign, symbol, type of material and date of assay. These containers were not labeled with the assay of material contained therein. Metal drums in this room housing radioactive waste materials were labeled with the word "Radioactive" but not with assay, date of assay or type of materials contained therein. The strontium-90 beta gauge on the foil mill was labeled with the words "Radiation Hazard" and a radiation symbol. It was not labeled with the type, assay, or date of assay of the material contained therein.

15. Personnel Monitoring

Personnel monitoring is accomplished by the use of film badges supplied every two weeks by St. John's X-Ray Laboratory to approximately 10 employees of ALCOA. Records of film badge results were checked back to the beginning of 1958 and no exposures exceeding 300 mr per two-week period were noted. Exposures averaged less than 100 mr per two-week period. According to Lewis, film badges are not routinely supplied to personnel working in the neighborhood of the beta gauge. Lewis said that on several occasions these persons were supplied badges and they received no significant radiation exposure.

16. Records

Records of leak test results, film badge results, and isotope procurements are maintained. Waste disposal records are maintained of all shipments of

radioactive materials to Oak Ridge. Although these waste disposal records indicate the isotopes shipped, they do not show the quantities of each isotope. Records of radiation surveys around the beta gauge are recorded. No records of routine radiation surveys made in the laboratories using radioactive materials or the isotope storage area are maintained.

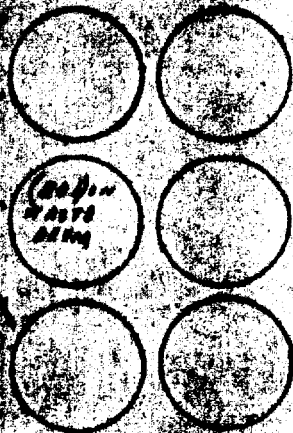
17. Instrumentation Employed by Inspector

All direct radiation measurements were obtained using an RCA GM survey instrument (No. 3925 calibrated on 8-4-58).





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