Form AEC-591 (4-60)

UNITED STATES ATOMIC ENERGY COMMISSION

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee

The Harshaw Chemical Company
1945 East 97th Street
Cleveland, Ohio 44106

2. Date of inspection

November 16 and December 7 - 9, 1964

3. Type of inspection Initial & Reinspection

4. 10 CFR Part(s) applicable

20, 30, and 70

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

34-6558-1	6-22-60	6-30-61 - Reinspection #1
Amendment 1 (Amended in entirety)	10-13-61	6-30-62
Amendment 2	11-15-61	6-30-62
Amendment 3	2-12-62	6-30-62
Amendment 4	5-31-62	6-30-64
Amendment 5	6-21-62	6-30-64
Amendment 6	8-24-62	6-30-64
Amendment 7	11-30-62	6-30-64
Amendment 8	11-20-63	6-30-64
Amendment 9	1-23-64	6-30-64
Amendment 10		

• continued •

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REGION
MAIL SECTION

6. Inspection findings (and items of noncompliance)

The following items of noncompliance were noted during the course of this inspection:

✓ License No. 34-6558-1

10 CFR 30.3 - "License Requirements"

- In that byproduct materials were possessed and used after June 30, 1964, the expiration date of this license without a valid AEC license. No timely application for renewal was filed. (See paragraph 19 of Report Details.)

License No. 34-6558-2

✓ 10 C

UNITED STATES ATOMIC ENERGY COMMISSION

COMPLIANCE INSPECTION REPORT

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The Harshaw Chemical Company
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2. Date of inspection

November 16 and December 7 - 9, 1964

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4. 10 CFR Part(s) applicable

20, 30, and 70

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

[illegible]-1	6-25-60	6-30-64 - Reinspection #1 - 2 - 2
Amendment 2 (Extended to expire)	10-13-61	6-30-65
Amendment 3	11-15-61	6-30-65
Amendment 4	2-12-62	6-30-65
Amendment 5	3-31-62	6-30-64
Amendment 6	6-11-62	6-30-64
Amendment 7	8-24-62	6-30-64
Amendment 8	11-30-62	6-30-64
Amendment 9	11-20-63	6-30-64
Amendment 10	1-23-64	6-30-64

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6. Inspection findings (and items of noncompliance)

The following items of noncompliance were noted during the course of this inspection:

/ License No. 34-4554-1

10 CFR 30.3 - "License Requirements"

- In that byproduct materials were possessed and used after June 30, 1964, the expiration date of this license without a valid AEC license. No timely application for renewal was filed. (See paragraph 10 of Report Details.)

/ 10 C

LICENSE NUMBERS, ISSUE AND EXPIRATION DATES, SCOPE AND CONDITIONS (INCLUDING AMENDMENTS), Cont'd.

5. 34-6558-1, Continued.

Amendment 11	3-12-64	6-30-64
Amendment 12	4-22-64	6-30-64
34-6558-3	1-6-64	12-31-65 - Initial I - H
Amendment 1	10-20-64	12-31-65
SNM-427, as renewed (Docket No. 70-472)	10-30-64	11-30-67 - Reinspection #1 III - B

INSPECTION FINDINGS, Cont'd.

6. License No. 34-6558-3, Continued.

Condition 15 - "Leak Tests"

- in that in the absence of a certificate showing that a leak test had been conducted within six months prior to the transfer of the two 25 millicurie Cesium 137 sealed sources to the licensee on January 22, 1964, the sealed sources were placed into use in May, 1964, without leak testing. (See paragraph 49 of Report Details.)

Condition 16 - "Gauge Installation"

- in that two industrial gauges procured and possessed under this license were installed, and subsequently removed, by this licensee, whereas this condition requires that such installation and relocation be performed by persons specifically licensed by the Commission to do so. (See paragraphs 24 and 26 of Report Details.)

License No. SNM-427

Condition 8 - "Leak Testing"

- in that the licensee has not performed leak tests of the plutonium-beryllium neutron source at six months intervals as stated in the license application which is referenced by this license condition. (See paragraph 51 of Report Details.)

In addition to the above, the following items were noted which would constitute noncompliance had License No. 34-6558-1 not expired prior to the date of this inspection:

10 CFR 30.3 - "License Requirements"

- in that a quantity of byproduct material was transferred to a recipient not authorized by the Commission to possess such material in that quantity. (See paragraph 56 of Report Details.)

INSPECTION FINDINGS, Cont'd.

6. 10 CFR 30.41 - "Records"

- in that the licensee has not maintained complete records of receipts and transfers of materials, particularly for the period prior to 1964. (See paragraph 53 of Report Details.)

Condition 7 - "Chemical and/or Physical Form"

(H) - in that the licensee has procured Americium 241 sources (Item H) from Monsanto Research Corporation, and the license specifies that such sources are to be "ORNL plated sources." (See paragraph 20 of Report Details.)

Condition 8 - "Possession Limit"

(H) - in that the licensee has possessed more than 24 microcuries at one time of Americium 241. (See paragraph 21 of Report Details.)

Condition 9 - "Authorized Use"
and 10 CFR 30.32(c)

(H) - in that the licensee has been incorporating byproduct material (Americium 241) possessed under this license into products to be distributed, a use not described by the licensee in its application nor authorized by the license. (See paragraphs 19 and 22 of the Report Details.)

Condition 16 - "Leak Testing"

- in that leak tests have not been performed at the prescribed six months intervals, and records of leak tests have not been maintained in units of microcuries. (See paragraphs 47 and 48 of Report Details.)

D E T A I L S

GENERAL INFORMATION

9. This inspection was conducted on an announced basis. The licensee was contacted by telephone, and an appointment was made for the inspection to be conducted on November 16, 1964. Similarly, the licensee was also notified in advance of the supplemental visit made on December 7, 1964. (The visit to the Elyria, Ohio plant on December 9 was unanncunced, however.)

10. The inspector was unaccompanied during the inspection. The Ohio Department of Health was notified that this licensee was to be inspected; however, no representative of that office accompanied the inspector.

11. The following persons were interviewed during the course of this inspection:

    Mr. Jay Manefee, RSO for Solid State Division
    Mr. Robert Shaw, Accountant
    Mr. A. A. Longano, Process Engineer
    Mr. A. J. Rehker, Safety Supervisory (Elyria, Ohio plant)
    Mr. Charles Copple, Plant Engineer
    Mr. C. E. Hoskins, Plant Manager, Elyria, Ohio

    All information is presented in substance unless otherwise indicated.

INSPECTION HISTORY

12. The last previous inspection of License No. 34-6558-1 was conducted on April 25, 1962. The licensee was cited for three items of noncompliance at that time as follows:

    A. Failure to leak test a 4.5 millicurie Cesium 137 source between the dates July 13, 1961 and April 25, 1962.
    B. Certain byproduct materials stored in an unrestricted area were not secured against unauthorized removal.
    C. Form AEC-3 "Notice to Employees" was not posted.

13. There has been no previous inspection of Licenses No. 34-6558-3 or -4.

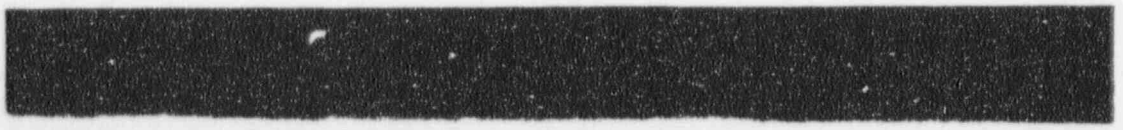
14. The last previous inspection of the licensee's source material program was conducted on June 30, 1960, under the provisions of Licenses No. C-4058, C-4284, D-167, D-626, and D-703. Two items of noncompliance were noted as a result of that inspection as follows:

    D. Containers of thorium catalyst were not labeled per 10 CFR 20.203(f)(2) and (4).
    E. Four transfers of licensed materials were made subsequent to the expiration of the license under which the materials had been possessed.

    The licensee's only current source material program is now covered by License No. SMC-606.

15. The last previous inspection of License No. SNM-427 was conducted on April 25, 1962. No items of noncompliance were noted as a result of that inspection.

16. During this inspection (1964), no items of noncompliance were noted with respect to the programs conducted under License No. 34-6558-4 and License No. SNM-606 and Forms AEC-591, INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGEMENT were issued accordingly. Copies of the forms were mailed to Headquarters on December 31, 1964.



CORRECTION OF PREVIOUS ITEMS OF NONCOMPLIANCE

17. The licensee was again found to be in noncompliance in that leak testing of sealed sources possessed under License No. 34-6558-1 have not been performed at proper intervals. (See "Leak Testing" section of this report.) However, no citation against Condition 16 of the license can be made at this time, since the license expired on June 30, 1964 and no timely application for renewal was filed; citation can only be made against 10 CFR 30.3.

18. All other items of noncompliance appear to have been corrected. No instances of storage of materials in an unsecured manner were noted, and a Form AEC-3 was observed to be posted. Concerning the source material program, the licensee now has only one container of licensed source material on hand, which was found to be adequately labeled. The other item has been corrected in that the licensee now has a valid source material license.

SCOPE OF PROGRAM - LICENSE NO. 34-6558-1

19. Until its expiration, on June 30, 1964, this license authorized the possession and use of various isotopes (mostly in less-than-millicurie quantities) to be used for the testing and study of scintillation materials and associated detector products. Most of the materials procured under this license were small sealed sources which were used primarily as "check sources" or laboratory standards. Exhibit "A" attached to report, shows among other things, various byproduct material possessed and used by the licensee at the time of the inspection. The licensee is in noncompliance with 10 CFR 30.3 in that since June 30, 1964, byproduct materials have been possessed and used without benefit of a valid AEC license. Until recently, materials authorized under this license were obtained and used strictly for research and developmental purposes. However, it was learned that Americium 241 and Plutonium 239 can be sealed into scintillation crystals with advantageous results. The licensee has fabricated several of these scintillation crystal detectors and hopes to continue to do so. Although this detector product has not been advertised by Harshaw sales outlet, the licensee has fabricated and distributed (or transferred) many of these detectors containing this material to customers. Such use of byproduct material is not within the meaning of Condition 9 of License No. 34-6558-1 and 10 CFR 30.32(c), therefore would constitute noncompliance had the license not already expired. Transfer of such Americium 241 scintillation crystal type sources which were made by Harshaw to customers during the year 1964 is shown in Exhibit "C" attached to report. It will be noted the exhibit shows the transfers made from August 5 through October 28, 1964, the period subsequent to the license expiration date of June 30, 1964.

20. A list of all isotopes on hand at the time of this inspection (under all licenses) was supplied the inspector, and is attached to this report as Exhibit "A." It was learned during the inspection that whereas the licensee originally procured its americium sources from Oak Ridge (as specified in Item 7H of License No. 34-6558-1) all alpha sources are currently being procured from Monsanto Research Corporation. Procurement and possession of byproduct materials in a physical form other than that specified constituted noncompliance with the License Item 7(H).

21. It was also noted through review of the licensee's records of receipts and shipments that Americium 241 sources in quantities in excess of 24 microcuries (the amount specified in Item 8 of the license) was obtained and possessed on occasion, in particular, May 22, 1964 - 32.179 microcuries, prior to the expiration date of the license. A list of shipments of americium sources to the licensee from Monsanto Research Corporation is attached to this report as Exhibit B. Possession of more than 24 microcuries of Americium 241 at any one time constituted noncompliance with Item 8H of License No. 34-6558-1.

SCOPE OF PROGRAM - LICENSE NO. 34-6558-1, Cont'd.

22. Menefee explained that in the fabrication of crystals, it is desirable to have a small amount of an isotope with known energy characteristics actually imbedded in the crystal in order that it can be used for calibration of the crystal. Amount of isotope in any one crystal may range from 0.03 microcurie to about 0.75 microcurie, depending on the count-rate desired by the customer. Menefee stated that Harshaw has not advertised such detectors as a commercially available product, and added that these detectors are not "stocked" as a shelf item. However, word of Harshaw's developmental work in this line "got around" and requests were received from various customers for special orders. All such detectors currently manufactured by Harshaw are done so, strictly on a "custom" design basis. In fact, Menefee said that the alpha sources are procured only if Harshaw has received an order from a customer for which the sources will be required. Sources are procured "as needed." The largest single order for such units came from GIANINNI CONTROLS CORPORATION, Duarte, California. Menefee explained that Gianinni uses the detectors in space applications. More than eighty such detectors, each containing approximately 0.7 microcuries of Americium 241 were fabricated by Harshaw and shipped to Gianinni during 1964. A list of all Americium 241 shipments from Harshaw during the period August 5 through October 28, 1964 is attached as Exhibit "C."

23. Menefee explained that the sources are received from Monsanto as a foil, and that the foil is then imbedded by Harshaw into the crystal detector which is hermetically sealed. Menefee added that the licensee is contemplating a request for license amendment which would permit the procurement of americium in non-foil or "unsealed" form in order that the alpha-emitting material might be "grown into" the crystal. However, this procedure has not yet been attempted with licensed materials, Menefee said.

SCOPE OF PROGRAM - LICENSE NO. 34-6558-3

24. This license provides for the possession and use of Cesium 137 contained in Industrial Nucleonics gauges, at Harshaw's plant located at 113 John Street, Elyria, Ohio. During inspection of this facility on December 9, 1964, it was learned that the following units have been procured:

    a. One Model LS-101 unit containing 50 millicuries of Cesium 137 as of February, 1961, was received by the licensee on August 3, 1961, and was installed on a "chlorine tank" under the supervision of Industrial Nucleonics personnel.

    b. Two Model LS-101 units each containing 25 millicuries of Cesium 137 as of October, 1963, received by the licensee on January 22, 1964. These two units were installed by Harshaw personnel in May, 1964; and subsequently removed "from the line" and placed in storage also by Harshaw personnel a few months later; no Industrial Nucleonics personnel were present, or supervised either the installation or removal of these units.

25. All three of the above sealed sources and their usage in associated gauge units are now authorized by Items 6, 7, 8, and 9 of License No. 34-6558-3. However, the possession and use of the 50 millicurie Cesium 137 unit was not authorized until the issuance of Amendment No. 1 of the license which became effective on October 20, 1964. Inasmuch as the unit was procured in 1961, the licensee was in a state of noncompliance with 10 CFR 30.3 until October 20, 1964, for possession and use of byproduct materials not authorized by the license.

26. Also, the installation and subsequent removal of the two 25 millicurie Cesium 137 gauge units by Harshaw personnel constitutes noncompliance with Condition 16 of the license, which requires that "Installation, relocation . . . be performed only by Industrial Nucleonics Corporation or other persons specifically authorized . . . ."

SCOPE OF PROGRAM - LICENSE NO. 34-6558-3, Cont'd.

27. Although Mr. Charles E. Hoskin, the Plant Manager of the Elyria plant, is named on the license as the "authorized user," the request for installation and use of the devices was brought about by Harshaw's Engineering Department (Mr. Wakefield, Chief Engineer, whose office is in Cleveland at the 97th Street address, and Mr. Copple, Elyria). However, Hoskin stated that the gauges were installed and used under his "supervision" inasmuch as he is plant manager, and therefore, all activities within the plant are under his "supervision."

SCOPE OF PROGRAM - LICENSE NO. 34-6558-4 (Form AEC-591 issued for this license)

28. The effective date of this license is August 28, 1964. This license covers research and development sources possessed and used by Molechem, Incorporated, a newly purchased subsidiary of Harshaw. The only licensed materials on hand under the provisions of this license are as follows:

1.0 microcurie of Americium 241 as an Ortec plated source.
1.0 microcurie of Americium 241 as a Tracerlab plated source.
1.0 microcurie of Bismuth 207 as a deposited source (on mylar).
1.0 microcurie of Americium 241 in liquid form.

All of the above are in accordance with the provisions of this license, and are used only for instrument calibration and testing in research and developmental applications at the Molechem facilities located at 2240 Prospect Avenue, Cleveland.

SCOPE OF PROGRAM - LICENSE NO. SMC-606 (Form AEC-591 issued for this license.)

29. This license authorizes the possession (for resale and use) of up to fifty pounds of source material. According to Bob Shaw, Accountant at the 97th Street location, the only source materials on hand at the time of the inspection are as follows:

At 1945 East 97th Street: 5 pounds 11 ounces of uranium acetate.
At 1000 Harvard Avenue: (Anal. Lab) 1 pound uranium acetate.
At 1000 Harvard Avenue: (Semi-works Lab) 118 grams uranyl acetate.
At 1000 Harvard Avenue: (Semi-works Lab) 73.2 grams uranyl nitrate
At Elyria, Ohio plant: 1 pound uranyl acetate
At Elyria, Ohio plant: 162 pounds thorium catalyst (10% ThO_2)

The above locations are all authorized in Item 8 of the license. During the inspection at Elyria on December 9, the inspector was shown the thorium catalyst, which was stored in a single container on the 3rd floor of Building 25. The third floor is a storeroom, very infrequently used. The container was labeled "Caution $\frac{1}{8}$ Radioactive Material" (with symbol) "Thorium catalyst; 162#, TH-0101T-$\frac{1}{8}$."

30. The licensee explained that the catalyst is the remainder of a batch that was made up by Harshaw over ten years ago, and is kept on hand as there are occasional requests for it. The other materials are used as analytical reagents in the various labs.

SCOPE OF PROGRAM - LICENSE NO. SNM-427

31. This license authorized the possession and use of up to 80 micrograms (five microcuries) of plutonium as alpha sources and up to 80 grams (5 curies) of plutonium encapsulated as plutonium-beryllium neutron sources. Menefee reported that only one neutron source has been procured, a single 1 curie source which was received from Monsanto November 1, 1963. This source is currently on hand and is located at Harshaw's facilities at 2240 Prospect Avenue (address authorized in the license).

[redacted]

SCOPE OF PROGRAM - LICENSE NO. SNM-427, Cont'd.

32. The licensee also has on hand seven small alpha sources each less than 0.1 microcurie (sources plated on platinum foil) which were procured from Monsanto. These sources are used in the same manner in scintillation crystal type detector units as the Americium 241 sources under License No. 34-6558-1 described earlier. However, unlike the application for the byproduct material license, in this instance the licensee did indicate that this material was to be incorporated into radiation detectors for sale to other agencies.

ORGANIZATION

33. With the exception of the licensee's source material program, and the gauge program, all uses of licensed materials are conducted within the Crystal Solid State Division. Jay Menefee is the Radiological Safety Officer for this division. Menefee reports to Mr. E. C. Stewart, Division Manager and Vice President. Mr. William Managan, who was one of the principle users in this program originally (and is still named as a user on the license), is now Sales Director. Mr. C. T. Schmidt, who previously served as RSO, is no longer associated with Harshaw. Mr. Menefee has been in this position since early, 1964.

34. Menefee is in charge of the research and development group for scintillation detectors. Approximately 10 persons are in the group working under Menefee. Menefee estimates that no more than half his time is spent as "RSO," the remainder is spent on engineering duties. Principle people working directly under Menefee are J. Erker, E. Blaskis, J. Vercan, and B. Ryan.

35. The licensee also has facilities at 2240 Prospect, Cleveland. Some licensed materials are used and stored at this location also. C. Corwin and L. Davis are the principle users at this location (both named as users on the -1 license). The licensee's MOLECHEM Division is also located at this address on Prospect (-4 license). Mr. John Baum is in charge of that program.

36. The special nuclear material program is also administered under the Crystal and Solid State Division and is therefore under Menefee as RSO. However, Menefee stated that the gauge program, and the source material program are "not in his department." The gauge program (-3 license) is at the Elyria, Ohio plant only. C. E. Hoskin is the Plant Manager. A. J. Rehker, Safety Supervisory (Elyria) and Charles Copple, Plant Engineer (Elyria) both report to Hoskin. The responsibility for maintaining inventory records for the source material program has been delegated to Mr. Bob Shaw, Accountant. Mr. W. M. Gray (previously named on the "attention" line of License No. SMC-606) is no longer with the company.

FACILITIES AND EQUIPMENT

37. The licensee's main facilities, insofar as licensed materials are concerned are located at Harshaw's main office building located at 1945 East 97th Street, Cleveland. A new wing has been added to the older, administration building, which is used for laboratory facilities. Since the licensee performs no work with other than sealed sources (except for very occasional uses of Iodine 131) facility requirements are minimal. The building is occupied exclusively by the licensee and contains no living quarters (also true of Prospect and Elyria locations).

38. Storage of licensed materials at 97th Street is maintained in a locked storage vault in one end of Menefee's lab (the section used as his office) except that some alpha foils are stored in a small metal cabinet (which is also kept locked). A few sealed sources and the plutonium-beryllium neutron source are kept at the Prospect Street location, and according to Mr. Menefee are kept locked when not in use.

FACILITIES AND EQUIPMENT, Cont'd.

39. Of the three gauges possessed under the -3 license, one is mounted on a chlorine tank, the other two (the two 25 millicurie units) are in storage. It was noted that the closet storage room in which the two unmounted gauge units are stored, was locked at the time of the inspection.

40. The licensee possesses numerous portable survey instruments (at Cleveland facilities) and many laboratory instruments such as scalers, pluse-height analzers etc. Portable meters include a Victoreen "Thyac" meter with a thin mica end-window GM probe sensitive to alpha and beta-gamma radiations.

RADIATION SURVEYS AND EVALUATIONS

41. Menefee stated that because of the licensee's work with the production of highly sensitive scintillation crystals, extreme care is exercised to determine that no contamination of facilities occurs. He explained that foil or deposited sources are handled with tweezers and surveys are always performed after any source handling. (Actual handling of the sources amounts only to removal from shipping container and placing in the crystal housing, which is then hermetically sealed.) Menefee stated that no contamination of facilities, equipment, or personnel has ever been detected.

42. The licensee also possesses a nominal 10 millicurie cobalt source and a 4.5 millicurie cesium source for instrument calibration. According to Menefee, these sources are not used outside of Menefee's lab (restricted area) and a survey conducted in the labs above Menefee's, with the sources exposed, showed only 0.05 mr/hr (recorded).

PERSONNEL MONITORING

43. The licensee uses film badges supplied by Nuclear Chicago Corporation on a bi-monthly basis. Badges are supplied to and worn by all persons having occasion to use byproduct materials (except that badges are not assigned to any personnel at the Elyria plant for the industrial gauges). Approximately twenty persons total are badged according to Menefee, including three persons that are assigned ring badges. The issuance of badges, and maintenance of personnel monitoring records is the responsibility of Miss Doris Smith, Security Officer for Harshaw. Review of the cumulative badge reports revealed no exposures in excess of 70 mrem cumulative for the first ten months of 1964. Maintenance of personnel monitoring records on Form AEC-5 is not required for a program of this scope since personnel are not likely to receive doses in excess of 25% of the limits specified by 10 CFR 20.101, and the licensee has no high radiation areas.

POSTING AND LABELING

44. The licensee's only "restricted areas" are Menefee's lab at the 97th Street location and Baum's lab at the Prospect Street location. (Prospect facilities were not visited during this inspection.) A Form AEC-3 "Notice to Employees" is posted in Menefee's lab.

45. The storage facility in Menefee's lab is posted with a sign bearing the conventional radiation caution symbol and the words "Caution - Radioactive Materials" and "Caution - Radiation Area." Storage containers were also noted to be labeled with the kind, quantity, and date of assay of the contents as required by 10 CFR 20.203(f)(1) and (4).

46. Labeling of the thorium catalyst storage container was discussed in paragraph 29. All three Industrial Nucleonics gauges were observed to be labeled with the symbol and the words "Caution - Radioactive Materials" and kind, quantity, and date of assay of the sources therein. Labeling of the gauges was legible.

LEAK TESTING - LICENSE NO. 34-6558-1

47. Condition 16 of License No. 34-6558-1 (expired June 30, 1964) required that sealed sources containing Cobalt 60, Cesium 137, Tin 113, Cerium 144, Mercury 203, Selenium 75, or Iron 55 be leak tested at intervals not to exceed six months. (Remainder of leak test condition is typical, except that Part D permits the licensee to perform own tests.) The following sources were on hand at the time of this inspection, which would be subject to this leak test requirement:

Harshaw No.	Isotope and Strength	Description
HC 200	Cobalt 60; 10.4 millicuries	Tracerlab Type R-31 source, #485
HC 201	Cesium 137; 4.5 millicuries	Tracerlab Type R-31 source, #439
HC 202	Cesium 137; 1.37 millicuries	Tracerlab Type R-31 source, #436

All other sources of the isotopes named in Condition 16 and possessed by the licensee at the time of this inspection contain less than the generally licensed quantities specified for sealed sources in 10 CFR 30.72.

48. Menefee stated that the above Tracerlab Cobalt 60 and Cesium 137 sources were last leak tested on November 13, 1964. According to licensee records, previous tests were performed on November 15, 1963 and May 14, 1963. No leak test was performed during the period between November 15, 1963 and November 13, 1964. Menefee stated that it was during this period that Schmidt left, and Menefee became RSO. Failure to perform tests within the prescribed intervals constitutes noncompliance with Condition 16, Part A of License No. 34-6558-1. Also, it was noted that the records maintained of the test results indicated only that no leakage was detected, and test results were not maintained in units of microcuries, which constitutes noncompliance with Part B of Condition 16.

LEAK TESTING - LICENSE NO. 34-6558-3

49. The licensee possesses three sources (gauges) under this license subject to the leak testing requirement of this license (Condition 15) which requires that a source not be put in use until . unless the transferor certifies that it has been tested within the six period prior to the transfer, and the source be tested within the period from there to six months after installation, and thereafter at intervals not to exceed three years. The 50 millicurie Cesium 137 gauge was installed in 1961 by or under the direct supervision of Industrial Nucleonics personnel, and the two 25 millicurie Cesium 137 units were installed and put into use by Harshaw personnel in May, 1964 (not under the supervision of Industrial Nucleonics personnel). According to Rehker, the Safety Supervisor at Elyria, no leak tests have been performed of any of the units since their installation, and no records could be located indicating that the units had ever been leak tested by the supplier within the six month period prior to transfer. (Mr. Wakefield, of the Engineering Department in the Cleveland office, was contacted by Rehker during the Elyria inspection. Wakefield was responsible for the procurement of the devices; he confirmed that no certificates or other records were available, and that no tests have been performed since receipt.) Inasmuch as no certificates from the supplier were available showing that the units had been tested within the six months prior to the transfer (according to statements by the licensee) the licensee was required by Part A of Condition 15 to have the units tested before their installation (put into use). Failure to have such tests performed prior to use constitutes noncompliance with Condition 15A. It is likely that such certificates were furnished the licensee by the supplier and subsequently misplaced. However, the licensee (Wakefield, Copple, Rehker, and Hoskin) denied any knowledge of ever seeing such a certificate. If such a certificate were received by the licensee, then the licensee violated Part D of Condition 15 in that the records of leak test results were not maintained for inspection by the Commission.

LEAK TESTING - LICENSE NO. 34-[illegible]-4

50. The sources [illegible] under this license were previously possessed by [illegible] under a different [illegible] before he came to Harshaw according to Menefee. The effective [illegible] license is August 18, 1964, and Condition 14 requires [illegible] sources be tested for leakage and/or contamination [illegible] not exceed three months. Menefee stated that these sources [illegible] were tested on November 13, 1964, and less than [illegible] was detected. (Licensee permitted to [illegible])

LEAK TESTING - LICENSE NO. [illegible]

51. The October [illegible] this license requires, by License Condition No. 11, that [illegible] be leak tested every six months, and that plutonium alpha sources [illegible] three months. Prior to the issuance of this amendment, the leak test [illegible] requirement was inferred by the statement made by the licensee [illegible] dated January 17, 1961, (referenced in Item 8 of the license) as follows: "It is proposed that there will be wipe tests performed at [illegible] intervals to verify that there has been no alpha activity leakage through the doubly sealed containers around the source." Menefee stated that to his knowledge, the only leak tests performed of the neutron source were performed on November 15, 1963, and November 13, 1964, the same dates as the byproduct material source tests were performed. Records of these tests were available and indicated that no leakage in excess of 0.005 microcuries was detected. Failure to conduct leak tests of the plutonium beryllium neutron source at six month intervals as stated in the licensee application dated January 17, 1961, constitutes noncompliance with Condition 8 of the license "Authorized Use." Under [illegible] as renewed October 30, 1964, the leak test requirements for plutonium alpha sources and plutonium-beryllium neutron sources are now incorporated in License Condition No. 11.

WASTE DISPOSAL

52. There is no [illegible] waste generated in any of the licensed programs.

RECORDS

53. The licensee has maintained records of licensed material receipts since Menefee became RSO in 1964. Menefee has established a detailed record system whereby each incoming source is assigned a "Harshaw number," is logged in, and all data pertinent to that source is recorded (such as leak testing, date of shipment, customer to whom shipped, source description, type of device in which mounted, etc.). However for the period prior to 1964, complete records of receipts and transfers of licensed materials are not available, which constitutes noncompliance with 10 CFR 30.41 (pertaining to License No. 34-6558-1 only, since procurements under the other licenses were few, and records of those procurements were maintained and available).

54. Due to the nature of the licensee's isotope programs, the survey requirements to determine compliance with Part 20 (par. 20.201(b)) are minimal. However, some surveys have been made (such as the radiation levels associated with the use of the cobalt and cesium sources) which have been recorded. Personnel monitoring records are maintained in that the film processor reports are kept on file. Again, the scope of this program is such that Forms AEC-5 are not required since personnel monitoring devices would not actually be required by Part 20. Leak test records have been discussed in the "Leak Testing" section above.

RECORDS, Cont'd.

55. Records of shipment now being maintained by the licensee also include the AEC or Agreement State license number of all customers to whom licensable quantities of materials are shipped. Those records which had been maintained, and were reviewed during the inspection, indicated the license numbers of customers (see Exhibit C).

56. During a recent inspection of Indiana University, Bloomington, Indiana, under License No. 13-108-5, it was learned that an Americium 241 source of approximately 0.1 microcurie was received from Harshaw in September, 1964, whereas Indiana's license authorized only 0.04 microcurie of americium. This matter was discussed with Menefee by telephone subsequent to the Harshaw inspection. Menefee checked the Harshaw records and confirmed that such a shipment had been made, and commented that the license number was shown, but not the possession limit. Transfer of licensable quantities of materials to a person not duly authorized to receive them constitutes noncompliance with 10 CFR 30.3.

DISCUSSION OF NONCOMPLIANCE ITEMS

57. Items of noncompliance noted with respect to the programs covered by Licenses No. 34-6558-1 and SNM-427 were discussed with Jay Menefee. Concerning the expiration of the -1 license, Menefee stated that this was an oversight on his part, and blamed it partly on his being assigned the job as RSO only recently. He stated that he would apply for license renewal immediately and also would indicate in the application that Harshaw is now "distributing" sources incorporated into detectors, and request the license be amended accordingly. (It is noted that a telegram was received by the Division of Materials Licensing on November 24, 1964, to that effect, and which was acknowledged by DML by letter dated December 4, 1964.)

58. Concerning the other violations noted with respect to the programs under the -1 license and SNM-427, Menefee pointed out that these deficiencies were due to insufficient attention to administrative matters (record keeping, test frequency, overpossession, etc.) and again explained that there was no control system established by his predecessor as RSO. The inspector did observe that between the two visits of this inspection to the Cleveland 97th Street location, Menefee had compiled a complete tabulation and inventory of all materials currently on hand, had set up a good record system, and had completed the records back into 1964 until the date he came.

59. Results of the inspection of License No. 34-6558-3 were discussed with C. E. Hoskin, Plant Manager of the Elyria plant. Hoskin stated that originally, Harshaw personnel had been led to believe by Industrial Nucleonics personnel that Harshaw did not need a license for the gauge to be installed on the chlorine tank - that it was to be radium. Therefore, no application for license was filed until December, 1963, when it was desired to obtain the two 25 millicuries Cesium 137 units. When, subsequent to the receipt of the two smaller units, it was learned that the chlorine unit also contained Cesium 137, a request for license amendment to include it was made (Amendment No. 1) for Harshaw by Industrial Nucleonics (application dated September 29, 1964, and effective date of Amendment No. 1 on October 20, 1964).

60. Concerning the unauthorized installation and subsequent removal of the two 25 millicurie Cesium 137 gauges by Harshaw personnel, Hoskin stated that it was their understanding that this requirement (Condition 16 of the license) merely meant that the installation of the source into the device was to be performed by Industrial Nucleonics and that it was permissible for the device to be installed by Harshaw. He added that he now understands the meaning, and that any subsequent installation will be performed by Industrial Nucleonics or other persons specifically licensed to do so.

DISCUSSION OF NONCOMPLIANCE ITEMS, Cont'd.

61. With respect to leak testing, radiation survey, etc., Hoskin stated that a Harshaw purchase order was completed on September 22, 1964 (No. S 13954 MO) for Industrial Nucleonics to come to Harshaw to make "source inspections" which were to include wipe testing, general inspection as to operability, etc., but added that as yet no representative from Industrial Nucleonics has arrived. Hoskin stated that he would get in touch with Industrial Nucleonics immediately to see "what the hold-up is."

ENCLOSURES:
Exhibits A thru C

PERMANENT ISOTOPE INVENTORY — LICENSE NUMBER:

Harshaw Number	Isotope	Activity	Assay Date	Disposition	Manufacturer & Model No.	Location Building Room No.
HC200	Co^{60}	10.9 mc	1-14-63	HERMETICALLY SEALED POINT SOURCE TRACERLAB TYPE R-31	TRACERLAB # 485	LAUREL RM 181 17
HC201	Cs^{137}	4.5 mc	12-19-61	HERMETICALLY SEALED POINT SOURCE TRACERLAB TYPE R-31	TRACERLAB # 439	LAUREL RM 181
HC202	Cs^{137}	1.37 mc	1-14-63	HERMETICALLY SEALED POINT SOURCE TRACERLAB TYPE R-31	TRACERLAB # 436	LAUREL RM 181
HC203	Cs^{137}	10 μc	10-25-61	HERMETICALLY SEALED DISC SOURCE	TRACERLAB REFERENCE SOURCE TYPE B-Cs^{137}	LAUREL RM 181
HC204	Cs^{137}	10 μc	1-30-61	HERMETICALLY SEALED DISC SOURCE	TRACERLAB REFERENCE SOURCE TYPE B-Cs^{137}	LAUREL RM 181
HC205	Co^{60}	5.2 μc	1-30-61	HERMETICALLY SEALED DISC SOURCE	TRACERLAB REFERENCE SOURCE TYPE B-Co^{60}	LAUREL RM 181
HC206	Fe^{55}	20 μc	7-14-60	SEALED SOURCE IN E-713 HOLDER WITH ¼ MIL MYLAR WINDOW	TRACERLAB	LAUREL RM 181
HC207	Bi^{207}	2 μc	12-4-62	$Bi(NO_3)_3$ IN HNO_3 SOLUTION	NUCLEAR SCIENCE & ENGINEERING	LAUREL RM 181
HC208	Sr^{85}	9.5 μc	12-10-63	$SrCl_2$ IN 3N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCI & ENGINEERING #	LAUREL RM 181
HC209	Mn^{54}	6.25 μc	8-28-61	$MnCl_2$ IN 1N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR & ENGINEERING # M31	LAUREL RM 181
HC210	Na^{22}	2.9 μc	8-23-61	NaCl IN 1N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR & ENGINEERING	LAUREL RM 181

Comments:

EXHIBIT A-1

PERMANENT ISOTOPE INVENTORY —— LICENSE NUMBER:

Hand Book	Isotope	Activity as of	Assay Date	Date Rec.	Description	Manufacturer & Serial No.	Location Address - Room No.
HC211	Mn^{54}	6.25 μc	8-28-61		$MnCl_2$ IN 1N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCIENCE & ENGINEERING # M10	LAUREL RM 181
HC212	Y^{88}	3.8 μc	12-13-62		YCl_3 IN 2N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCIENCE & ENGINEERING # Y36	LAUREL RM 181
HC213	Y^{88}	3.2 μc	10-30-63		YCl_3 IN 2N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCIENCE & ENGINEERING # 3	LAUREL RM 181
HC214	Cd^{109}	0.31 μc	8-29-63		$CdCl_2$ IN 1N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCIENCE & ENGINEERING # C47	LAUREL RM 181
HC215	Zn^{65}	5.8 μc	8-31-61		$ZnCl_2$ IN 1N HCl SOLUTION IN SEALED AMPOULE	NUCLEAR SCIENCE & ENGINEERING # Z33	LAUREL RM 181
HC216	Zn^{65}	6.4 μc	6-26-61		$ZnCl_2$ IN 0.5N HCl SOLUTION	TRACERLAB	LAUREL RM 181
HC217	Cs^{131}	0.94 μc	7-30-64		LUCITE MOUNTING WITH 1/4 MIL MYLAR COVER	MONSANTO RESEARCH Corp # Cs-7-9	LAUREL RM 181
~~HC218~~	~~V^{49}~~	~~10 μc~~	~~6-11-63~~		~~VANADYL CHLORIDE~~	~~NUCLEAR SCIENCE & ENGINEERING~~	~~LAUREL RM 181~~
HC219	Ra+Be	22.54 Mg.			SEALED IN LEAD P.G SURROUNDED BY PARAFFIN NEEDLES	UNITED STATES RADIUM CORP	LAUREL RM 17
HC220	Ra	4.91 Mg.	7-5-60		RA TUBE TYPE CTS-10 SEALED IN STAINLESS STEEL HOUSING	ATOMIC ENERGY OF CANADA LTD # 5-10-493	PROSPECT Rm 21
HC221	Pu+Be	1 c	10-29-63		SEALED IN TANTALUM INNER CONTAINER AND S.S OUTER CONTAINER	MONSANTO RESEARCH CORP # MRC Pu-Be-219	PROSPECT Rm 21

Comments: HC218 Sent to Monsanto, Dayton, for disposal

PERMANENT ISOTOPE INVENTORY ---- LICENSE NUMBER:

Harrison Number	Isotope	Activity & Date	Assay Date	Date Rec.	Description	Manufacturer Serial No.	Location
HC222	I^{125}	10 μc	4-1-64		I^{125} in solution		Laurel Rm 181
HC223	Cd^{109}	[illegible] <1 μc			Cd foil sealed in Lucite housing		Laurel Rm [illegible]
HC224	Co^{57}	1 mc	2-7-63		$CoCl_2$ in [illegible] HCl	Nuclear [illegible] & [illegible]	Laurel Rm 181
HC192	Po^{210}	1 μc	1-1-61		Open plated α-Source	U.S. Nuclear 2198	Prosp[illegible] Rm [illegible]
HC193	U([illegible])	0.01 μc	1-1-61		Open plated α-Source	U.S. Nuclear [illegible]	Prospect [illegible]
HC194	Sn^{113}	10 μc	6-8-62		Sealed Al-foil	Tracerlab S-301	Pros[illegible] Rm [illegible]
HC197	Po^{210}	1 mc	1-1-62		Sealed in brass case	Monsanto [illegible] Plated	Prospect Rm 21
HC227	Am^{241}	.08 μc	10-27-64		Plated on Pt. foil	MRC Am-573	Laurel [illegible]
HC228	Am^{241}	3.12 μc	10-27-64		"	MRC Am-[illegible]	Laurel [illegible]
HC229	Am^{241}	1.41 μc	10-27-64		"	MRC Am-575	Lau[illegible]
HC230	Am^{241}	.08 μc	10-27-64		"	MRC Am-[illegible]	Laurel [illegible]

Comments:

PERMANENT ISOTOPE INVENTORY —— LICENSE NUMBER:

Hazelton Number	Isotope	Activity & Units	Assay Date	Date Rec.	Description	Manufacturer & Serial No.	Location Address - Room No.
HC231	Pu^{239}	< .1			Plated on Pt foil		Laurel Rm 181
HC232	Pu^{239}	< .1			"		Laurel Rm 181
HC233	Pu^{239}	< .1			"		Laurel Rm 181
HC234	Pu^{239}	< .1			"		Laurel Rm 181
HC235	Pu^{239}	< .001			"		Laurel Rm 181
HC236	Pu^{239}	< .001 μc			"		Laurel Rm 181
HC225	Pu^{239}	.0026 μc	5-14-64		Plated on Pt. foil	MRC Pu-93	Laurel Rm 181
HC226	Am^{241}	.101 μc	8-13-64		Plated on Pt foil	MRC Am-549	Laurel Rm 181
HC237	H^3	250 mc	1-28-63		(5) Aircraft Markers	U.S. Radium Corp TYPE 3L4c377	LAUREL Rm 181

Comments:

EXHIBIT A-4

PERMANENT ISOTOPE INVENTORY —— LICENSE NUMBER: 34-6558-4 (1166)

Material & Enclosure	Isotope	Activity ± 10%	Assay Date	Date Rec.	Description	Manufacturer & Serial No.	Location Address & Room No.
HC 190	Am^{241}	1.00 μc	10-1-62	11-1-62	Open Plated α-Source	Ortec #24	Prospect Rm 21
HC 191	Am^{241}	1.00 μc	10-1-62	11-1-62	Open Plated α-Source	Tracerlab S-290	Prospect Rm 21
HC 195	Bi^{207}	1.00 μc	10-1-63	11-1-63	Deposited on Mylar	Ortec Bi-4	Prospect Rm 21
HC 196	Am^{241}	1.0 μc	10-1-63	11-1-63	Liquid	Monsanto	Prospect Rm 21

Comments:

EXHIBIT A-5

LIST OF SHIPMENTS OF AMERICIUM 241 SOURCES FROM
MONSANTO RESEARCH CORPORATION TO HARSHAW CHEMICAL COMPANY DURING 1964

Shipped	P.O. No.	Source No.	Number of Sources	Total Activity This Shipment
10/64	S-12255 CS	AM-524	1	0.761 microcuries
10/64	S-12255 CS	AM-523	1	.075 microcuries
0/64	S-12470 CS	AM-549	1	.101 microcuries
64	S-11670 CS	AM-445, 447, 450, 454 and 460 thru 499	44	32.179 microcuries
64	S-11670 CS	AM-434 thru 444, 446, 448, 449, 451 thru 453, 455 thru 459	22	15.773 microcuries
64	S-11639 CS	AM-432	1	.099 microcuries
	S-12289 CS	AM-527 thru 548	22	14.743 microcuries
64	S-12255 CS	AM-526	1	.028 microcuries
64	S-12255 CS	AM-525	1	.737 microcuries

EXHIBIT B

LIST OF SHIPMENTS OF BYPRODUCT AND SPECIAL NUCLEAR MATERIALS FROM HARSHAW

te of ipment	Destination	Customer License Number	Monsanto Source Number	Activity of Source
rcium 241 sources:				
/28/64	Gianinni Controls Duarte, California	California #123-59	AM-598	.66 uc
			AM-587	.53 uc
/64	Monsanto (returns)		AM-563	.0067 uc
			AM-564	.0074 uc
5/64	U. S. Bureau of Mines Morganstown, Virginia	47-7130-1	AM-548	.084 uc
5/64	Gianinni		AM-547	.752
			546	.766
			545	.712
			544	.766
			543	12
			542	.730
			541	.697
			540	.725
			539	.730
			538	.698
			537	.770
			536	.757
			535	.757
			534	.748
			533	.703
			532	.712
			531	.739
			530	.752
			529	.689
			528	.698
64	Gianinni		AM-523	.075
/64	Gianinni		AM-524	.761
/64	Gianinni		AM-525	.737
/64	Edgerton, Germeshausen & Grier Goleta, California	591-59	AM-526	.028
64	Gianinni		AM-499	.704
			498	.723
			497	.745
			496	.749
			495	.695
			494	.739
			493	.697
			492	.762
			491	.702
			490	.740
			489	.693
			488	.736
			487	.757
			486	.734
			485	.752
			484	.732
			483	.764
			482	.715
			481	.753
			480	.703

EXHIBIT C

EXHIBIT C

te of ipment	Destination	Customer License Number	Monsanto Source Number	Activity of Source
			AM-479	.736
			478	.695
			477	.709
			476	.760
			475	.752
			474	.763
			473	.698
			472	.758
			471	.747
			470	.723
			469	.717
			468	.724
			467	.721
			466	.760
			465	.734
			464	.739
			463	.766
			462	.745
			461	.726
			460	.705
			459	.703
			458	.705
			457	.694
			456	.701
			455	.723
5/64	Gianinni		AM-454	.736
			453	.716
			452	.733
			451	.726
			450	.720
			449	.752
			448	.724
			447	.714
			446	.767
			445	.736
			444	.752
			443	.701
ding	Atlantic Refining, Dallas, Texas	#2-134	AM-592	.004
ding	U. S. Navy, Post Grad. School Monterey, California		AM-601	.080
ding	GE (KAPL) Schenectady, New York	Contractor	AM-597	.021
onium 239 Sources:				
0/64	Texas A & M	SNM-148		.012 uc .014 uc .0126 uc
'64	Illinois Institute of Technology, Chicago	SNM-49	18 sources totalling	1.9 ugrams
/64	Monsanto (returns)	SNM-567	14 sources totalling	.26 ugrams
'/64	Baird Atomic Cambridge, Massachusetts	SNM-324	3 sources	.15 ugrams (total)
64	Baird Atomic	SNM-324	3 sources	.15 ugrams
ing	Texas A & M	SNM-148	PU-108	.014 uc
ing	I. I. T.	SNM-49	PU-104 PU-105	.0077 uc .0076 uc