

REPORT COMPILED SHEET

Identifying Information

Type Report

(circle)

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1. Licensee THE HARSHAW CHEMICAL Co.
2. Address 6801 COCHRAN ROAD
OLON, OHIO 44139
3. License No(s) 34-06558-05
4. Date of Inspection February 18, 1971
5. Inspector EDGAR C. ASHLEY
6. Status of Compliance NONCOMPLIANCE

Items of Noncompliance

7. Section of Regulation
or
License Condition

Details Paragraph

- A. 10 CFR 20.401(b)
- B. 10 CFR 20.401(b)
- C. License Item 8.A
- D. _____
- E. _____
- F. _____
- G. _____

- A. 37
- B. 27
- C. 17
- D. _____
- E. _____
- F. _____
- G. _____

Classified Information

3. This report contains classified or business confidential information.
Yes No

Edgar C. Ashley
Inspector

J. Mallan
Reviewer

3-2-71

Date

3-2-71

Date

B/91



UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION III
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February 18, 1971

James M. Allan, Senior Radiation Specialist

HEALTH PHYSICS ANALYSIS - HARSHAW CHEMICAL COMPANY, SOLON, OHIO
LICENSE NO. 34-6558-5

All radioactive material activities conducted under this license are conducted at the licensee's Solon, Ohio facilities. No further work is being conducted at the East 97th Street, Cleveland, Ohio, or the 113 Johns Street, Elyria, Ohio, addresses.

The maximum possession of "open sources" is limited to microcurie quantities of americium 241 for the manufacture of doped crystals, to be incorporated into the scintillator detectors under the provisions of License No. 34-06558-07G. All other sources of radioactive materials possessed under this license are either sealed sources or plated discs except some ampules of krypton 85. The licensee uses radioactive materials for the development, testing, and calibration of the various instruments and built-in calibration sources for these instruments. With this type of program, most of the sources are normally kept in storage and only used on occasion.

The various use and storage areas were visited during this inspection. It was noted that all radioactive materials are used with extreme care because of the high sensitivity instruments being tested and calibrated. Any contamination would ruin the detector being tested and/or produced.

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Since the last previous reinspection, a new Radiation Safety Officer has been named by the licensee. This new Radiation Safety Officer is Nand K. Gupta, Ph.D., Research Nuclear Physicist. During a review of this program, with Dr. Gupta, it appeared that Dr. Gupta is quite capable of handling the position of Radiation Safety Officer.

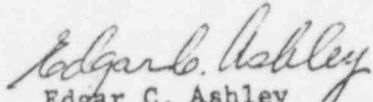
Three items of noncompliance were noted as a result of this inspection. None of the three items of noncompliance appeared to cause a significant health and safety hazard. One of the items of noncompliance relates to the failure of the licensee to submit a report of the results of surveys conducted of an old laboratory which was turned over to unrestricted use at the old East 97th Street facility. A second item of noncompliance related to the failure of Dr. Gupta to record the results of all surveys, in all cases, ~~conducted~~ performed of the various facilities at Solon, Ohio. The third item of noncompliance concerned the possession of 250 millicuries of krypton 85 while the possession limit of krypton 85 under this license is 175 millicuries. The licensee representatives advised that a report would be submitted to the Commission regarding the results of surveys conducted after the closedown of the old East 97th Street laboratory and that the results of all surveys performed by Dr. Gupta would be recorded in the future. Also, a request will be made to raise the possession limit of krypton 85 to 250 millicuries and ~~the~~ the excess krypton 85 which is on hand at this time would be kept in storage until an amendment is issued.

James M. Allan

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As a result of this inspection, it is the opinion of the inspector that no significant health and safety hazards exist of the licensee's use of radioactive materials under this license.


Edgar C. Ashley
Radiation Specialist

DETAILS

GENERAL INFORMATION

9. This was an announced reinspection of this byproduct material program conducted on February 18, 1971. The licensee was notified by telephone of this forthcoming inspection on February 11, 1971.
10. Unsuccessful attempts were made to contact the Ohio State Department of Health prior to this inspection. Mr. Steve Horvath, of that organization, was telephoned on February 23, regarding ^{the results of} this inspection.
11. Licensee representatives ~~was~~ interviewed during the course of this inspection ~~was~~ included Nand K. Gupta, Ph.D., Radiation Safety Officer, and Mr. E. C. Stewart, Vice President and General Manager. In addition, miscellaneous other personnel were contacted during visits to the various facilities.
12. All information contained in this report is presented in substance unless otherwise indicated.

INSPECTION HISTORY AND CORRECTION OF PREVIOUS ITEMS OF NONCOMPLIANCE

13. Reinspection No. 4 of this byproduct material program was conducted on September 10, 1969. As a result of that inspection, one item of noncompliance was noted regarding the use of a nominal 5 millicurie cobalt 60 sealed source at the Cleveland Clinic, Cleveland, Ohio, a place of use not authorized by this license. The licensee returned that source to the licensee's facilities and all other byproduct material possessed under this license has been used only at the places as authorized under the license.

PROGRAM

14. Radioactive materials possessed under this license are used for source and instrument development, testing, and calibration, and distribution to authorized recipients. More specifically, the licensee uses ~~this~~ licensed materials to test, study, and calibrated scintillation, semiconductor, ionization type radiation detectors, and electron multiplier tubes.
15. In some cases, the licensee includes in their scintillation crystals a small calibration source of americium 241. Plutonium 239 is also authorized ^{for this purpose} ~~but is not now being used~~ but is not now being used. These small

- sources, having a maximum strength of 0.03 microcuries each, are manufactured and distributed under the provisions of License No. 34-06558-07G.
16. A "permanent isotope inventory" is maintained for all radioactive materials on hand. Each receipt is assigned a Harshaw number and is logged in the inventory. Similarly, each disposal or transfer of radioactive material is noted in the inventory. As of the time of this inspection, the inventory included 38 different isotopes. These sources range in strength from much less than 1 microcurie up to 4.5 curies (americium-beryllium neutron source). Most of the sources were noted to be less than 1 millicurie each. The forms of the sources are liquid, plated discs, rods, and sealed sources. Dr. Gupta advised that many of the sources are quite old and lost their usefulness and are simply in storage. Dr. Gupta stated further that he is planning to go through the entire inventory and dispose of any decayed and unused sources.
17. Item 6.A. of this license provides for byproduct material with Atomic nos. between 3-83 inclusive. Item 7.A. authorizes any chemical or physical form while Item 8.A. limits the total possession of byproduct material under this section to 10 curies with no single nuclide to exceed 175 millicuries except for promethium 147 for which the limit is 400 millicuries. During a review of the isotope inventory, it was noted that the licensee possesses 250 millicuries of krypton 85. As a result, the licensee ~~advised~~ advised that the possession of greater than 175 millicuries of krypton 85 constituted noncompliance with License Item 8.A.
18. License Items 6, 7, and 8B through H provides for various individually named isotopes, forms and possession limits. Under Item B, the licensee possesses approximately 13.5 millicuries of americium 241. Under Item C, the licensee is authorized curium 244 but does not possess any of that isotope. Under D, the licensee possesses 70.167 micrograms of californium 252. Under Item E, the licensee is authorized polonium 210 but does not possess any of that isotope. Under Item F, the licensee is authorized hydrogen 3 as sealed sources but does not possess any tritium sealed sources. (The licensee does possess approximately 2 microcuries of tritium as solutions - exempt quantities.) Under Item G, the licensee possesses microcurie quantities of plutonium. Under Item H, the licensee possesses a 4.5 curie americium-beryllium neutron source as authorized.

19. The licensee's inventory also shows some non-byproduct materials on hand such as radium 226, radium-beryllium neutron source, and small quantities of cobalt 56, yttrium 88, sodium 22, bismuth 207, and some small quantities of source material such as 10 microcuries of thorium 228, .008 microcuries of protactinium 234, and small pieces of natural uranium ore.
20. Except as noted above in paragraph 17, it appears that the licensee is possessing and using radioactive materials under this license in the amounts, forms, and purposes authorized.

ORGANIZATION AND ADMINISTRATIVE CONTROL

21. This licensed program is conducted within the licensee's crystal and electronics ^{products} department. Mr. E. C. Stewart, licensee Vice President and General Manager of this department. Most of the program is conducted within the development group of the department. The development group is headed by Dr. Shrader. The Radiation Safety Officer for this licensed program is Nand K. Gupta, Ph.D., Research Nuclear Physicist. Organizationally, Dr. Gupta is located within the radiation detector group which is part of the development group. Dr. Gupta has been with the licensee approximately one year and has been the Radiation Safety Officer for the last three months. Dr. Gupta replaced Mr. Vincent Ravaschieri, former RSO, ^{who is} ~~no longer~~ no longer with the company.
22. This licensed program is conducted under the jurisdiction of the local Isotope Committee. The Isotope Committee was recently reorganized to show Dr. Gupta as the Chairman, Dr. ^J Lindow, Director of the Radiation Detector Group and Mr. Authur Lucus, Head of the TLD Department. Since its recent organization, the Isotope Committee has met once. During this meeting, a review was made of the proper radiation procedures to be followed with the use of radioactive materials under this license and how to enforce these procedures. Users and/or supervisors of use of radioactive materials as appointed by the committee includes a list of ten individuals representing ~~various~~ various groups within the department. A list of the approved users is as follows:

Dr. N. Gupta, Radiation Safety Officer

Dr. J. Lindow, Radiation Detectors

Mr. A. Lucas, TLD Testing

Dr. N. Mitrofanov, Gas Tube R & D

Mr. V. Gradojevich, Gas Tubes R & D and Production

Dr. K. Rosette, Solid State Detector, R & D

Dr. M. Farukhi, Scintillators R & D

Mr. R. Carlson, Medical Scintillation Cameras, R & D and Production

Mr. T. Henry, Scintillation Crystal, Quality Control

Mr. R. Arnold, TLD Material, Quality Control

23. The procurement of licensed material is controlled by the Radiation Safety Officer, in that all requests for licensed material must be approved by the RSO.

RADIOLOGICAL SAFETY PROCEDURES

24. Written instructions and emergency procedures are supplied to the users in the form of the licensee's Standard Operating Procedures entitled, "Operation of the Open Radioisotope Laboratory" which includes the "Rules and Emergency Procedures". These particular operating and emergency procedures were primarily designed for use in the licensee's Radioisotope Laboratory in which the americium 241 crystals are "grown" and subsequently incorporated into detector crystals. This particular project is conducted under the provisions of license No. 34-06558-07G.
25. Most of the work conducted under this license is done with small reference sources. Work with these sources is done on a very infrequent basis and at the time of this inspection, essentially all of the radioactive materials possessed under this license were in storage.

FACILITIES AND EQUIPMENT

26. Just prior to the last previous reinspection of this licensed program, the licensee moved the crystal and electronics department to 6801 Cochran Road, Solon, Ohio. As a result of that move, all work with radioactive materials under this license is now conducted at Solon, Ohio facility. No work is being conducted under this license at the 1945 East 97th Street, Cleveland, Ohio, or 113 Johns Street, Elyria, Ohio facilities. The licensee is planning to request that these two former facilities be removed as a place of use from this license.

27. Sometime in January 1970, the licensee dismantled all of his equipment in the old Isotope Lab on East 97th Street in Cleveland which was known as the Laurel Lab. It was learned during this inspection that the former Radiation Safety Officer, Mr. Ravaschieri, spent a total of 3 days over at the Laurel Lab performing waste disposal operations, wiping, cleaning, and surveying prior to releasing that old facility to other uses than with radioactive materials. During this inspection, a letter to the licensee with the attention to Mr. Ravaschieri from Mr. Robert Brinkman of the Division of Materials Licensing dated January 22, 1970 was discussed. This January 22, 1970 letter was in the form of a deminimus letter with a requirement that the results of the survey made of the old (Laurel) Laboratory showing that the contamination and radiation limits were as specified in the deminimus letter be reported to the Commission at least thirty days prior to the planned date of abandonment of the facility as a restricted area. Dr. Gupta, the current Radiation Safety Officer, had no knowledge of any written results of any such surveys, but contact with other licensee personnel verified that Mr. Ravaschieri did, in fact, spend three days at the other facility performing the above noted functions. The only written record concerning that cleanup function of the Laurel Laboratory was a disposal shipment to Tracerlab of a 4' x 4' ^{x 4'} wooden crate of dry active waste from that East 97th Street facility. The date of this particular shipment is noted to be January 16, 1970. The licensee was advised that failure to submit a report of the results of that survey in accordance with the January 22, 1970 letter from Mr. Brinkman constitutes noncompliance with 10 CFR 20.401(b) in that records of the results of surveys performed in conjunction with this byproduct material program were not maintained as required. Dr. Gupta stated that he would contact all current licensee employees who were involved with anything that had to do with that Laurel Laboratory cleanup operation including any persons who were involved with the counting of the wipes taken from the laboratory to determine that no contamination remained and submit a

report of these findings to Mr. Brinkman to verify that no contamination or radiation level problems existed in the facility prior to turning it over to other purposes. Dr. Gupta advised that that old laboratory area at 97th Street has been completely changed and rebuilt following that final cleanup and survey by Mr. Ravaschieri.

28. The facility in Solon, Ohio, which is used for the same purposes that the Laurel Laboratory was used at East 97th Street is known as the Alpha Lab located in Room 903. In this room, the licensee has a glove box hood, vented sink and storage safe among other typical Isotope Laboratory equipment. Under the provisions of the -07G license, a maximum of one to two microcuries of americium 241 is placed in the glove box, and at a rate of once a year, crystals are grown. Throughout the year, pieces of this grown crystal are cut up and incorporated into new crystals at the rate of about one hour per week. Each of the pieces of the grown crystal which is incorporated into the crystal has a maximum strength of about 0.03 microcuries.
29. As stated previously, the bulk of the radioisotope work under this license involves the use of reference or calibration sources. Most of the ~~sources~~ sources are plated ~~as~~ discs and/or sealed sources. The 4.5 ^{ci} americium-beryllium neutron source is stored in Room 817 in the Gas Tube Area. This americium-beryllium source is in its own paraffin housing which is in turn stored in a large heavily shielded upright safe with a combination lock. This 4.5 curie americium-beryllium source is used very infrequently.
30. In Room 712, the TLD Group uses a 100 millicurie cesium 137 sealed source ~~permanently~~ mounted within a shielded housing. The TLD material is inserted into a small opening of a rotating drawer which allows the TLD material to be positioned inside the housing for exposure testing. The operation of this irradiator eliminates the possibility of a person sticking his fingers or hand within the irradiator.
31. In the fan loft area of the building, the TLD group has a caged in area for the storage and use of a 70 millicurie cobalt 60 sealed source. The cobalt 60 source is stored within a large lead pot and is remotely controlled for its removal to a calibration setup located directly above the lead pot. When the cobalt 60 sealed source is brought up out of the pot into the exposure area, a red warning light is actuated at the time

that this is done. The standard procedure which the licensee employs in the use of this cobalt 60 source is that the operator positions himself at the top of the stair well outside of the fan loft door to keep anyone from entering the area while the cobalt source is in the exposure position. The licensee advised that this cobalt 60 source is used for approximately 13 minutes, twice a day.

32. Other areas in which small reference or check sources are used were visited during the inspection. It was noted that these sources are kept in plastic containers, cans, etc., all stored within locked caged areas or locked storage cabinets.
33. The licensee has on hand many different types of radiation detection instruments. These instruments include several 2 pi and 4 pi scintillation detectors for the counting of wipe samples and thyac 2 portable survey meters Model 489.

PERSONNEL MONITORING AND EXPOSURE DETERMINATIONS

34. The licensee utilizes the Nuclear-Chicago film badge service on a twice a month exchange basis. A review of the film badge reports as supplied by Nuclear-Chicago for 1969, shows the maximum whole body exposure received by any person during that time was 130 millirem. During 1970 through November 30, 1970, the maximum whole body exposure received by any person was 872 millirem with the average of approximately 400 millirem for the year. As of February 5, 1971, a total of 41 persons were on the film badge service. Nine of these 41 persons also have neutron film included in their film badge packet. All of the neutron exposures for 1970 as reported by Nuclear-Chicago shows all zeros except for one 10 millirem report. The film badge reports from Nuclear-Chicago still go to Doris Smith, Security Officer of Harshaw Chemical Company at the 97th Street facility. Dr. Gupta gets a copy of these personnel monitoring records from Mrs. Smith.
35. Pocket dosimeters are available and are worn by persons who want to make a daily check of their exposures from time to time.

RADIATION SURVEYS AND/OR EVALUATIONS

36. Dr. Gupta has performed some surveys and evaluations of the facilities in which the 4.5 curie americium-beryllium neutron source is used and where the 70 millicurie cobalt 60 calibration source is used up in the fan loft. A review of the records of these surveys and evaluations show that no health and safety problems exist from the use of these sources.
37. Dr. Gupta advised that he had performed surveys of the other various locations in Solon, Ohio where radioactive materials are used but that no records have been maintained of these miscellaneous surveys which constitutes noncompliance with 10 CFR 20.401(b). Dr. Gupta advised that he would begin keeping a logbook showing the results of the surveys which he makes of all areas in the future.
38. An alpha sensitive constant air monitor has been operated in the alpha lab (Room 903) at all times when radioactive material work is being performed in the room.
39. All new sealed sources receive from the supplier are accompanied with the leak test certificate showing no contamination of greater than 0.005 microcuries exist. The licensee performs periodic leak tests on all sources which are on hand. According to the licensee's records, all sealed sources are leak tested at intervals of six months or less and all "open" sources such as plated discs are wiped tested at intervals of three months or less. The latest leak test performed by the licensee is noted to be December 10, 1970. The alpha wipes are counted with a silicone ^{surface} ~~barrier~~ barrier detector while the beta gamma wipes are counted with two 9 x 5 sodium iodide (TL) crystals having a 4 pie geometry. All leak test records show less than 0.005 microcuries of removable contamination.
40. All dry active waste containers are surveyed prior to shipment. Results of these surveys show less than 0.2 mr/hr at the surface of the containers and that only detector background is noted for the wipes taken of the outside ^{of} containers.

WASTE DISPOSAL

41. All of the licensee's waste is shipped to Tracerlab for ultimate disposal. All normal waste shipments, in 30-gallon drums supplied by Tracerlab. The licensee always ships 4 drums at one time. The only exception to this 30-gallon drum shipment was the wood crate of waste from the laurel Laboratory which was shipped to tracerlab on January 16, 1970, as discussed previously. Normally, the waste shipments contain incidental quantities of radioactivity while the bulk of the material being shipped is waste sodium iodide used in research and paper and other miscellaneous items used with the radioactive materials. The only other waste shipment made in 1970 was 4, 30-gallon drums on July 23, 1970. In addition to the individual waste shipment record, the licensee's inventory records also show that the transfer of the particular material was transferred as a waste disposal item.

POSTING AND LABELING

42. During a visit to the various laboratories, it was noted that each room or area in which radioactive materials are stored and used and each of the containers in which radioactive materials are stored or used was noted to be posted or labeled in accordance with 10 CFR 20.203.
43. Forms AEC-3, "Notice to Employees" were noted to be posted in the various areas visited during this inspection.

RECORDS

44. Receipts and transfers of licensed material are recorded on a form known as "Radioisotope Receipt and Shipment Log".
45. Each customer who is to receive a specifically licensed isotope must complete and return to Harshaw a form known as "Radioisotope Certification." This certification includes information regarding the quantity, isotope, activity, and description and a statement which certifies that the persons have a specific AEC or State License for the radioactive material listed on the form or is authorized to receive the noted material by contractual agreement with the Atomic Energy Commission and that the type of license or License Number or Contract Number must be given on the form and verified by the signature of the authorized person of the company. Also, on the form is the place for the customers name, address, purchase order number and the date that the signature was affixed to the form.

46. Completed at the time of shipment of radioactive materials to the customer is a form entitled, "Radioactive Content Shipment Survey Record" which identifies the detector and radioactive material involved in the shipment, the carrier by which the shipment is to be made, the customer order number, the customer's name and address, and wipe test results of the package, the shipping container external monitoring results, the fact that an instruction sheet is enclosed and that the package is properly labeled.
47. Included with each shipment of radioactive materials to a customer is a sheet outlining instructions for handling radioactive material.

LICENSE CONDITIONS

48. The various conditions of this license, through Amendment No. 10, were reviewed with Dr. Gupta during this inspection. Except for the overpossession of krypton 85 as noted above in Paragraph 17, no other discrepancies were noted.

MANAGEMENT DISCUSSION

49. The results of this inspection were discussed with Mr. Stewart, the Vice President and General Manager of the Crystal and Electronics Department of Harshaw Chemical Company, and with Dr. Gupta, Radiation Safety Officer, and with Dr. Shrader, who is Dr. Gupta's supervisor. The licensee representatives advised that they did not realize that they had as much as 250 millicuries of krypton 85 on hand and would refrain from using 100 millicuries of the material until a license amendment could be obtained to authorize the possession of 250 millicuries of the krypton 85. Also, a closer check would be made of the total amount of any one isotope on hand in the future. Since Mr. Ravaschieri, the former Radiation Safety Officer, is no longer with the licensee, the licensee representatives advised that it would be difficult to track down any report that Mr. Ravaschieri was supposed to have made during January 1970 regarding the survey made of the Laurel Laboratory prior to releasing it to unrestricted activities. However, all persons who had knowledge of that cleanup operation would be contacted and a report of the results of any surveys to their knowledge would be reported to the Commission as noted previously in the report. Finally, Dr. Gupta reiterated his intent to keep a record of all of the surveys which he makes of the various facilities under this license.

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50. The licensee representatives were advised that they may expect to receive further communication from the Commission regarding the results of this inspection.