Form AEC-591
(4-65)

UNITED STATES ATOMIC ENERGY COMMISSION

COMPLIANCE INSPECTION REPORT

I-A

1. Name and address of licensee	2. Date of inspection
Clevite Corporation 540 East 105th Street Cleveland, Ohio	June 19, 1963
	3. Type of inspection Reinspection
	4. 10 CFR Part(s) applicable 20, 30 and 31

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

34-653-2	8-1-57	8-31-59	- Reinspection #2
Amendment 3 (amended in entirety)	11-14-62	11-30-63	

6. Inspection findings (and items of noncompliance)

The only items of noncompliance observed or otherwise noted during the course of this inspection were:

License No. 34-653-2

10 CFR 31.101 - "Limits on Levels of Radiation for Radiographic Exposure Devices and Storage Containers."

- in that the licensee permitted radiation levels in excess of those prescribed by this section for radiographic exposure devices and storage containers. (See Paragraph 51 of Details.)

10 CFR 31.104 - "Radiation Survey Instruments"

- in that the survey instrument used by the licensee in connection with its radiographic operations had a maximum range of only 25 mr/hr, and further, the instrument was used over a period of greater than three months without calibration. (See Paragraph 30 of Details.)

- continued -

7. Date of last previous inspection	8. Is "Company Confidential" information contained in this report? Yes ☐ No ☒ (Specify page(s) and paragraph(s))
February 8, 1961	

DISTRIBUTION:

Division of Compliance
Headquarters (Orig.)

Division of Licensing and Regulation
Headquarters (1 cy.)

Gen W. Roy GWR
(Inspector)

Approved by: EJM
Eugene J. Moretti, Radiation Specialist (Review), Region III
(Operations office)

July 24, 1963
(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.

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RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE COVERING MEMORANDUM

6. Inspection Findings (continued)

10 CFR 31.105 - "Leak Testing, Repair, Tagging, Opening, Modification and Replacement of Sealed Sources"

(b) - in that the licensee has not performed any tests for leakage and/or contamination of any of the four sealed sources in its possession in violation of this section which requires such tests to be performed at intervals of not more than six months. (See Paragraph 40 of Details.)

10 CFR 31.106 - "Quarterly Inventory"

- in that the licensee has not conducted and recorded a physical inventory to account for all sealed sources in its possession on a quarterly basis. (See Paragraph 46 of Details.)

10 CFR 31.201 - "Limitations"

(a)(2) - in that the licensee has permitted an individual to act as "Radiographer" without supplying that individual with a copy of the AEC license, and without making any determination as to that individual's understanding of the applicable regulations, license conditions, and operating procedures. (See Paragraph 25 of Details.)

10 CFR 31.203 - "Personnel Monitoring Control"

(a) - in that the licensee permitted an individual to conduct radiographic operations, without requiring that individual to wear a pocket chamber or dosimeter. (See Paragraph 33 of Details.)

10 CFR 31.303 - "Radiation Surveys and Survey Records"

(b) - in that the licensee failed to conduct surveys following each radiographic exposure to determine that the sealed source had been returned to its shielded condition, and

(c) - also the licensee did not make any surveys prior to securing the exposure device and storage container to assure that the sealed source was in its shielded condition. (See Paragraph 35 of 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 on June 17, 1963 and an appointment was made for the inspection to be conducted on June 19, 1963.

10. The inspector was unaccompanied during this inspection. The Ohio State Board of Health was notified of the inspection by letter dated July 11, 1963.

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

Mr. J. E. Dawson, Security Officer, Safety Director, and RSO
Dr. D. R. Hale, Section Head, Crystal Growth Section
Mr. W. A. Gilroy, Technician, Crystal Growth Section

All information is presented in substance unless otherwise indicated.

INSPECTION HISTORY

12. The initial inspection of this byproduct material program was conducted in May, 1958. No items of noncompliance were noted at that time.

13. Reinspection #2 was conducted in February, 1961. No items of noncompliance were noted with respect to License No. 34-653-3. However, three items of noncompliance were noted with respect to License No. 34-653-2, in that:

a. the licensee conducted exposures in excess of two hours duration in violation of the procedures referenced by Condition 13 of the license.

b. no survey meter was maintained in the Crystal Growth Section whose radiography was being performed in violation of Condition 16 of the license.

c. the containers for the portable exposure devices were not properly labeled as required by Section 203(f)(1).

14. Reinspection #2 of this byproduct material program was conducted on June 19, 1963 and is the subject of this report.

CORRECTION OF PREVIOUS ITEMS OF NONCOMPLIANCE

15. The item of noncompliance with respect to Condition 13 of the license (violation of procedures) was corrected with the issuance of Amendment 2 to License No. 34-653-2 on August 15, 1961. With respect to the other two items of noncompliance it was observed during this inspection that the licensee now has a portable survey meter which is maintained in the Crystal Growth Section. It was also observed that the storage container for the portable exposure devices was properly posted. (Both of these items are discussed in more detail in later sections of this report.)

PROGRAM

16. The licensee uses byproduct material as a sealed source possessed under this license to perform radiography of crystals, as the crystals are being grown within steel autoclaves. This radiography work is performed by the Crystal Growth Section. A single ORNL sealed source containing approximately 98 millicuries (as of June 15, 1963) of Cobalt 60 is used for this purpose. This source is used in a Clevite Corporation custom-made exposure device (Drawing No. L-13X6241-001) consisting of a small "hand pot" with a built-in "shutter" or "gate" that can be opened to permit a beam of radiation to escape from the pot.

PROGRAM (continued)

17. The licensee also possesses three other ORNL sealed sources of Cobalt 60. However, these sources are not currently being used, and are in storage. The strengths of these sources at the time of this inspection were 683 millicuries, 58.5 millicuries, and 39 millicuries. There have been no byproduct materials under this license procured since the purchase of the above four mentioned sources which were all procured by the licensee on or before March 21, 1952.

18. There have been no radiographic exposures conducted since January 29, 1963, according to the licensee's records and statements by Dr. Hale and Mr. Gilroy. Prior to that time a total of 30 radiographic exposures were made during the period from July 5, 1962 to January 29, 1963. The exposures ranged in duration from 4 hours to 16 hours each (most shots were of 16 hour durations, and were made "overnight" during low occupancy periods.)

19. In his letter to Mr. W. O. Miller of the Division of Licensing and Regulation, dated September 19, 1962, Mr. Dawson stated that the licensee probably would have no further need for a radioactive source after December 1962. During this inspection Mr. Dawson stated that the end of this crystal project work is still indefinite. He stated, however, that Clevite is considering the disposal of the four Cobalt sealed sources, and procuring the services of commercial industrial radiographic firms whenever radiography is desired.

ORGANIZATION

20. The Clevite Research Center is the research group of the Clevite Corporation, with facilities at 540 East 105th Street in Cleveland, Ohio. The four major groups participating at the Clevite Research Center are as follows: Mechanical Research, Electronics Research, Ordnance and Aerospace Research. In addition to these four groups, there is a Central Services Division which supplies services for the other "tenant divisions". The only current program at the Research Center involving the use of radioactive materials is the crystal radiography program which is performed in the Crystal Growth Section of the Electronics Research Group under the provisions of License No. 34-653-2. Dr. D. R. Hale is the Section Head of the Crystal Growth Section. Dr. Hale reports to Dr. Hans Jaffe, General Manager of Electronics Research, who reports to the President of the Clevite Corporation (General Offices at 17000 St. Clair, Cleveland.)

21. Mr. Dawson is a member of the Central Services Group and reports to Mr. Ed J. Gilmore, Manager of Central Services, who reports to Mr. Lynch, who is the head of Ordnance Research. Mr. Dawson stated that he spends most of his time in the performance of his duties as Personnel Director and Security Officer. However, he stated he has been given the authority by the Corporation, as Safety Director and Radiological Safety Officer, to take any steps which he deems necessary with regard to health and safety and/or compliance with the various Federal Regulations. Dawson stated that he can deal directly with the various Divisional Managers if necessary.

22. Mr. W. A. Gilroy and Dr. D. R. Hale are the only persons that have acted as "Radiographers" under this license. The licensee has no persons acting as radiographers' assistants. Actually, Dr. Hale stated that practically all radiographic exposures have been performed by Mr. Gilroy.

23. The licensee currently has no Radioisotope Committee.

RADIOLOGICAL SAFETY PROCEDURES

24. A set of written instructions and procedures were compiled by Mr. Dawson, with the assistance of a Mr. Peter Di Renzo, a Contract Administrator for the Electronic Research Group. Copies of these procedures were supplied to Dr. Hale, Mr. Gilroy and other persons interested in the isotope program.

RADIOLOGICAL SAFETY PROCEDURES (continued)

Also, copies of these procedures were supplied to the Division of Licensing and Regulation in support of the license renewal application.

25. Although the written instructions referenced above were supplied to Dr. Hale and Mr. Gilroy incorporating all of the various requirements of 10 CFR 31, it became apparent by discussion during the inspection that neither Dr. Hale nor Mr. Gilroy were familiar with the written procedures and instructions nor with the applicable Federal Regulations. For instance, throughout the inspection Mr. Gilroy stated that he was not aware that the survey instrument had to be calibrated every three months, that the sources had to be leak tested at six month intervals, that dosimeters must be worn during all radiographic operations, that surveys are required following each radiographic exposure to assure that the source has returned to the storage container, etc. When this matter was discussed with Mr. Dawson, Dawson stated that when he supplied copies of the procedures to Dr. Hale and Mr. Gilroy, he, Dawson, had assumed that they read them. Dawson stated that he further assumed that since they had not raised any questions, that they understood them. Mr. Gilroy, the radiographer, also stated that he had not received a copy of the AEC license. The licensee is in noncompliance with 10 CFR 31.201(a)(2), "Limitations", in that the licensee has permitted Mr. Gilroy to act as radiographer without supplying Mr. Gilroy with a copy of the AEC license and without making any determination of Mr. Gilroy's understanding of the various requirements in the AEC license, Federal Regulations and the licensee's own procedures.

26. No radiographic operations were observed during the inspection. Mr. Gilroy described the procedures which he uses in the performance of crystal radiography. He stated that most exposures are conducted on an overnight basis. The source, in the exposure device, is hand carried from the storage vault on the ground level to the autoclave cell located on the second floor directly above. The device and the film holder are then positioned on opposite sides of the autoclave containing the crystal to be radiographed (usual source to film distance approximately 1 yard). Gilroy stated that he then places the rope barrier and signs containing the radiation caution symbol and the words "Caution - Radioactive Material" and "Caution - Radiation Area" at those areas indicated on the blueprint drawing submitted with the license application (at the entrances to the room in which the autoclave cell is located). After the ropes are in place and the signs have been posted, Gilroy then exposes the source and locks the cell. He stated that usually he exposes a source about 4 o'clock in the afternoon, locks the area and then goes home for the night. The source is allowed to remain in the exposed position all night until he returns at 8 o'clock the next morning. Gilroy stated that in these instances he is the first one in the area and that he closes the device, returns the device to storage and then takes down the ropes and signs. The only discrepancies noted in Gilroy's description from the written procedures are those discrepancies which also constitute noncompliance with the Regulations. These are discussed in later sections of this report.

FACILITIES AND EQUIPMENT

27. A detailed blueprint-type sketch of the facilities on the second floor of the Crystal Growth Section (where the radiographic operations are performed) was submitted by the licensee to the Division of Licensing and Regulation in support of the license renewal application. The position of the storage vault, which is located on the ground floor beneath the Crystal Growth Section, is also indicated on this sketch. Both floors are under the complete control of the licensee and contain no living quarters. Radiographic operations are performed usually during the night hours and the facilities are kept locked during those times . (The building is also protected by the ADT security system.)

FACILITIES AND EQUIPMENT (continued)

28. Detailed drawings were also submitted of the custom made exposure device. It was observed during the inspection that the exposure device, storage facility, and utilization facilities are as described on the submitted drawings. Briefly, the exposure device consists of a small cylindrical hand pot of approximately 4 inches diameter with walls of approximately 1½ inch thick lead. The device is equipped with a movable sliding gate arrangement which may be raised to expose the source during radiographic exposures.

29. As stated previously the autoclave cells in which the radiographic exposures are performed are equipped with locks. Gilroy stated that he locks the cell during radiographic exposures and takes the key with him. In addition to the lock, a metal bar is placed across the doors to the cell. Gilroy explained that this feature was designed to prevent the cell from blowing open during other operations and actually has nothing to do with the radiography. However, the bar is put in place as a safeguard precaution during radiographic operations also.

30. The licensee possesses a Victoreen Model 646 "Thyac II" portable survey meter which is used in conjunction with the radiographic program. The maximum range of this instrument is 25 milliroentgens per hour. Consequently, the licensee is in noncompliance with 10 CFR 31.104 which requires that survey instruments used in conjunction with radiographic programs have a range of a few milliroentgens to at least one roentgen per hour. The last calibration of this instrument was performed on October 1, 1962, by the Victoreen Instrument Company according to Mr. Gilroy. Since radiographic operations were conducted on January 29, 1963, the licensee is again in noncompliance with Section 31.104 in that a period of greater than three months had lapsed since the last instrument calibration.

PERSONNEL MONITORING

31. Film badges are obtained from the N. S. Landauer, Jr. Company on a "twice per month" basis. (Badges are exchanged on the last working day prior to the 1st and the 15th of the month.) The film badges are exchanged and the personnel monitoring records maintained by Miss Ruth Fisermann, Industrial Nurse. Film badges are assigned on a regular basis to Mr. Gilroy, the radiographer and to Mr. Kosarko and Mr. Stibora. These latter gentlemen do not use the source, but their other duties require that they occasionally work in the vicinity of the source storage vault area.

32. A review of the reports as supplied by the processor revealed that none of the film badges for any of these three individuals has ever recorded any measurable amount of exposure. The "permanent total" for all three men is recorded as 0 (This permanent total for Mr. Gilroy, includes a total of 57 badges over a period of approximately 28½ months up to the date of the inspection).

33. The licensee also possesses four Victoreen Model 362 pocket chambers and a Victoreen Model 287 minometer. However, during this inspection Mr. Gilroy stated that he has not worn his pocket chamber during the performance of radiographic exposures in the past. This constitutes noncompliance with 10 CFR 31.203(a), in that the licensee permitted an individual to act as a radiographer and to conduct radiographic operations without requiring the use of a pocket dosimeter or chamber.

RADIATION SURVEYS AND/OR EVALUATIONS

34. The licensee has conducted a survey of the radiation levels in the area adjacent to the autoclaves cell in which radiographic operations are performed. The survey was conducted with the 98 millicurie source in the "Exposed" position within the autoclave cell. A copy of the record of this

RADIATION SURVEYS AND/OR EVALUATIONS (continued)

survey showing the 2 mr/hr isodose line was submitted by the licensee to the Division of Licensing and Regulation in support of the recent license renewal application. Mr. Gilroy stated that although he uses the source in the same position as indicated in that recorded survey, he still makes checks at the beginning of each radiographic operation to insure that the radiation levels outside of his roped areas are less than 2 mr/hr. With the source in typical operating position in the autoclave unit and with the gate open, radiation levels at the door to the cell range from 10 to 15 mr/hr and 6 feet from the door of the cell are less than 3 mr/hr.

35. Mr. Gilroy stated, however, that he has not performed any surveys following the completion of radiographic exposures or prior to returning the exposure device to storage, for the purpose of determining or assuring that the source was properly returned to its shielded position. He explained that since he personally closes the shutter on the device, he had never "felt it necessary" to perform such a survey with an instrument to determine that the shutter was actually closed, and was not familiar with this requirement. Failure to perform such surveys constitutes noncompliance with 10 CFR 31.303(b) and (c).

POSTING AND LABELING

36. It was noted that a Form AEC-3 "Notice to Employees" was posted at the employees' entrance to the Clevite Research Center Building.

37. A sign is posted above the source storage vault bearing the conventional radiation caution symbol magenta on yellow and the words "Caution - Radioactive Materials" and "Caution - Radiation Area" and "Authorized Personnel Only - Radioactive Cobalt 60 - 4 Curies Total Stored Here." The custom exposure device-storage container was tagged with the conventional radiation caution symbol and the words "Danger - Radioactive Materials - Cobalt 60 - 500 millicuries - November 15, 1950" and also "Radiation Hazard." The storage containers for the other three Cobalt sources are similarly labeled.

38. Mr. Gilroy stated that signs bearing the conventional radiation caution symbol and the words "Caution - Radiation Area" and "Caution - Radioactive Materials" are posted at the various entrances leading to the Crystal Growth Section during radiographic exposures.

TRANSPORTATION

39. Both Mr. Dawson and Mr. Gilroy stated that none of these sources have been removed from the Crystal Growth Section facilities. The source is "transferred" back and forth from the storage facility to the autoclave chamber by Mr. Gilroy personally.

LEAK TESTS

40. The licensee stated during this inspection that none of the four Cobalt 60 sealed sources currently in the possession of the licensee have ever been tested for leakage and/or contamination since they have been in the possession of the licensee (since 1952). Both Mr. Hale and Mr. Gilroy stated that they were unaware that there was a leak testing requirement for these sources. Failure to perform leak tests of the sealed sources used for radiographic purposes at intervals of six months or less constitutes noncompliance with 10 CFR 31.106(b).

WASTE DISPOSAL

41. There is no radioactive waste material generated in this program since only sealed sources are used. The only four sealed sources ever procured are still in the possession of the licensee.

RECORDS

42. The licensee has records indicating the date of receipt of each of the four sealed sources currently on hand. Three of the sources were obtained on November 15, 1950 at strengths of 200, 300, and 500 millicuries each at that time. Those sources have decayed to current strengths at the time of this inspection of 39, 58½ and 98 millicuries respectively. The fourth source was procured on March 21, 1952 at a strength of 3000 millicuries. That source has decayed to a current strength of 683 millicuries. Therefore, the total quantity of radioactive material on hand at the time of this inspection is approximately 880 millicuries of Cobalt 60 contained in four sealed sources. These quantities are in accordance with the possession limits of the license.

43. A record has been maintained of the survey made by the licensee to determine that the radiation levels in the unrestricted areas adjacent to the autoclave facilities were less than 2 mr/hr. No other surveys have been performed.

44. The licensee does have a record of the latest date of calibration for the survey instrument as was indicated in paragraph 33.

45. The licensee has no leak test records as the licensee has made no leak tests.

46. The licensee has not conducted any physical inventories on a quarterly basis nor maintained in a quarterly inventory record as described in Section 31.106. When this section was discussed with the licensee, the licensee again repeated that the same four sources have been possessed by the licensee at the same location since 1952. However, the licensee has no records to substantiate that the four sources have in fact remained at this location throughout the entire period which does constitute noncompliance with Section 31.106.

47. The licensee does have records, however, indicating the dates on which radiography was performed, the identity of the radiographer who performed the work, a description of the exposure device, and the location where used, although this information has not been compiled onto a single separate sheet.

48. The film badge records as supplied by the Landauer Company are maintained on file. The licensee does not maintain personnel monitoring records on Form AEC-5, since film badge dose results do not exceed 25% of the calendar quarter dose results of 10 CFR 20.101(a).

INDEPENDENT MEASUREMENTS

49. Independent measurements were made of the radiation levels from the various source containers as follows:

Maximum radiation level measured at the surface of the custom exposure device containing the 98 millicurie Cobalt source with the shutter in a closed position - 500 mr/hr

Maximum radiation level measured at a distance of six inches from this container - 140 mr/hr

Maximum radiation level measured at a distance of one meter from this container - 20 mr/hr

Maximum radiation level measured at the surface of a storage container containing the 58 millicurie source - 250 mr/hr

Maximum radiation level at six inches - 100 mr/hr

INDEPENDENT MEASUREMENTS (continued)

Maximum radiation level at one meter - 12 mr/hr

Maximum radiation level from a storage contai[illegible] containing the 39 millicurie source, the surface reading - 200 mr/hr

The six inch reading - 90 mr/hr

The one meter reading - 10 mr/hr

All containers are of less than 4 inch radius.

50. The storage container containing the larger source (6[illegible]3 millicuries) was not removed from the pit for the purpose of independent measurements. The licensee had removed the handle from this container as a preventative measure to preclude its accidental removal from the pit because of the higher source strength. However, with the other three containers removed from the pit, a radiation level of 500 milliroentgens per hour was recorded at a distance of 8 inches from the surface of the container.

51. The licensee is in noncompliance with Section 31.101 of 10 CFR 31 in that the above radiation levels are in excess of the limits prescribed by this section for radiographic exposure devices and/or storage containers.

52. All measurements were made with an Eberline Model E-500B portable survey meter (with end window probe) which was calibrated at Argonne National Laboratory prior to the inspection visit.

53. Since the licensee had not performed any leak tests of any of the sealed sources in the past ten years, an independent measurement was made of the removable contamination from inside the shutter area of the custom exposure device. A wad of cotton, supplied by the licensee, was rubbed about the inner surfaces of the opened shutter by the inspector with the use of tongs. However, survey of the cotton swab with the end window GM probe revealed no detectable contamination.

MANAGEMENT DISCUSSION

54. All items of noncompliance were discussed with Mr. Dawson and with Dr. Hale (Head of the Crystal Growth Section). During the discussions of the noncompliance items, Dr. Hale appeared surprised at all of the requirements of Part 31 and Mr. Dawson appeared surprised that Dr. Hale's group had not been complying with these requirements. Dawson stated that the responsibility to maintain compliance is his (Dawson's) but that he had just "assumed" that the requirements were understood and were being complied with.