

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 82-01

Docket No. 030-05998

License No. 37-00611-09 Priority I Category B

Licensee: Automation Industries, Incorporated  
Kimberton Road, Route 113 South  
Phoenixville, Pennsylvania 19460

Facility Name: Nuclear Encapsulation Facility

Inspection At: Phoenixville, Pennsylvania

Inspection Conducted: July 2, 1982

Inspectors: J. Davis, Radiation Specialist

11/3/82  
date

R. Ladun, Radiation Specialist

11/3/82  
date

Approved by: J. Kinneman, Chief  
Materials Program Section No. 1

11/3/82  
date

Inspection Summary:

Inspection on July 2, 1982 (Report No. 30-5998/82-01)

Areas Inspected: Routine, unannounced inspection of radiation protection program including organization, scope of operations, training, review of report of transportation violation, review of report of equipment defect, review of report of constriction of "S" tube in radiography devices, licensee audits, material inventory, personnel radiation protection - external, personnel radiation protection - internal, effluent control and waste disposal, hot cell entry, tour of radioisotope facility. The inspection involved twelve inspector hours on site by two NRC inspectors.

Results: No violations were identified.

## DETAILS

### 1. Persons Contacted

\*G. Mayberry, Jr., General Manager  
\*S. Boyko, Production Manager  
R. Fredericks, Technician  
R. Megay, Technician

\*Denotes those present at the exit interview.

### 2. Organization

Mr. J. Dwight is the President of Sperry Products Co., Inc. Dr. P. Moreland, Jr. is Vice President - Operations, responsible for the Phoenixville facility. He is also the Radiation Safety Officer (RSO) for the Phoenixville facility. Since the last inspection, Mr. G. Mayberry has been named General Manager of the Phoenixville, Pennsylvania, Nuclear Encapsulation Facility and reports to Dr. Moreland. Mr. S. Boyko is the Production Manager and Mr. M. Santoro is the Engineering Manager. Mr. E. Shaffer is the on-site RSO. He reports directly to Mr. Boyko for production matters and to Mr. Moreland for radiation safety matters. There are three other employees who work with licensed material.

No violations were identified.

### 3. Scope of Operations

The licensee encapsulates and distributes iridium-192 radiography sources up to 100 curies each.

A licensee representative stated that since the last inspection, production has decreased resulting in a 40 percent reduction in the work force. Management has placed all employees on a staggered schedule including the On-site RSO. Half of the employees work Monday, Tuesday, and Wednesday and the other half work Wednesday, Thursday, and Friday. This is only a temporary reduction and as soon as the work load increases, all employees will return to a five day work week.

No violations were identified.

### 4. Training

The On-Site RSO has completed a Health Physics fundamentals computer managed course given by Radiation Management Corporation (RMC). This course included: Atomic and Nuclear Properties, Radioactivity, Interaction of Radiation with Matter, Interaction of Radiation with Biological Systems, External Radiation Exposure, Radiation Detection, Internal Radiation Exposure, Radioactive Waste Treatment, Emergency Planning and Regulations and Guides.

This training is a PLATO Computer based education system which includes two hours of training by RMC. Mr. Shaffer spent one day a week for four or five weeks working on this system totaling approximately 40 hours of instruction. Mr. G. Levine, RMC, was his tutor and instructor and signed a statement on June 30, 1982, that Mr. Shaffer has completed this course.

No violations were identified.

5. Investigation of Report of Transportation Violation

The inspector discussed with a licensee representative a report from the State of Washington, Department of Social and Health Services that during May 1981, a Washington licensee had received a package bearing a Radioactive Yellow III label instead of the proper Radioactive Yellow II label.

The licensee representative stated that the State of Washington report was in error in that they had not loaded a cobalt-60 source in a Tech Ops camera. They loaded the cobalt-60 in an Automation exposure device which normally required a Radioactive Yellow III label for that size source. They then placed the exposure device into a wooden crate overpack. They surveyed the overpack and determined the TI to be 0.5. To be on the conservative side they applied a Radioactive Yellow III label to the overpack. They stated that they understood the importance of proper rather than conservative labeling.

No violations were identified.

6. Investigation of Report of Equipment Defect

The inspector discussed with the licensee representative the report filed by Newport News Shipbuilding regarding a failure of the Radiography Cable Connector on the pigtailed assembly.

Licensee representatives stated that the connector is cast metal and would take considerable force to bend. This force would be much greater than that encountered in normal operations. Several years ago, they had to machine this connector and had some variations with the pigtailed assembly but it is currently a casting. During assembly of the source they have a Quality Control procedure in which they perform three visual inspections of the pigtailed assembly and perform a pull test. If there was a problem with the casting, it would not pass the pull test.

No violations were identified.

7. Investigation of Report of Constricting of S-tube

The inspector discussed with the licensee representative the report filed by Automation Industries regarding constricting of the S-tube in Model 520 Iriditron radiographic exposure devices (see letter dated November 5, 1981).

Licensee representative stated that there is an internal blistering of the titanium S-tube which interferes with smooth movement of the source. They have sent the depleted uranium shields containing the S-tube back to Nuclear Metals Inc., their supplier, for metallurgical analysis. Preliminary data available suggests the problem stems from moisture getting in between the uranium and the "S"-tube and causing corrosion. Blistered S-tubes showed up in serial numbers 733, 740, 746, and 750 which had been manufactured by NL Industries, Albany, New York. In addition, serial number 304, manufactured in 1975 by Nuclear Metals Serial Number 809, manufactured in January 1982 by Nuclear Metals also exhibited the same problem.

Licensee representative stated that all new exposure devices are tested prior to sale by passing a "cold" source through the "S" tube several times to assure smooth, drag free operation. All exposure devices returned for replacement of the iridium-192 source are also tested in the same way. Licensee representatives stated they planned to continue research into the cause of the blistering of the "S" tube and would immediately inform Region I of any new instances of the problem.

No violations were identified.

#### 8. Licensee Audits

Licensee representatives stated that they have a contract with Radiation Management Corporation to perform a radiation safety audit each quarter. The first audit was conducted on March 31, 1982, and the following one was conducted on June 1, 1982. The inspector reviewed the reports and except for some posting requirements, they indicated that all activities were being conducted in compliance with the applicable regulations. The report recommended that the licensee update some procedures, such as the Operating and Emergency Procedure Manual. A licensee representative stated that they were in the process of reviewing and updating these procedures. They will send the updated procedures to RMC for comment and then to the NRC for incorporation into their license.

No violations were identified.

#### 9. Material Inventory

The inspector reviewed records of Ir-192 and Co-60 received. It was determined that on the day of the inspection the licensee had on hand 756 curies of Ir-192 and 497 curies of Co-60. A shipment of between 5000 and 6000 curies of Ir-192 from Oak Ridge was expected soon. At present, approximately 50 Ir-192 sources are manufactured and transferred each month, about one-half the volume of a year ago.

No violations were identified.

#### 10. Personnel Radiation Protection - External

The inspector reviewed the film badge, TLD ring badges, and dosimeter records since the last inspection. No overexposures were noted. It was noted that between February 22, 1982 and February 26, 1982, an individual received 5910 millirem to the thumb on the right hand. The index finger and middle finger received 120 and 70 millirem, respectively. A licensee representative stated that they do not believe this to be a correct exposure since the index and middle fingers would have received an exposure within the same order of magnitude as the thumb. The inspector noted that the average exposure to the extremities was 50 millirem per week with the high being 200 millirem per week during the source cleaning procedures using the "semi-automatic mechanism" (SAM). Dosimeter readings were being recorded in their dosimeter log.

The inspector reviewed selective records of surveys performed by the licensee including radiation levels in the restricted and unrestricted areas, contamination surveys in the restricted and unrestricted areas, etc., since the last inspection. The inspector noted that the surveys performed were in compliance with the various sections of 10 CFR 20, and the license conditions.

No violations were identified.

#### 11. Personnel Radiation Protection - Internal

The inspector examined the records of whole body counting and bioassay results. No measurable uptakes had been recorded. It was noted that two individuals had their last whole body count performed in June 1982, and another individual had his whole body count performed in July 1981. License application requires whole body counting to be performed once per year.

The inspector examined the records of airborne sampling performed using an air monitor when a licensee representative entered the hot cell since the last inspection. Values recorded for the individual were 3 orders of magnitude lower than the values specified in Appendix B, Table I, Column I for both Ir-192 and Co-60.

No violations were identified.

#### 12. Effluent Control and Waste Disposal

The inspector examined the records of the surveys performed of the concentrations of Ir-192 and Co-60 released from the hot cell stack since the last inspection. Concentrations released are in the  $1 \times 10^{-12}$  microcuries per milliliter range which is an order of magnitude less than the Appendix B, Table II, Column I value for insoluble Ir-192 and Co-60.

The inspector examined the records of liquids discharged into the sanitary sewage system since the last inspection. Licensee representatives stated that they analyze the water in their sump once per month. Prior to any release they take five samples. These samples are in the  $1-6 \times 10^{-6}$  microcuries per milliliter range. This is an order of magnitude less than the Appendix B, Table II, Column II values for insoluble Ir-192 and Co-60. The licensee takes advantage of the effluent water the facility utilizes and has determined that the water concentration released into the sanitary sewage system is in the  $2-5 \times 10^{-7}$  microcurie per milliliter range.

The licensee representative stated that they are using US Ecology as their solid waste collector.

No violations were observed.

### 13. Hot Cell Entry

The inspector examined the licensee's procedures for entry into the hot cell and reviewed the licensee's Hot Cell Door Opening log. There was a hot cell entry made on May 20, 1981 to change the HEPLA absolute filter and an entry made on October 1, 1981 to perform mechanical work. The licensee representative stated that they do wear protective clothing, take an air sample prior to entry, and make contamination surveys of the person exiting. One individual exiting on the October 1, 1981 entry had his 0-200 millirem dosimeter go off scale. He was also wearing a Hi-range IR dosimeter. This dosimeter read 227 millirem. Whole body film badge results also confirmed this exposure.

The licensee representative stated that they are using a fresh air supplied respirator. They are in the process of developing procedures to use this respirator. They are not taking advantage of the protection factor when determining compliance with 10 CFR 20.103.

No violations were identified.

### 14. Tour of Radioisotope Facility

The inspector observed the encapsulation of a 100 curie iridium-192 sealed source and the transfer from the hot cell to the source changer and from the source changer to the shipping container. The inspector observed that personnel wore the proper dosimetry and had calibrated and operating survey meters and followed the licensee's operating procedures.

The inspector observed the method used by the licensee to leak test the sealed spaces using the "semi-automatic mechanism." Methods utilized for sampling and analysis would be capable of detecting leaking sources in accordance with License Condition 14.

No violations were identified.

15. Exit interview

The inspectors met with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection. The inspector summarized the scope of the inspection. He also reviewed the problem of the internal constricting of the titanium S-tube contained in the depleted uranium shield. It appears that this is a generic problem that will have to be further investigated by the NRC. It also appears that other fabricators might have the same type of problem. An information notice will be issued when it has been determined that this is a generic problem.