U.S. NUCLEAR REGULATORY COMMISSION

REGION I

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Report No.:	070-03061/97-001
Licensee:	Imaging and Sensing Technology Corporation
Location:	Westinghouse Circle Horseheads, NY 14845-2299
Dates:	September 17-18, 1997

Inspector: Keith D. Brown 11/12/97

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RETURN ORIGINAL TO
REGION I

EXECUTIVE SUMMARY

Imaging and Sensing Technology Corporation
NRC Inspection Report 070-03061/97-001

This inspection included review of the organization and scope of the program for control of licensed material; the licensee's management oversight of the licensed material program; the licensee's facilities and equipment; the licensee's program for licensed material receipt, use, transfer, and control; the licensee's program for training, retraining, and instruction to workers; the licensee's area radiation surveys and contamination control program; the licensee's radiation protection program; and the licensee's implementation of decommissioning funding requirements. Subsequent to the inspection, Confirmatory Action Letter (CAL) No. 1-97-025 was issued.

Management Oversight

The licensee has not reviewed the radiation protection program content and implementation as required by 10 CFR 20.1101(c). The licensee needs to amend the license to update the list of authorized users.

Facilities and Equipment

The checks of fume hood function required by the license do not appear to be adequate. The licensee should review the checks to ensure they would identify any failures in the protection the hoods provide.

Material Receipt, Use, Transfer, and Control

The NRC is concerned that the failure to resolve differences between the physical and running inventories could lead to a failure to detect a loss of material.

Radiation Protection

The licensee had not used urinalysis and stack samples results to evaluate doses and compare the doses to the dose limits in 10 CFR 20.1101(d) and 20.1201. This was also a finding of the previous inspection. In August, 1994, the licensee committed to update its Radiation Safety Manual. This task was only recently completed.

Confirmatory Action Letter

On September 26, 1997, a CAL was issued in which the licensee agreed to evaluate the dose to workers and to members of the public, update its Radiation Safety Manual to take into account the revision to 10 CFR Part 20 effective January 1, 1994, perform the annual audit required by 10 CFR Part 20, and revise its procedures for accounting for licensed material.

REPORT DETAILS

I. Organization and Scope of Program

a. Inspection Scope

The inspection included a full review of plating of uranium onto detectors. Use of the sealed neutron sources was not reviewed in detail. The organization and scope of the program was determined through interviews of the Radiation Safety Officer and other individuals involved in the program.

b. Observations and Findings

The licensee manufactures various radiation detectors including fission chambers that employ uranium-235 that are used to monitor neutrons inside and external to the core of nuclear reactors. The licensee also uses several plutonium-beryllium neutron sources to test instruments.

Approximately once each year, the licensee makes a purchase of enriched uranium metal from Lockheed Martin Energy Systems, Inc. Personnel from the companies Engineering Department put the metal into solution, then, throughout the year, the solution is used to electroplate the metal onto the surface of long metal tubes. The appropriate manufacturing personnel then incorporate these tubes into ion chambers, which detect fission fragments following capture of a neutron by a uranium-235 atom. The licensee produces detectors both for use within reactor cores and outside the reactor core.

The licensee receives detectors back from licensees that are defective or have failed at the end of their useful life. The licensee logs each return on a returned material report. Failures of returned detectors are tracked to identify common defects and investigate any trends in the failures as required by 10 CFR 21.21(a). Since the last inspection, no defects were identified that required reporting to the NRC under the provisions of 10 CFR 21.21(d).

c. Conclusions

No violations were identified.

II. Management Oversight

a. Inspection Scope

The inspection included review of the program oversight by the Radiation Safety Officer, the licensee's audits of the program, and the adequacy of supervision by authorized users. To review these items, the inspector interviewed the Radiation Safety Officer and other individuals involved in the program.

b. Observations and Findings

The license lists three users of the licensed material, Thomas Mike, the Radiation Safety Officer and Facility Manager; James Robbins, the supervisor of manufacturing of the in-core and external monitors; and William H. Todt, Sr., director of the Engineering Department who is currently on special projects and not involved in use of licensed material. The inspector recommended that the licensee amend the license to update the representative of the Engineering Department. The inspector also suggested that the licensee consider naming the individuals who work directly with the licensed material, such as the individual who dissolves the uranium metal, as authorized users on the license.

10 CFR 20.1101(c) requires the licensee to review the radiation protection program content and implementation at least annually. This audit had not been performed since the rule went into effect on January 1, 1994. An outside health physics consultant, however, had been contracted to perform the audit of the program for 1997.

c. Conclusions

Failure to review the radiation protection program content and implementation at least annually is an apparent violation of 10 CFR 20.1101(c). The licensee needs to amend the license to update the list of authorized users.

III. Facilities and Equipment

a. Inspection Scope

The inspection included observation of the facilities used for licensee plating operations, neutron source use, and detector assembly; review of servicing records for licensee equipment; discussion of the licensee's procedures for using material; discussion of the licensee's calibration procedures; and review of the licensees instrument calibration records.

b. Observations and Findings

The licensee's detector plating operations are confined to a single room within its facility. The room contains several fume hoods, one of which is used for dissolving uranium metal to prepare the electroplating solution and another which is used for electroplating uranium from the solution onto metal tubes. Personnel working in the uranium plating room are required to wear protective lab coats, gloves, and foot coverings, and to frisk themselves for contamination as they leave the room.

Before each use, the fume hoods are checked to ensure that the face velocity is above a minimum value. Over the period covered by this inspection, the face velocity for the hood used in electroplating operations varied by a factor of two, from 200 linear feet per minute to 400 linear feet per minute. The change did not appear to coincide with changing of filters or other servicing. Neither the licensee's Radiation Safety Officer nor a Nuclear Engineer who works in the area was able, during the inspection, to identify the cause of the change.

During dissolving of uranium metal, the individual performing the work wears goggles in addition to the other protective clothing discussed above. The licensee monitors breathing zone concentrations during these operations.

Detectors are assembled in a dedicated room to which only a small number of employees have access. Sealed neutron sources are stored in shielded vaults (tubes) in the floor of the detector testing area. The area is equipped with alarms to warn personnel when the sources are in use.

An outside firm, Applied Health Physics, performs instrument calibration for most of the licensee's instruments. The licensee has one neutron detector, which is calibrated by the manufacturer. Meters are scheduled for calibration so that only a small number will be out at any given time. Checks of records since the last inspection showed that meters calibrations were performed on time.

c. Conclusions

No violations were identified. Although the licensee's checks of fume hood function meet the conditions of its license, the NRC is concerned that the checks may not be adequate to show that the hoods are functioning properly. In particular, the change in hood face velocity by a factor of two could be accompanied by increased turbulence in the air flow which could, in turn, reduce the effectiveness of the hood. The NRC believes the licensee should review the hood function to ensure it is adequate to protect workers and review the methods for checking hood function to ensure they are adequate to identify any failures in the protection the hoods provide.

IV. Material Receipt, Use, Transfer, and Control

a. Inspection Scope

The inspection included a review of the licensee's receipt procedures and its method of accounting for licensed material possessed. The inspector reviewed records of receipt of material, inventory records, records of material use, and disposal records, and interviewed the Radiation Safety Officer and the Accountability Officer.

b. Observations and Findings

The licensee purchases uranium metal from Lockheed Martin Energy Systems in Oak Ridge, Tennessee. The material arrives in a type B container as required by 10 CFR 71.55. The Radiation Safety Officer reported that when this shipment is received, he takes it directly to the laboratory in which it is dissolved and performs required receipt surveys there.

The licensee's electroplating operations generate about two 55 gallon drums of waste products each year. These are disposed of using Teledyne as the broker. Previously, Applied Health Physics was used as the waste broker.

In addition to the uranium metal, the licensee receives return shipments of detectors that are no longer working. These detectors are shipped as limited

quantity items. When the licensee is finished testing these detectors, it either disposes of them or returns them to the customer for disposal.

The licensee keeps a running log of all material received and used. The amount of material used in a given plating operation is determined by the volume of solution used. Of this material, a predetermined amount is assumed to plate onto the tube, and the rest is assumed to go into the waste solution. The log also contains entries for activity in returned detectors correlated to the individual detector. Every six months, this log is checked against a physical inventory of material. This inventory sometimes disagrees with the running inventory by as much as 17%, the physical inventory sometimes being higher than the running inventory and sometimes lower. These differences are necessarily due to inaccuracies in the assessment of activity used in plating operations. At the time of the inspection, the licensee did not have a method of resolving the source of the inconsistencies between the physical and the running inventories.

c. Conclusions

The NRC is concerned that the failure to resolve differences between the physical and running inventories could lead to a failure to detect a loss of material.

V. Training, Retraining, and Instruction to Workers

a. Inspection Scope

The inspector reviewed records of training the licensee personnel over the previous two years. The inspector also interviewed licensee personnel to determine their familiarity with procedures and license requirements.

b. Observations and Findings

The licensee is required to provide training to all personnel working with licensed material upon hire and yearly thereafter. The licensees training records showed that required training had been completed. Training sessions are held separately for personnel within a each department that uses material so that the licensee can focus the training to the needs of particular job functions. All personnel interviewed by the inspector were familiar with procedures and license requirements as they applied to their respective jobs.

c. Conclusions

No violations were identified.

VI. Area Radiation Surveys and Contamination Control

a. Inspection Scope

The inspector reviewed the licensee's records of survey performed since December 1995. The inspector performed independent surveys in the detector plating and the detector assembly areas using a thin-windowed Geiger-Mueller detector.

b. Observations and Findings

The licensee performs documented monthly wipe-test surveys of all areas which are designated for material use. Wipes are counted for gross alpha and gross beta-gamma. Any areas exceeding 22 disintegrations per minute per 100 square centimeters (dpm/100 cm^2) alpha or 150 dpm/100 cm^2 beta-gamma are cleaned and resurveyed. Licensee personnel also perform additional surveys of areas when material is used.

The inspector performed surveys for evident contamination in the uranium plating and the detector assembly rooms. No areas of contamination were found.

c. Conclusions

No violations were identified.

VII. Radiation Protection

a. Inspection Scope

The inspection reviewed the licensee's program for monitoring the internal and external doses of its personnel, and for evaluating the dose to members of the public. The inspector reviewed records of dosimetry evaluations, bioassay results, breathing zone sampling, and stack sampling. The inspector also interviewed the Radiation Safety Officer and licensee personnel who use licensed material.

b. Observations and Findings

The licensee issues personnel dosimeters to a number of individuals, primarily to monitor doses from x-ray radiography. The dosimeters are processed by Landauer, a NVLAP accredited dosimetry processor. The highest annual whole-body dose received by any individual since the last inspection was 340 mrem, and was attributable to x-ray radiation. Users of uranium metal are also monitored for external dose, but external doses received are small or unmeasurable.

The licensee performs urinalysis of all personnel involved in electroplating operations. The license requires these bioassays every six months. The licensee tries to take each sample shortly after the individual has worked with uranium, which is appropriate since the uranium used is in soluble form. An outside firm analyses the samples for uranium-234, uranium-235, and uranium-238 concentrations. All urinalysis results since the last inspection showed no appreciable uptake.

During operations to dissolve the uranium metal, the licensee samples the breathing zone of the worker performing the operation. The air-borne concentrations indicated by these surveys were well below the appropriate derived air concentration in 10 CFR Part 20, Appendix B.

As a result of the last inspection, the licensee was cited for failing to perform surveys required by 10 CFR 20.1501. Specifically, the licensee failed to evaluate breathing zone samples, urinalysis, and stack samples, and compare the resulting

doses to the dose limits in 10 CFR 20.1201 and 20.1301. The Radiation Safety Officer reported that the licensee has still not evaluated the dose to members of the public from air emissions, nor has it determined worker doses using urinalysis results. It has recently hired a consultant and anticipates that the consultant will assist in these analyses.

In an August 26, 1994 letter to the NRC sent as part of the license renewal, the licensee committed to revising its Radiation Safety Manual to ensure compliance with the revision of 10 CFR Part 20 which went into effect on January 1, 1994. During the inspection, the licensee reported that it had very recently completed the update. The licensee reported that updating the Manual was one of the actions it had taken in response to the findings of a State of New York inspection of its program.

c. Conclusions

Failure to evaluate urinalysis and stack samples, and compare the resulting doses to the dose limits in 10 CFR 20.1101(d) and 20.1201 is an apparent violation of 20.1501. This violation was also cited in the previous inspection. In August of 1994, the licensee committed to updating its Radiation Safety Manual. This task was not completed until sometime in 1997.

VIII. Decommissioning Funding Requirements

a. Inspection Scope

The inspector reviewed the licensee's procedures for maintaining records in accordance with 10 CFR 30.35(g). The inspector reviewed as-built drawings of the current places of use. The inspector also examined the licensee's Decommissioning Funding Plan (DFP) and discussed the licensee's review of the DFP with the Radiation Safety Officer.

b. Observations and Findings

The licensee began operations as Imaging and Sensing Technology Corporation in 1988. Prior to that, the facility operated as a unit of Westinghouse Corporation. Shortly after the change, the licensee moved the uranium plating area to its current location. After completion of the move, the licensee had a final radiation survey performed. The licensee maintains the report of the results of that survey. Since that time, the locations of use have been stable.

The licensee submitted a DFP with a letter to the NRC dated August 8, 1994. There have been no changes in the facility since that time that would have required updating the DFP. The licensee is, however, in the process of reviewing the plan to determine if changes in the costs of labor and disposal require changes in its financial assurance.

c. Conclusions

No violations were identified.

IX. Management Meetings

Pamela Henderson, acting Branch Chief, Research and Development Branch, and the inspector presented the inspection findings to the Radiation Safety Officer and the Executive Vice President during a telephone conversation on September 25, 1997. At the same time, the NRC representatives discussed the contents of a Confirmatory Action Letter (CAL) to be issued to the licensee. The NRC deemed the CAL necessary because the licensee had not corrected the violation cited in the previous NRC inspection and had not yet fully implemented the revision to 10 CFR Part 20 effective January 1, 1994. The CAL was issued on September 26, 1997.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

Lou Binetti, Executive Vice President and Part Owner
Thomas Mike, Radiation Safety Officer and Facility Manager
Gail Malloy, Accountability Officer
Kurt Dewalt, Nuclear Engineer
Chuck Amrine, Nuclear Engineer
Shirley Daugherty, Technician
Tim Hughes, Quality Assurance Department
Other licensee personnel