

**FEB 24 1995**

Docket Nos. 030-05980  
030-05982  
030-08335  
030-08444

License Nos. 37-00030-02  
37-00030-08  
37-00030-09G  
37-00030-10G

Mr. Larry Harmon  
Plant Manager  
Safety Light Corporation  
4150-A Old Berwick Road  
Bloomsburg, Pennsylvania 17815

Dear Mr. Harmon:

SUBJECT: COMBINED INSPECTION REPORT NO. 94-001

On December 12 and 13, 1994, Betsy Ullrich and Anthony Dimitriadis of this office conducted a routine safety inspection at the above address of activities authorized by the above listed NRC licenses. The inspection consisted of observations by the inspectors, interviews with personnel, and a selective examination of representative records. The findings of the inspection were discussed with you and members of your staff at the conclusion of the inspection. A copy of the NRC inspection report is enclosed.

Within the scope of the inspection, no violations were identified.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, title 10, Code of federal Regulations, a copy of this letter will be placed in the Public document room. No reply to this letter is required.

Your cooperation with us is appreciated.

Sincerely,

**Original Signed By:**  
**Mohamed M. Shanbaky**

Mohamed M. Shanbaky, Chief  
Research and Development Section  
Nuclear Materials Safety Branch  
Division of Radiation Safety  
and Safeguards

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L. Harmon  
Safety Light Corporation

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Docket No. 030-05980  
030-05982  
030-08335  
030-08444

License Nos. 37-00030-02  
37-00030-08  
37-00030-09G  
37-00030-10G

Enclosure:

Combined Inspection Nos. 030-05980/94-001, 030-05982/94-001, 030-08335/94-001  
and 030-08444/94-001

cc w/enclosure(s):

Commonwealth of Pennsylvania  
Norman Fritz, Radiation Safety Officer

Mr. Ralph T. McElvenny  
Chairman and Chief Executive Officer  
USR Industries, Incorporated  
550 Post Oak Boulevard  
Suite 550  
Houston, Texas 77027

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

INSPECTION REPORT

Report No. 030-05982/94-001

Docket Nos. 030-05980  
030-05982  
030-08335  
030-08444

License Nos.	Priority	Category	Program Code
37-00030-02	1	B	03211
37-00030-08	3	B	03214
37-00030-09G	4	E	03240
37-00030-10G	4	E	03241

Licensee: Safety Light Corporation

Facility Name: Safety Light Corporation

Inspection At: 4150-A Old Berwick Road  
Bloomsburg, Pennsylvania

Inspection Conducted: December 12-13, 1994

Inspectors:

Betsy Ullrich  
Betsy Ullrich, Senior Health Physicist  
Nuclear Materials Safety Branch

2/2/95  
date

Anthony Dimitriadis  
Anthony Dimitriadis, Health Physicist  
Nuclear Materials Safety Branch

2/2/95  
date

Approved by:

M. Shanbaky  
Mohamed M. Shanbaky, Chief  
Research and Development Section  
Division of Radiation Safety  
and Safeguards

2/23/95  
date

Inspection Summary: Routine, unannounced inspection conducted on December 12 and 13, 1994. (Combined Inspection Report Nos. 030-05980/94-001, 030-05982/94-001, 030-08335 and 030-08444/94-001)

Areas Inspected: Organization and Scope of Licensed Activities; Facilities, Equipment and Inventory; Package Receipt and Shipment; Airborne Effluent Releases of Tritium; Liquid Effluent Releases; Personnel Radiation Protection; Surveys; Waste Disposal; Transfers to General Licensees; and Emergency Plan.

Results: No violations were identified.

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## DETAILS

### 1. Persons Contacted

- \* Larry Harmon, Plant Manager
- \* Norman Fritz, Radiation Safety Officer
- John MacHutchin, Consultant
- Charles Berlin, Radiation Safety Technician
- Lester Burgess, Radiation Safety Technician
  
- \* present at exit interview

### 2. Organization and Scope of Licensed Activities

Safety Light Corporation is authorized by NRC License No. 37-00030-08 to possess and use up to 350,000 curies of hydrogen-3 (tritium) for research and development, manufacturing, and distribution of luminous signs and other products, and any byproduct material as sealed sources for use as reference standards. License No. 37-00030-02 authorizes possession of any byproduct material as contaminated facilities and equipment resulting from activities previously conducted under this license. The licensee is also authorized by License Nos. 37-00030-09G and 37-00030-10G to distribute luminous signs and other products to persons who possess them pursuant to a general license.

The licensee's current operations include the assembly of luminous signs and markers, and the manufacture and distribution of tritium gas chromatograph foils and accelerator targets. Assembly of signs occurs daily. Most tritium-filled tubes used in the assembly of signs are received from Shield Source, Incorporated of Peterborough, Ontario, Canada. One rotary tube-filling machine remains on site for the production of tritium-filled tubes used in the luminous signs, but such production occurs only about once each month. The total amount of tritium possessed as of December 13, 1994 was 66,333 curies.

The day-to-day activities at Safety Light Corporation are handled by Larry Harmon, the Plant Manager and Norman Fritz, the Radiation Safety Officer. Two radiation safety technicians perform surveys, sampling, and analysis. Approximately 15 to 20 employees are involved in the production of luminous signs and tritium foils. John MacHutchin, former Radiation Safety Officer now retired, acts as technical consultant for the licensee and serves on the Radiation Safety Committee.

No decontamination activities are being performed under License No. 37-0030-02. The failure to perform decontamination activities as required by the license was cited as an apparent violation in the NRC Inspection Report No. 030-05980/86-001. This apparent violation has not been corrected. However, a plan has been approved to characterize the site to determine what decontamination activities are needed. The plan will be implemented when weather permits, after License No. 37-00030-02 is renewed. (This occurred January 3, 1995). Ground water continues to be monitored using onsite and perimeter wells to evaluate the status of radioactive material that was buried on the property during the 1950's and 1960's.

The Radiation Safety Committee meets routinely during the year. Minutes were reviewed of seven meetings held between June 16, 1993, through December 1, 1994. Meetings were held quarterly as required. Appropriate issues were reviewed at the meetings. During the past year, topics of concern to the Radiation Safety Committee included: changes needed to be in compliance with the revised Part 20 which became effective January 1, 1994; planning and evaluation of the biennial drill of the Emergency Plan; and renewal of the licenses.

No safety concerns were identified.

### 3. Facilities, Equipment and Inventory

Most licensed activities occur in the tritium Processing building, which includes: the gas-fill room where tubes are filled with tritium and gas chromatograph foils are prepared; the Exit Sign assembly room and dark room; and the Health Physics laboratory. Licensed material is also stored in the Liquid Waste building and the Solid Waste building behind the tritium Processing building. Various other buildings on the site remain contaminated from past activities involving cesium-137, strontium-90, and radium.

The licensee maintains an inventory of tritium in use and in storage which is updated daily. Inventory records are maintained in the Health and Safety Annex of the Main Office building. As of December 7, 1994, there were 53,330 curies of tritium in the Processing building. An additional 13,003 curies is located in the Liquid and Solid Waste buildings.

The Health Physics laboratory has a Packard TriCarb Model 4530 liquid scintillation counter which is used for counting water samples and bioassay samples. An Eberline MS-2 (mini-scaler) gas-flow proportional counter is also used to count wipe samples from room surveys, package surveys and other contamination surveys. This instrument is calibrated annually with a radium source received from the U.S. Department of Commerce, National Bureau of Standards, NBS Ref. No. PS 37603. The certificate of calibration for the proportional counter was dated July 21, 1994. An Eberline MS-2 gas-flow proportional counter is located in the ancillary counting laboratory for emergency response. The Health Physics laboratory also maintains a variety of air sampling equipment and portable tritium monitors used in various areas of the facility. The tritium gas Johnson Monitors are calibrated annually using a tritium gas calibrator Model CL-1. All instruments observed appeared to be operating correctly. Review of calibration records indicate that calibrations were performed as required.

No safety concerns were identified.

4. Package Receipt and Shipment

Most of the licensed material received by Safety Light is in the form of filled tubes from Shield Source Incorporated. In 1994 there were 49 shipments from Shield Source Inc., typically in the range of between 2,625 and 7,478 curies received per shipment. Licensed material is also received in the form of luminous signs returned by general licensees to Safety Light, which are sorted for re-use in production or placed into the waste processing stream. Commercial signs are disassembled by Safety Light technicians. Records of incoming packages and outgoing shipments of licensed material were reviewed for the period of January 11, 1994 through December 12, 1994. All incoming packages were surveyed using the Triton III portable tritium monitor and wipe tested for removable contamination. All incoming shipments are required have an RGA number which Safety Light uses to associate the incoming shipment with a customer or product's point of origination. Approximately 350 outgoing shipments of licensed were made between January and April, 1993. Most shipments were boxes of luminous signs. All were wipe tested and no contamination was identified.

Removable contamination was identified on one package containing a returned luminous exit sign on November 23, 1993. Analysis of the wipe detected 177,000 disintegrations per minute (dpm) per 100 square centimeters (cm<sup>2</sup>) of area, an amount in excess of 22,000 dpm/100 cm<sup>2</sup> limit in 10 CFR 71.87. The licensee notified the final carrier, United Parcel Service (UPS), and the NRC as required by 10 CFR 20.1906(d). In addition, the licensee surveyed the UPS truck and identified one wipe with 3,149 dpm/10 cm<sup>2</sup>. The licensee cleaned and re-surveyed the truck to verify that no residual contamination remained.

On December 13, 1994, receipt of two boxes of returned aircraft luminous signs from Japan Airlines was observed by the NRC inspector. A tritium air monitor, Model Triton III, was used to verify that no leakage of tritium occurred from the packages. One technician carefully removed packaging material as the other technician strategically placed the tubing over the material to detect any leaking tritium gas. Two wipes were taken of the boxes and analyzed to verify that no removable contamination was present. The boxes were then placed in the department of quality control. The aircraft signs are not disassembled at this facility, but are delivered to Shield Source in Canada for disassembly.

No safety concerns were identified.

5. Airborne Effluent Releases of Tritium

All building exhausts from the tritium process building are combined for discharge through a single stack which is monitored continuously for particulate (insoluble), aqueous (soluble), and gaseous forms of tritium. Samples are analyzed weekly. Records for the period of January, 1993 through December, 1993 state that 0.06 curies of insoluble tritium,

64 curies of soluble tritium, and 361 curies of gaseous tritium were released in 1993. An additional 8.76 curies of tritium was released from the solid waste building in 1993. The licensee calculated the public dose from all releases to be 1.45 millirem in 1993.

The licensee continuously monitors the Solid Waste building for soluble tritium. Periodic sampling for insoluble and gaseous forms is performed, from which a factor is determined which relates the amount of insoluble and gaseous tritium released to the soluble tritium. This factor of 1.2 has been very consistent over the past two years. The licensee performs a dose assessment for this ground point release from the Solid Waste building. Tritium release from this building was a critical path in 1993. A leaking contaminated source was identified in the building, and subsequently removed and is contained in a hood in the Processing building. This has greatly reduced the measured releases from the Solid Waste building in 1994, and is expected to reduce the overall total dose from releases at the site.

For the period of January 1, 1994 through September 30, 1994, the licensee has released 0.07 curies of insoluble tritium, 63 curies of insoluble tritium, and 108 curies of gaseous tritium. The amounts of tritium released to the environment have decreased since the last inspection, most likely due to decrease in use of tritium gas for filling of tubes.

No violations or safety concerns were identified.

## 6. Liquid Effluent Releases

In accordance with the Commonwealth of Pennsylvania NPDES permit, the licensee makes discharges of tritium in liquid wastewater to the Susquehanna River. Wastewater is collected in one of three holding tanks, each with a volume of 1.71 E4 liters. When a tank is full, a sample from the tank is collected and analyzed for tritium using a TriCarb liquid scintillation counter prior to release. Samples are also analyzed for other components regulated by the Commonwealth of Pennsylvania, including non-radioactive zinc. Seven discharges were made to the river during the period of May 4, 1993 through December 31, 1993. The tritium concentration in the holding tanks during this period ranged from 0.38 E-3 microcuries per milliliter (uCi/ml) to 1.03 E-3 uCi/ml, which is less than the maximum permissible concentration limit of 3 E-3 uCi/ml listed in Table II, Column 2 of Appendix B to 10 CFR 20.1-20.602 in effect at that time. Six discharges were made to the river during the period of January 1, 1994 through December 8, 1994. Tritium concentrations in the holding tanks ranged from 0.117 E-3 uCi/ml to 1.33 E-3 uCi/ml. The average concentration of tritium in holding tank water was less than the 10 CFR 20.1001-20.2402 Appendix B, Table 2, Column 2 value of 1 E-3 uCi/ml, which became effective on January 1, 1994. In all cases, holding tank water was further diluted prior to release in order to meet the non-radioactive zinc concentration limits.

Comparative analysis was made of a sample of water taken from a tank that was discharged to the river on December 8, 1994. The licensee assayed 1 milliliter of the sample using their liquid scintillation counter and determined the tritium content to be  $7.45\text{E-}4$  uCi/ml. The licensee's sample count time is 5 minutes, and the licensee's liquid scintillation counter efficiency for tritium is 62%. The NRC Region I laboratory assayed three 10 milliliter samples on January 11, 1995, using a Packard Tri-Carb liquid scintillation analyzer. This instrument has a efficiency of 24% for tritium and a lower limit of detection of 26 disintegrations per minute. The average of the NRC results is  $6.01 \pm 0.06 \text{E-}4$  uCi/ml. The licensee's result is in statistical agreement with the NRC results.

Tritium in the environment is monitored by analysis of samples from various wells. Seven wells are monitored monthly, and the remaining 22 wells are sampled 1 to 4 times each year on a specified schedule. Sample results for most wells were less than 5,000 picocuries per liter during 1993 and 1994. The maximum concentrations of tritium were found in Bore 24, which were usually around 100,000 picocuries per liter in 1993 but generally less than 50,000 picocuries per liter in 1994. Samples from these wells are also sent to an outside laboratory for gross alpha and gross beta analysis to identify radioactive material in ground water from contaminated soil on the site from past activities. Beta concentrations in most wells are less than 100 picocuries per liter, and no detectable quantities of alpha are found in most wells. The licensee maintains a separate graph for each well showing the date and concentration of gross alpha, gross beta, and tritium detected in each sample. Results shown on the graph are similar or lower than the concentrations detected in previous years.

No violations or safety concerns were identified.

## 7. Personnel Radiation Protection

Bioassays are performed every two weeks to detect tritium uptake of individuals who have worked in areas where tritium is used or stored. Analysis of 1 milliliter aliquots is performed using the liquid scintillation counter after decoloration of the urine samples is performed. Most samples contained less than 0.01 uCi/liter in 1993 and 1994, which the licensee calculates the dose to be less than 0.1 millirem. The maximum concentration of tritium detected in any individual sample was 0.52 uCi/l in 1993 and 2.85 uCi/l in 1994. The maximum annual dose to any individual during 1993 was 5 millirem.

No violations or safety concerns were identified.



8. Surveys

The gas-fill room, and associated unrestricted areas of the tritium processing facility, are surveyed each day that the gas-fill room is entered. Most other areas are surveyed weekly for removable contamination. The radioactive waste storage areas are surveyed approximately two times per month. The liquid waste storage areas are surveyed bimonthly. Records of surveys were reviewed for the period January 1994 through December 1994. The wipes were analyzed in an Eberline MS-2 proportional counter. Background was typically 120 dpm. The survey records listed the results of the routine wipe tests as well as results of re-wipes of areas which were above the threshold level of 3,000 dpm. Typical contamination levels in the gas-fill room are on the order of 1 E3 to 1 E5 disintegrations per minute per 100 square centimeters (dpm/100 cm<sup>2</sup>). Typical contamination levels identified in the associated unrestricted areas (hallway, bathrooms, etc.) were occasionally 1000 to 2000 dpm/100 cm<sup>2</sup>. Areas identified as contaminated were cleaned and re-surveyed as required.

No safety concerns were identified.

9. Waste Disposal

Radioactive waste generated within the facility is picked up by one of the Radiation Safety Technicians and transported to the waste storage building. The waste is placed into plastic bags which are placed into bins in the Solid Waste building. No waste has been disposed offsite since 1991, except for liquid wastewater released to the river (see Paragraph 6). Foils and unusable glass tubes containing tritium which have been sealed in stainless steel containers welded shut to prevent leakage of tritium, are also stored in the Solid Waste building. The licensee estimates that 10,722 curies of tritium is contained in waste in the Solid Waste Building. An additional 2,921 curies of tritium signs are stored in the Liquid Waste Building.

The waste generated from liquid scintillation vials has not been shipped offsite since 1989. Instead, the licensee uses Scintiverse counting fluid which is disposed of by evaporation inside a hood. The hood vents to the Main Stack, which is monitored for tritium.

No safety concerns were identified.

10. Transfers to General Licensees

Records were reviewed for the period of January through September 1994 of transfers to general licensees of luminous devices pursuant to 10 CFR 32.51 and License No. 37-00030-09G. Over 700 shipments of luminous exit signs were made during this period. Shipments ranged from 2 signs to 325 signs. Reports of transfers are filed quarterly as required, and contain all required information. Most of the larger shipments were to Isolite

in Berwyn, Pennsylvania and EmergiLite in Westbrook, Connecticut. Both of these companies are authorized by specific licenses to receive and store luminous signs, as well as distribute the signs to general licensees. Signs are appropriately labelled at Safety Light for distribution as authorized by the Isolite or EmergiLite licenses. Similar shipments are prepared and distributed to Isolite Southwest in Dallas, Texas and Isolite West in San Luis Obispo, California.

Records were reviewed for the period of January through September 1994 of transfers to general licensees of luminous aircraft devices pursuant to 10 CFR 32.53 and License No. 37-00030-10G. Over 300 luminous aircraft signs were distributed during this period. Reports are made to the NRC of all transfers. Although 10 CFR 32.56 requires reports annually for all devices submitted during the previous year, these reports are submitted each calendar quarter at the same time as the required reports for all other luminous devices distributed under License No. 37-00030-09G.

No violations or safety concerns were identified.

11. Emergency Plan

The licensee performed a biennial onsite exercise of their Radiological Contingency Plan as required by 10 CFR 30.32(3)(xii) in September, 1994. Two observers were assigned to evaluate employee response to a simulated accident in the tritium Processing building with an injured employee. Results of the exercise were reviewed at the October 3 Radiation Safety Committee meeting. Based on the results, the licensee plans to re-train employees in why various alarms may be activated, in order to improve their response to alarms. Also, specific instructions may be developed for handling of potentially contaminated individuals. For example, a contaminated injured person was brought to a carpeted area of the Administrative building; the licensee believes that other areas would be as easily accessible and less difficult to clean after treatment of the contaminated person. No changes have been made or are planned to the Radiological Contingency Plan at this time.

12. Exit Interview

The NRC inspectors met with the individuals identified in Paragraph 1 at the conclusion of the inspection. The scope and findings of the inspection were summarized.