

JUN 15 1989

Docket Nos. 030-05980  
030-05981  
030-05982 ✓  
030-08335  
030-08444

License Nos. 37-00030-02  
37-00030-07E  
37-00030-08 ✓  
37-00030-09G  
37-00030-10G

Safety Light Corporation  
ATTN: Mr. Jack Miller  
President  
4150-A Old Berwick Road  
Bloomsburg, Pennsylvania 17815

Gentlemen:

Subject: Special Inspection No. 89-001

On April 25, 1989, Francis M. Costello and James H. Joyner of this office conducted a special safety inspection at the above address of activities authorized by the above listed NRC licenses. The inspection was an examination of your licensed activities as they relate to radiation safety and to compliance with the Commission's regulations and the license conditions. The inspection consisted of observations by the inspector, interviews with personnel, and a selective examination of representative records. The findings of the inspection were discussed with you and other members of your staff at the conclusion of the inspection. A copy of the NRC inspection report is enclosed.

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 and the enclosure will be placed in the Public Document Room.

No response to this letter is required.

Your cooperation with us is appreciated.

Sincerely,

**Original Signed By:**  
**John D. Kinneman**

John D. Kinneman, Chief  
Nuclear Materials Safety Section B  
Division of Radiation Safety  
and Safeguards

OFFICIAL RECORD COPY

IR SAFETY LIGHT - 0001.0.0  
06/14/89

RETURN ORIGINAL TO  
REGION I

IE:07

Enclosure:

Combined Inspection Nos. 030-05980/89-001, 030-05981/89-001, 030-05982/89-001  
030-08335/89-001 and 030-8444/89-001

cc:

Public Document Room (PDR)  
Nuclear Safety Information Center (NSIC)  
Commonwealth of Pennsylvania  
Norman Fritz, Radiation Safety Officer

USR Industries, Inc.  
ATTN: Mr. Ralph T. McElvenny  
Chairman and Chief Executive Officer  
550 Post Oak Boulevard  
Suite 550  
Houston, Texas 777027

bcc:

Region I Docket Room (w/concurrences)  
Management Assistant, DRMA  
F. Costello, RI  
M. Weber, NMSS  
G. Sjoblom, NMSS  
M. Knapp, RI  
J. Joyner, RI  
J. Gutierrez, RI  
D. Holody, RI  
J. Kinneman, RI  
M. Bell, NMSS  
J. Lieberman, OE

*FAC*  
RI:DRSS  
Costello/bc

06/15/89

*Kinneman*  
RI:DRSS  
Kinneman

06/15/89

*Joyner*  
RI:DRSS  
Joyner

06/15/89

OFFICIAL RECORD COPY

IR SAFETY LIGHT - 0002.0.0  
06/14/89

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 030-05982/89-001  
030-05981/89-001  
030-05980/89-001  
030-08335/89-001  
030-08444/89-001

Docket Nos. 030-05982  
030-05981  
030-05980  
030-08335  
030-08444

License Nos.	<u>37-00030-08</u>	Priority	<u>1</u>	Category	<u>B</u>
	<u>37-00030-02</u>		<u>3</u>		<u>E</u>
	<u>37-00030-07E</u>		<u>5</u>		<u>E</u>
	<u>37-00030-09G</u>		<u>4</u>		<u>E</u>
	<u>37-00030-10G</u>		<u>4</u>		<u>E</u>

Licensee: Safety Light Corporation  
4150-A Old Berwick Road  
Bloomsburg, Pennsylvania 17815

Facility Name: Safety Light Corporation

Inspection At: Bloomsburg, Pennsylvania

Inspection Conducted: April 25, 1989

Inspector: Francis M. Costello 6/15/89  
Francis M. Costello date  
Senior Health Physicist

Approved by: John D. Kinneman 6/15/89  
John D. Kinneman, Chief date  
Nuclear Materials Safety Section B

Inspection Summary: Inspection conducted April 25, 1989 (Combined Report  
Nos. 030-05980/89-001, 030-05982/89-001, 030-05981/89-001, 030-08335/89-001,  
and 030-08444/89-001)

Areas Inspected: Routine, unannounced inspection including review of scope of licensed activities, contamination control, training, bioassay, airborne releases, package surveys, radioactive waste disposal and environmental sampling.

Results: No violations were identified with respect to License Nos. 37-00030-08, 37-00030-07E, 37-00030-08G, 37-00030-10G. With respect to License No. 37-00030-02, the apparent violations identified in Inspection No. 030-5980/86-001 apparently had not been corrected.

## DETAILS

### 1. Persons Contacted

\*Jack Miller, President  
Larry Harmon, Plant Manager  
Norman Fritz, Radiation Safety Officer  
John McCutcheon, Radiation Safety Consultant  
Charles Berlin, Radiation Safety Technician  
Michael O'Donoghue, Attorney  
Allen Mandelbaum, Attorney

Clayton Pittiglio, NRC, NMSS  
Timothy Johnson, Section Leader, NRC, NMSS

\*present at exit interview

### 2. Scope of Licensed Activities

Safety Light Corporation is authorized by NRC License Nos. 37-0030-08, 37-0030-07E, 37-00030-09G and 37-00030-10G to possess and use any form of hydrogen-3 for research and development, manufacturing, and general and exempt distribution of various products and any byproduct material as sealed sources for use as reference standards. The licensee's current operations include the manufacturing and distribution of luminescent signs, gas chromatograph foils and accelerator targets. The licensee also distributes watch dials which have previously been labelled with tritium.

Safety Light Corporation is also authorized by NRC License No. 37-00030-02 to possess any byproduct material as contaminated equipment and facilities for the decontamination, cleanup, and disposal of such material. No current decontamination activities are being conducted under this license. The failure to perform decontamination activities was cited as an apparent violation in NRC Inspection Report No. 030-5980/86-001. This apparent violation has not been corrected. On March 16, 1989, the NRC issued an Order which required the licensee to prepare a site characterization plan for the purpose of eventual site decontamination and to submit certain financial and other information to the NRC. The licensee had complied, in part, with the requirements of the Order that were due as of the date of the inspection.

The licensee is continuing to monitor water from bore holes on site and at the perimeter of the licensee's property to evaluate the status of radioactive material that was buried on the property during the 1950's and 1960's. Analysis is performed for the licensee by a contractor.

### 3. Bioassay

A licensee representative stated that weekly urinalyses are performed on all individuals working with tritium. The inspector reviewed the licensee's bioassay records for 1989 and determined that the maximum individual urine sample contained 10.8 microcuries of tritium per liter. The cause of this uptake was the repair of the licensee's tritium procession system following an accidental leak which occurred on January 17, 1989. The details of this incident are included in Attachment 1. The review by the Radiation Safety Committee of the circumstances that resulted in the uptake appeared adequate and the uptake was within the limits of 10 CFR 20.103.

No violations were identified.

### 4. Airborne Releases

All building exhausts are combined for discharge through a single stack, 0.6m in diameter and 18m high. Continuous monitoring of this stack for particulate, aqueous and gaseous forms of tritium is performed using filters and ethylene glycol bubblers in conjunction with an oxidizer furnace. The filters and ethylene glycol solutions are changed and analyzed daily. The licensee has determined diffusion factors for the exhaust stream under predominant meteorological conditions (wind toward the southeast) and utilizes these factors to calculate the concentration of tritium released to unrestricted areas.

Licensee records indicate that, during 1988, 172.6 curies of tritium were released as tritiated water vapor and 3,634.2 curies were released as gaseous tritium. The licensee's summary of releases are included as Attachment 2. Using previously determined diffusion factors, the licensee determined that the concentration of tritium released to the unrestricted area was within the limits in 10 CFR 20.106.

On January 17, 1989, the licensee experienced an instance of an unexpected stack release from the gas fill system. The release involved 1911 curies of tritium gas. Licensee calculations indicated that the average ground level concentration of tritium at approximately 125 meters downwind from the stack was approximately 60% of the MPC for unrestricted areas for that day. The Radiation Safety Committee investigated this incident and documented its findings, including corrective actions. (Attachment 1)

No violations were identified.

### 5. Radioactive Waste Disposal

The licensee made four shipments of radioactive waste containing about 1800 curies of tritium to U.S. Ecology Nuclear between September 1988 and April 1989. The records of these shipments indicated compliance with DOT regulations.

Licensee records indicated that the current inventory of radioactive waste on site is approximately 23,970 curies, which is within the license limit of 35,000 curies. Approximately 18,000 curies of this waste is in the form of tritiated foils. The licensee's total inventory is approximately 63,289 curies.

No violations were identified.

6. Environmental Sampling

The inspector reviewed bore hole and well water sampling results. It was noted that analyses of on-site subsurface water continue to indicate concentrations of radioactive material in excess of limits for unrestricted areas. The principal isotopes in the subsurface water are strontium-90, radium-226, and tritium.

The licensee also continues to sample drinking water from wells on the properties of nearby residences. The tritium concentration in these samples has varied over the past year from less than detectable to 5,300 picocuries per liter. The licensee's minimum detectable concentration for these analysis is approximately 1,000 picocuries per liter. These samples are taken from the nearby residences on a monthly basis. The EPA standard for tritium in drinking water is 20,000 picocuries per liter.

No violations were identified.

7. Exit Interview

The inspector and other NRC staff met with the license representative denoted in paragraph 1 at the conclusion of the inspection. The scope and findings of the inspection were summarized. The inspector emphasized the importance of the licensee complying with all terms of the NRC's March 16, 1989 Order in a timely manner.

Attachment 1

Combined Inspection Report Nos. 030-05980/89-001, 030-05981/89-001,  
030-05982/89-001, 030-05335/89-001, and 030-08444/89-001

License Report on January 17, 1989 Tritium Release

SAFETY LIGHT CORPORATION

TO: RADIATION SAFETY COMMITTEE

January 23, 1989

FROM: NORMAN FRITZ

SUBJECT: RELEASE OF 1/17/89 ROTARY INDEX I

MH started generation of tritium gas from ORNL Pyro #DG1-13 at 0830 hrs., 1/17/89 for transfer to bulk storage pyro. She set her heat controller at 350 degrees C and observed a pressure rise in seven minutes, then proceeded to fill tubes on Rotary I. Before 0850 the Rotary I hood and room monitors alarmed and shortly thereafter, went off scale ( $>10,000 \mu\text{Ci}/\text{cu.m}$ ). MH noticed 1123 torr on the bulk storage Setra pressure gauge and a temperature of approx. 600 degrees C on ORNL pyro temperature controller, signifying an overshoot of temperature and resultant tritium gas pressure. She immediately opened valve #2 to the fill side of the rig, valve #16 into a 1 liter volume and valve #4 into Pyro #1, thereby reducing the pressure to some 600 torr. She then turned the heat controller off and called Health & Safety and NF for assistance. Time elapsed since heat was applied to ORNL pyro - 20 min. NF arrived at 0854 and CB assisted at entry door to room with portable tritium monitor after surveying other plant areas to determine levels of tritium in air that other personnel might be subjected to. DG present in Rotary II fill area.

# SAFETY LIGHT CORPORATION

## TRITIUM DETECTION INFORMATION

ROTARY I HOOD MONITOR -  $>10,000$  Ci/cu.m  
highest reading

ROTARY I ROOM MONITOR -  $>10,000$   $\mu$ Ci/cu.m  
highest reading

ROTARY II ROOM MONITOR -  $100$   $\mu$ Ci/cu.m  
highest reading

SIGN ASSEMBLY MONITOR -  $38$   $\mu$ Ci/cu.m

DARK ROOM MONITOR -  $60$   $\mu$ Ci/cu.m (JH asked to  
exit room)

HALL O.S. FILL ROOM -  $55$   $\mu$ Ci/cu.m (outside  
doors opened immed.)

PRODUCTION ASST. OFFICE -  $12-13$   $\mu$ Ci/cu.m

HEALTH & SAFETY STACK CHARTS -  $10$  V peak by  
0902, back on  $30$  mV by 0953

### IMPINGER SAMPLING:

1/17/89 Run (10 a.m. Sampling)  
SUB =  $1870$  Ci  
3H(S) =  $1.05$  Ci

1/18/89 Run (10 a.m. Sampling)  
SUB =  $2011$  Ci  
3H(S) = Not Run

AVERAGE =  $(1870 + 2011)/2 = 1941$  Ci

Subtract est.  $30$  Ci for period approx.  
 $7$  a.m. 1/16/89 to approx.  $10$  a.m.  
1/17/89.

$1941$  Ci -  $30$  Ci =  $1911$  Ci (Use for  
best estimate of release)

### DOWNWIND CALCULATIONS:

SUB @  $125$  m =  $25.74 \times 10^{-6}$   $\mu$ Ci/mL =  $0.59$  X  
MPC

3H(S) @  $125$  m =  $1.41 \times 10^{-8}$   $\mu$ Ci/mL =  $0.06$  X  
MPC

# SAFETY LIGHT CORPORATION

## INVESTIGATION AND ANALYSIS

### PRELIMINARY ESTIMATE OF CAUSE OF RELEASE -

Overheat of ORNL pyro to 600 degrees C creating pressure in excess of capability of Bulk Storage pyro to absorb and resulting in tritium gas loss due to failure of system integrity somewhere upstream of valve #2, including possibility of extreme diffusion through walls of ORNL pyro.

Several meetings including NF, LH, JGM, MH and JS precipitated the following actions:

Leak Detection - 1/19/89 - Entire rear side of system (ORNL, Bulk Storage, #1 and #2 pyros plus 1 L. cylinder) leak detected twice. No leak found. Just previous to shutdown of leak detector, a sharp reduction in vacuum appeared and a third leak detection was performed. A significant leak was discovered upstream of valve #1 at a VCO elbow. Two retaining nuts were found to be less than sufficiently drawn up.

Leak Repair - Rear side of fill rig shielded as much as possible to allow work in extreme upper right area near ceiling of rig. Hats and masks worn by MH & NF. Monitor probe at breathing zone.

Elbow removed and found to contain one deteriorated O-ring, and one O-ring in good shape. Both O-rings replaced and piping re-connected. Monitor probe showed tritium in excess of 10,000  $\mu\text{Ci}/\text{cu.m}$  and took quite a while to return to normal ranges, indicating tritium oxide was released. Fill rig monitor remained on  $10^2$  (max 1000  $\mu\text{Ci}/\text{cu.m}$ ) scale indicating that shielding was insufficient to prevent outgassing of VCO elbow from exiting work area, however no greater degree of shielding would have permitted room enough to perform work required.

# SAFETY LIGHT CORPORATION

## PERSONNEL UPTAKE FROM REPAIR OPERATION (in $\mu\text{Ci/L}$ )

<u>1/16/89</u>	<u>1/17/89</u>	<u>1/19/89</u>
1.23	3.74	5.17
.84	----	10.79

## PERSONNEL CONTAMINATION FROM REPAIR OPERATION (DPM/100 sq.cm)

<u>FACE</u>	<u>HANDS</u>
70,000	40,000
5000*	BKDG.

\* After preliminary washup.

## HEATER CONTROLLER CHECK

1/18/89 - JS, NF checked heater controller, band heaters and thermocouple off pyro. Set temp. for 350 degrees C. All parts functioned properly, however a blown fuse was discovered and replaced.

1/19/89 - JS, NF, MH checked heater controller, band heaters and thermocouple on pyro. Band heaters were found to be shorted out after a fuse was blown. When checked 1/18/89, band heaters sat on insulating block not grounded. On 1/19/89 they were grounded, being on pyro.

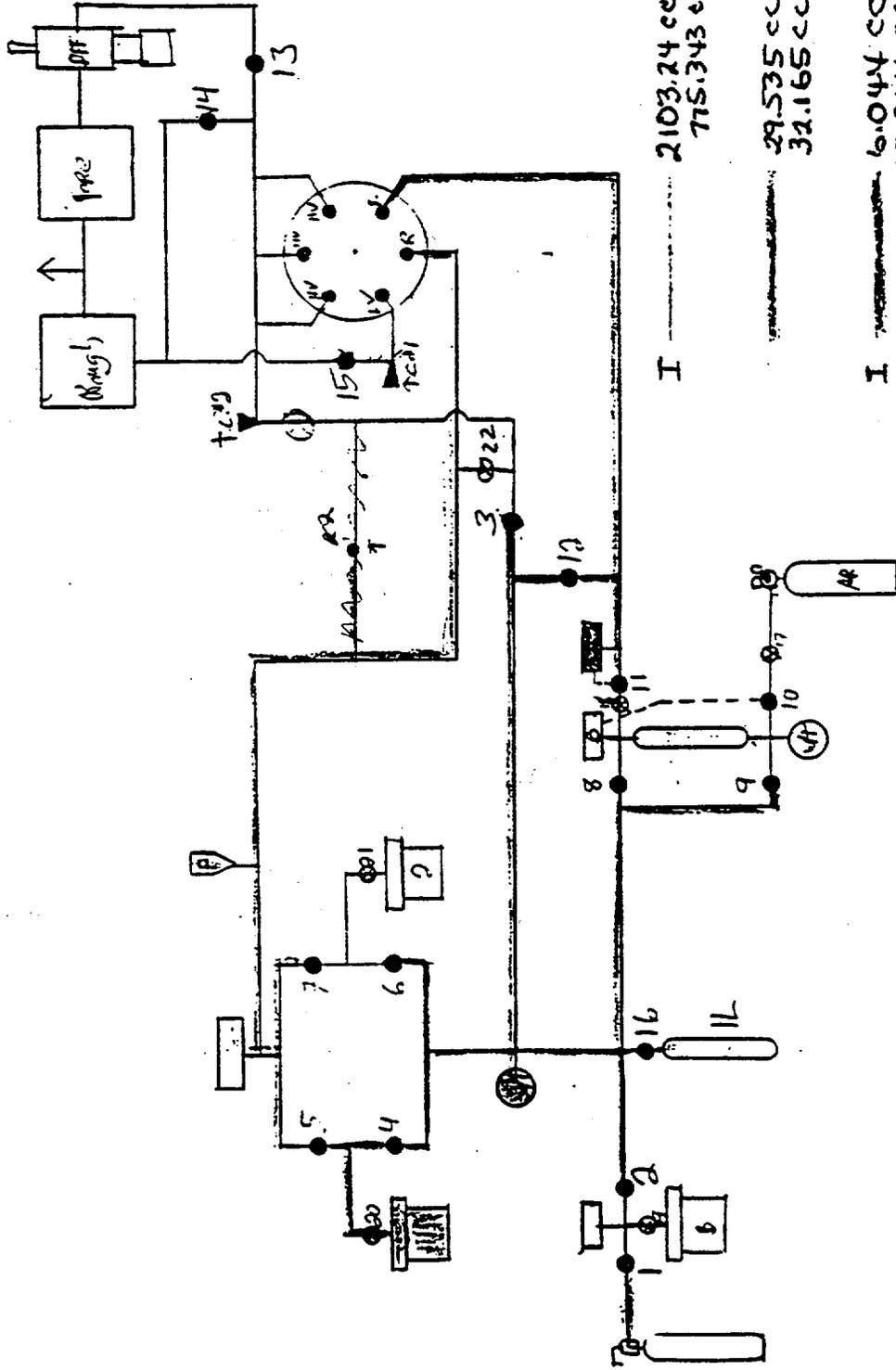
1/20/89 - JS and NF checked heater controllers and found that on Rotary I and Rotary II controllers for ORNL pyros, single pole relays were used, which allowed one leg of 240 V power (110 V) to blow a fuse when heater bands were grounded and the other leg to keep on supplying the band heaters. A double pole relay should have been used. This is why heat kept going to band heaters after the connectors became grounded, consequently allowing pyro to heat infinitely past set point of 350 degrees C.

## SAFETY LIGHT CORPORATION

### ACTIONS TO PREVENT SIMILAR OCCURANCE

1. Install double pole, single throw relays in Rotary I and Rotary II ORNL pyro heater controllers (will involve rebuilding of both controller boxes).
2. Investigate possibility of replacing sections of line in Rotary I that contain VCO connectors/fittings.
3. Discuss addition of overtemp. alarms on all heater controllers.
4. Re-emphasize to operators importance of observing results of actions with respect to any type of operation on gas handling rigs.
5. Evaluate our rig maintenance programs to determine if they are adequate and that they are being followed properly.

# ROTARY INDEX FILL MACHINE # 1

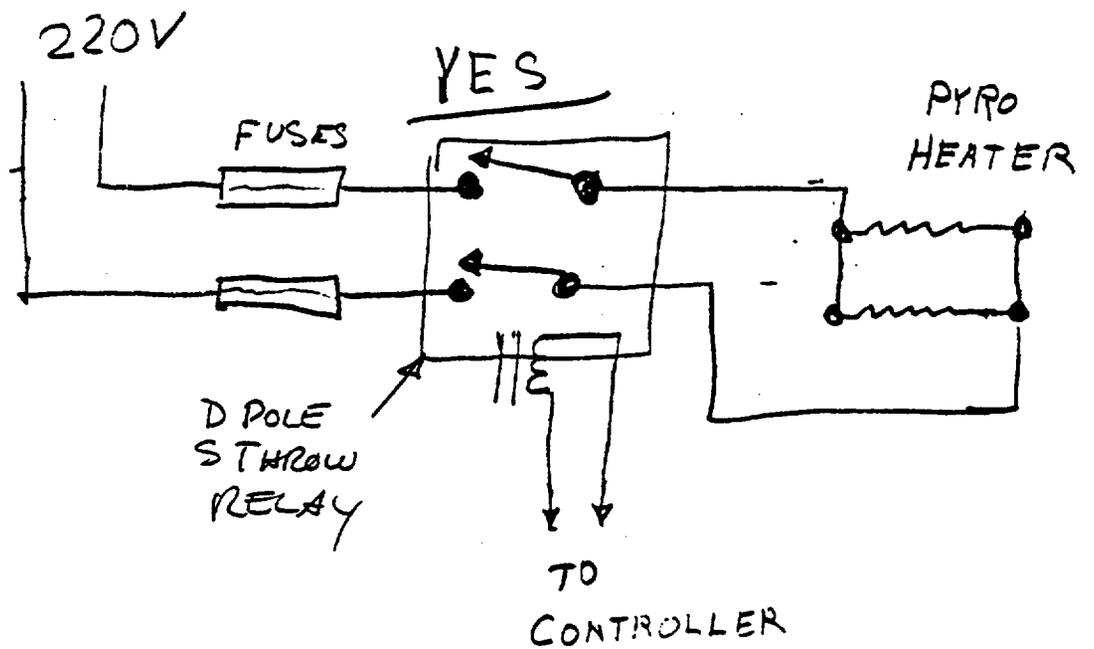
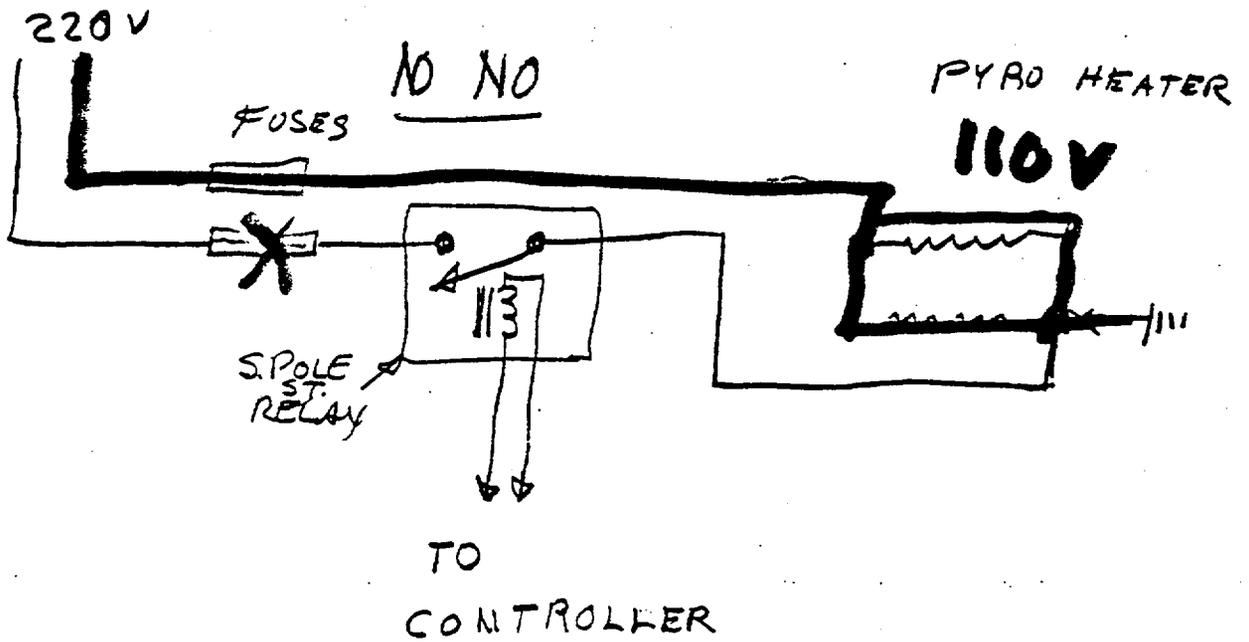


- I ----- 2103.24 cc METAL BELLOWS DOWN  
775.343 cc METAL BELLOWS UP
- I ----- 29.535 cc TURRET CLOSED  
32.165 cc TURRET OPEN
- I ----- 6.044 cc VALVE CLOSED  
15.264 cc VALVE OPEN  
18.500 cc \*
- I ----- 5.849 cc TURRET CLOSED  
7.168 cc TURRET OPEN
- I ----- 24.129 cc PYRO CLOSED  
33.349 cc PYRO OPEN
- I ----- 50.444 cc  
1001.177 cc

1 PYRO INVENTORY VOLUME (I) = 3170.125 cc  
 2 PYRO INVENTORY VOLUME (I) = ~~3180.389~~ cc  
 3203.949 cc \*  
 BULK TRANSFER INVENTORY VOLUME = 3154.86 cc

0.71 cc  
 3.57 cc  
 991.00 cc  
 \*(over)





Attachment 2

Combined Inspection Report Nos. 030-05980/89-001, 030-05981/89-001,  
030-05982/89-001, 030-05335/89-001, and 030-08444/89-001

Tritium Processed and Released to the Environment (1983-1988)

