

Docket Nos. 030-05980
030-05982

05 JAN 1989

License Nos. 37-00030-02 ✓
37-00030-08

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

Gentlemen:

Subject: Routine Inspection No. 88-001

On July 8, 1988, Frank Costello of this office conducted a routine 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 by Mr. Costello and Mr. S. Ebnetter, Director, Division of Radiation Safety and Safeguards, Region I. A copy of the NRC inspection report is enclosed.

We are continuing to evaluate the results of the inspection conducted on June 19-30, 1986 and November 12, 1986, your response to our letter dated April 20, 1988, and the results of this inspection to determine what if any, enforcement action is appropriate. You will receive additional correspondence describing our conclusions when this review is complete.

During the discussions at the conclusion of the inspection, Mr. Costello and Mr. Ebnetter expressed our concern that areas on your site are accessible to unauthorized individuals and are being occupied and used by other organizations and by personnel who do not receive the training and notifications required by 10 CFR 19.12. These areas appear to be contaminated in excess of the enclosed NRC Guidelines for the release of such areas for unrestricted use. In reply to this letter describe your plans to ensure that all areas to which there is unrestricted access meet the enclosed Guidelines and your plans to restrict access to those areas which do not meet the Guidelines. We would appreciate receiving your response within thirty (30) days of the date you receive this letter.

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.

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REG1 LIC30
37-00030-02 FDC

RETURN ORIGINAL TO
REGION I

1E:07.

OFFICIAL RECORD COPY

IR SAFETY LIGHT - 0001.0.0
01/03/89

LEO

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

Enclosures:

1. Combined NRC Region I Inspection Report No. 030-5980/88-001 and 030-5982/88-001
2. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material

cc:

Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Pennsylvania
John McCutcheon, 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, RI
S. Ebnetter, RI
J. Joyner, RI
J. Gutierrez, RI
D. Holody, RI
J. Kinneman, RI

PMC
RI:DRSS
Costello/bc
01/4 /88


RI:DRSS
Kinneman
01/4 /88

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IR SAFETY LIGHT - 0001.1.0
01/03/89

05 JAN 1989

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 030-05982/88-001
030-05980/88-001

Docket Nos. 030-05982
030-05980

License No. 37-00030-08
37-00030-02

Priority 1
3

Category B
E

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

Facility Name: Safety Light Corporation

Inspection At: Bloomsburg, Pennsylvania

Inspection Conducted: July 8, 1988

Inspector: *Francis M. Costello*
Francis M. Costello,
Senior Health Physicist

1/3/89
date

Approved by: *John D. Kinneman*
John D. Kinneman, Chief
Nuclear Materials Safety Section B

1/3/89
date

Inspection Summary:

Inspection conducted July 8, 1988 (Combined Report Nos. 030-05980/88-001 and 030-05982/88-001)

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 No. 37-00030-08. 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
Gerry Slowick, Production Manager
John McCutcheon, Radiation Safety Officer
Charles Berlin, Radiation Safety Technician

*present at exit interview

2. Scope of Licensed Activities

Safety Light Corporation is authorized by NRC License No. 37-00030-08 to possess and use any form of hydrogen-3 for research and development, manufacturing, and 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.

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. Licensee representatives stated that no future decontamination operations or activities are currently planned, unless environmental samples indicate movement or elevated concentrations of radioactive material. However, the licensee representative stated their intention to eventually decontaminate the property. Licensee representatives described recent efforts to repair and maintain weathertight buildings which contain radioactive contamination.

3. Contamination Control

The inspectors toured the foil manufacturing, tube manufacturing, liquid waste storage, and solid waste storage facilities. Contamination surveys are performed on a daily basis, as required, and the licensee's records indicated that the contamination levels were maintained within the limits contained in the license. When contamination in excess of the level is detected, the licensee decontaminates the area until the measured contamination levels are within these limits.

No violations were identified.

4. Training

One new employee who works with byproduct material has been hired since the last inspection. Licensee records indicated that the Radiation Safety Committee reviewed and approved the employee's training and the scope of her authorized activities. Discussions with workers during the course of the inspection indicated their familiarity with the requirements of the licensee's radiation safety program.

No violations were identified.

5. 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 1987 and 1988 and determined that the maximum individual urine sample contained 60 microcuries of tritium per liter. The licensee performed an investigation to determine the cause of this uptake and determined that the uptake had occurred on October 31, 1987 during a waste repackaging operation. The uptake occurred despite the use of protective clothing and the presence of a tritium air monitor in the area. A contaminated can of tritiated foils was encountered in the drum during the repackaging operation and the worker's contact with this can resulted in the uptake. The review by the Radiation Safety Committee (Attachment 1) appeared adequate and the uptake was within the limits of 10 CFR 20.103.

No violations were identified.

6. 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 1987, 148.5 curies of tritium were released as tritiated water vapor and 4,665.9 curies were released as gaseous tritium. During the first quarter of 1988, the licensee released 45.69 curies as tritiated water vapor and 991.04 curies as gaseous tritium. The licensee's summary of releases for the last five years are included as Attachment 2. Using the 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.

Since the last inspection, the licensee experienced several instances of unexpected stack releases from the gas fill system. The largest release was on September 3, 1987 and involved 273.75 curies of tritium gas. Licensee calculations indicated that the average ground level concentration of tritium at approximately 125 meters downwind from the stack was well below the MPC for unrestricted areas for that day. Licensee calculations indicate that approximately 16 curies of tritium oxide or 3,500 curies of tritium gas would have to be released in a day to exceed the MPC for unrestricted areas. The Radiation Safety Committee investigated these incidents and documented its findings including corrective actions.

The licensee samples airborne tritium at three locations along the property boundary. The three samplers are located along the east property line based on the prevailing westerly winds. The first sampler is located on the center line of the prevailing downwind direction from the stack. The other two samples are taken 150 feet north and south of this center line. In addition, the licensee occasionally takes samples on the west side of the property. These samples are evaluated for soluble tritium. Licensee records show that the airborne concentration of soluble tritium at these points averaged approximately 10^{-9} microcuries per milliliter, less than one percent of the applicable MPC. The results of the licensee's samples in 1988 to date are included as Attachment 3. These values are representative of the results of the samples in 1987.

No violations were identified.

7. Package Surveys

The inspectors reviewed the records of contamination surveys of incoming and outgoing packages. All outgoing packages are surveyed prior to leaving the gas-fill room and results are recorded prior to shipment. Incoming packages of tritium are taken to the liquid waste building for contamination surveys.

No violations were identified.

8. Radioactive Waste Disposal

The licensee made one shipment of radioactive waste containing about 8,9000 curies of tritium to a company in Canada in 1988. That company then sent the waste to an authorized radioactive waste disposal site in Canada. The records of this shipment indicated compliance with DOT regulations.

Licensee records indicated that the current inventory of radioactive waste on site is approximately 22,000 curies which is within the license limit of 35,000 curies. The licensee stated that it is experiencing difficulty with disposing the remainder of its waste inventory, primarily tritiated foils, because of the high cost of disposal.

No violations were identified.

9. 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 inspector split a sample of water from bore hole 14 with the licensee. Water from this hole had evidenced only tritium in the past. This hole is immediately adjacent to a neighboring residence which uses well water. The licensee measured 28,028 picocuries per liter of tritium in an unfiltered aliquot of the sample and 23,023 picocuries per liter in an average of three filtered aliquots from the sample. The licensee also sampled this bore hole the day after the inspection and measured 33,033 picocuries per liter in an average of three filtered aliquots of that sample. The NRC measured $33,600 \pm 1500$ picocuries per liter of tritium in the split sample, which is consistent with the licensee's results. The licensee has experienced considerable variability in the results of past monitoring of bore hole 14. The following are the results of the licensee's most recent monitoring of bore hole 14.

<u>Month</u>	<u>Tritium Concentration (pCi/l)</u>
December, 1987 (2 samples)	304,400 and 44,900
January, 1988	17,300
February, 1988	21,000
March, 1988	16,500
April, 1988	6,600
May, 1988	6,600
June, 1988	65,000
July, 1988	33,033

The licensee believes that some of this variability may be caused by inadvertent contamination of the samples.

The tritium concentration in the drinking water from the neighboring well has varied from 1900 to 7,600 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.

10. Exit Interview

The inspector and other NRC staff met with the licensee representative denoted in paragraph 1 at the conclusion of the inspection. The scope and findings of the inspection were summarized. The inspector noted that apparent violations described in the inspection report sent to the licensee on April 20, 1988 continued to appear to represent violations of regulatory requirements. In particular, the inspector noted that no decontamination activities had been undertaken in a long time. The inspector and the Director, Division of Radiation Safety and Safeguards, Region I expressed their concern that areas on site are accessible to unauthorized individuals and are being occupied and used by other organizations while these areas are contaminated in excess of NRC guidelines for the release of such areas for unrestricted use. The licensee president stated his intention to eventually decontaminate the site.

Attachment 1

Combined Inspection Report Nos. 030-05980/88-01 and 030-05982/88-01

Radiation Safety Committee Review of Tritium Uptake

SAFETY LIGHT CORPORATION

11/5/87

TO: RADIATION SAFETY COMMITTEE (JTM, LH, NF & JGM)
 RE: Minutes 11/4/87 a.m. RSC Meeting

1. Purpose of this meeting was to discuss two (2) above-normal tritium body uptake incidents which occurred on 10/31/87 (Saturday) a.m. The personnel involved were [redacted]. The former attended the meeting to provide additional background, as required.

2. Background:

- a. On 10/29/87 (Thursday) p.m. operations were conducted which involved the opening of 8 X 30 gal. drums of previously-packed tritium radwastes. The purpose of this project was to remove the contents of the drums, examine same and update tritium contents prior to re-packaging.
- b. Tritium concentrations in air in the working areas were checked routinely using a portable Triton monitor.
- c. Bioassays of the three (3) personnel involved in the 10/29/87 (Thursday) p.m. operation were conducted on 10/30/87 (Friday) a.m. Data obtained are as indicated below (included also are data obtained previously on 10/26/87 (Monday) a.m.):

<u>NAME</u>	<u>10/30/87 a.m.</u> <u>(μCi H³/L urine)</u>	<u>10/26/87 a.m.</u> <u>(μCi H³/L urine)</u>
	0.40	0.05
	0.67	0.09
	0.15	0.04

- d. Insofar as the above body burdens were not considered excessive for the type of work involved, and in view of the fact that additional monitoring of body burdens would be conducted as the operations progressed, it was decided to continue with the project, on an overtime basis, on 10/31/87 (Saturday).
- e. The operations conducted on 10/31/87 (Saturday) consisted of opening a group of 30 gal. radwaste drums containing 1 gal. and 1 quart steel cans of various forms of 'solid' tritium wastes.
- f. Urine samples submitted on 11/2/87 (Monday) a.m. showed tritium concentrations as follows (the resultant estimated total whole body dose commitments are also indicated):

SAFETY LIGHT COR. RATION

<u>NAME</u>	<u>11/2/87 a.m.</u> <u>(μCi H3/L urine)</u>	<u>Est. Whole Body Dose</u> <u>Commitment (rem)*</u>
	52.4	0.38
	18.2	0.13
	1.8	0.01

*Per "ICRP Publication 10" it was assumed that

- (1) Body water volume = 43 L and
- (2) Radiation dose to total body = 1.67×10^{-4} rems/ μ Ci H3 uptake

3. Preliminary Actions Taken (Effective 11/2/87 a.m.):

- a. The opening of further radwaste drums was discontinued until further notice.
- b. Personnel involved were removed, until further notice, from any active operations which might result in any significant additional uptake of tritium.
- c. In addition to informing personnel involved of their bio-assay results, RSC members were advised verbally of the situation.

4. Further Action Taken:

- a. RSC Committee met on 11/4/87 a.m. to discuss the incident, possible cause(s), and further action(s) to be taken. As indicated previously, [redacted] attended the meeting to provide any additional background information which might be required.
- b. Committee agreed that the next step would be to isolate each of the 17 assorted cans (which had been handled previously by CB and GM) in individual, sealed 30 gal. drums, and later monitor the air in each drum for the presence of tritium. It was agreed also that any drum showing significant levels of tritium should be checked further for the presence of HTO using impinger sampling methods. The actual handling and isolation of the cans involved would be done by LH and JGM, who are not normally involved in tritium handling or processing operations.

The above program was initiated on 11/4/87 (Wednesday) p.m. The results of these tests will be reviewed by the committee as soon as possible after the data becomes available. Further action(s) to be taken will then be determined.



JGM
R.S.O.

SAFETY LIGHT CORPORATION

12/3/87

TO: RADIATION SAFETY COMMITTEE (JTM, LH, NF & (JGM))

RE: 10/31/87 H³ Uptake Incident.

This is to advise that the estimated whole body dose commitment values indicated in my 10/5/87 memo to Radiation Safety Committee should be corrected, as indicated below.

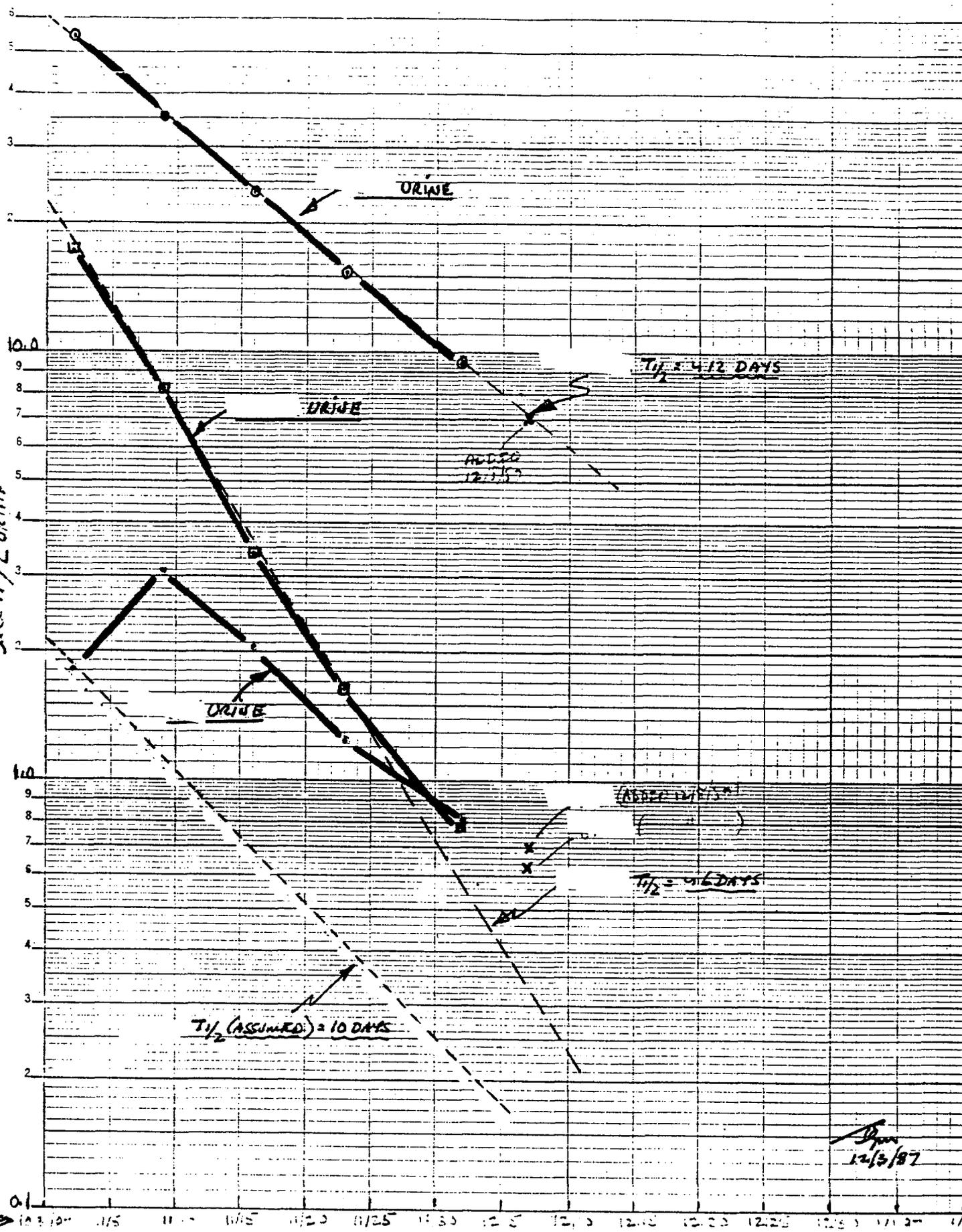
The above estimates were based on the $\mu\text{Ci H}^3/\text{L}$ urine data obtained as of 11/2/87 (Monday) a.m., whereas the actual uptakes of H occurred two (2) days previously on 10/31/87 (Saturday) a.m. The previously reported values must therefore be corrected to include dosage from the estimated amount of H³ excreted between Saturday and the following Monday a.m. Also, because of the above-normal tritium uptakes which occurred in this instance with CB and GM, the SLC customarily-assumed 10 day average biological half-life for excretion of tritium was not used in estimating their respective whole body dose commitments; rather, use was made of their actual elimination rates determined experimentally after the incident occurred (See Fig. I attached). The whole body water volume assumed was that for "Standard Man", i.e. 43 L. The 'corrected' whole body doses, determined in accordance with the above (except in the case of AS), are shown in Table I.

JGM
R.S.O.

BIOASSAY DATA


 SEMI-LOGARITHMIC 358-71
 KEUFFEL & ESSER CO. MADE IN U.S.A.
 3 CYCLES X 70 DIVISIONS

$\mu\text{C. H}^{32}\text{P} / \text{L URINE}$



[Signature]
 12/3/87

TABLE I
'CORRECTED' H³ UPTAKES & ESTIMATED RESULTANT WHOLE BODY DOSE COMMITMENTS

Name	$\mu\text{Ci H}^3/\text{L urine}$ (as of 11/2/87 a.m.)	Bio. Half-Life ⁽¹⁾ (Days)	'Corrected' $\mu\text{Ci H}^3/\text{L urine}$ ⁽²⁾ (as of 10/31/87 a.m.)	'Corrected' Total Body Burden ⁽³⁾ ($\mu\text{Ci H}^3$)	'Corrected' Whole Body Dose Commit. ⁽⁴⁾ (rem)
	52.4	~ 12	60.0	2580	0.43
	18.2	~ 6	22.0	946	0.16
	1.8	10*	2.1	90	0.02

*Assumed (since unable to obtain experimental value at this time).

NOTES: (1) & (2): From Fig. I

(3): 43 L body water volume assumed

(4): Assuming 1.67×10^{-4} rem/ $\mu\text{Ci H}^3$ uptake (per "ICRP Publication 10")

JGM
12/3/87

Attachment 2

Combined Inspection Report Nos. 030-05980/88-02 and 030-05982/88-01

Tritium Processed and Released to the Environment (1983-1987)

TRITIUM PROCESSED AND TRITIUM RELEASED TO ENVIRONMENT
YEARS 1983 THRU 1987

TRITIUM PROCESSED:

OPERATION:		<u>1987</u>	<u>1986</u>	<u>1985</u>	<u>1984</u>	<u>1983</u>
Rotary Fill I	(Ci):	439,453	350,019	303,710	83,157	0
Rotary Fill II	(Ci):	391,878	0	0	0	0
Static Fill	(Ci):	16,646	30,660	31,451	124,999	144,661
Foils/Targets, etc.	(Ci):	9,498	7,250	9,497	14,451	16,294
Application	(Ci):	0	0	63	128	258
TOTALS	(Ci):	<u>857,475</u>	<u>389,929</u>	<u>344,721</u>	<u>222,735</u>	<u>131,213</u>

TRITIUM RELEASED TO ENVIRONMENT:

A. Stack Emissions:	<u>1987</u>		<u>1986</u>		<u>1985</u>		<u>1984</u>		<u>1983</u>	
	Ci	X MPC**	Ci	X MPC**	Ci	X MPC**	Ci	X MPC**	Ci	X MPC**
3H (I):	0.1	<0.01	0.1	<0.01	0.8	0.04	0.1	<0.01	0.1	<0.01
3H (S):	148.5	8.30	95.7	5.35	120.9	6.75	142.7	7.97	174.0	9.78
3H (SUB):	<u>4,665.9</u>	1.30	<u>3669.9</u>	1.03	<u>1796.5</u>	0.50	<u>2050.4</u>	0.57	<u>2302.0</u>	0.65
TOTALS:	<u>4,814.5</u>	(0.6%) ¹	<u>3765.7</u>	(1.0%) ¹	<u>1918.2</u>	(0.6%) ¹	<u>2193.2</u>	(1.%) ¹	<u>2476.1</u>	(1.9%) ¹

B. Liquid Discharges

	<u>1987</u>	<u>1986</u>	<u>1985</u>	<u>1984</u>	<u>1983</u>
Total 3H(S) Discharged (Ci):	0.62	0.33	0.50	0.49	0.72
Total H ₂ O Discharged (mL):	4.3 X 10 ⁸	2.1 X 10 ⁸	3.1 X 10 ⁸	2.6 X 10 ⁸	3.6 X 10 ⁸
Ave. mCi 3H (S)/ml H ₂ O: ²	1.4 X 10 ⁻³	1.5 X 10 ⁻³	1.6 X 10 ⁻³	1.9 X 10 ⁻³	2.0 X 10 ⁻³
Ave. X MPC***:	0.47	0.50	0.53	0.63	0.67

*See January 4, 1983 Summary Report.

**At point of release: Referred to MPC for "Unrestricted" Areas.

***Referred to MPC for "Unrestricted" Areas.

¹Total 3H Emissions as % of Total 3H Processed.

Retyped by NRC from licensee supplied table, with minor editorial corrections.

Attachment 3

Combined Inspection Report Nos. 030-05980/88-01 and 030-05982/88-01

Licensee Air Sampling at Site Boundary

