

SAFETY LIGHT CORPORATION

4150-A OLD BERWICK ROAD, BLOOMSBURG, PA 17815

717-784-4344 FAX 717-784-1402

November 25, 1986

U.S. Nuclear Regulatory Commission
Region I
631 Park Ave.
King of Prussia, PA 19406

ATTN: Josephine M. Piccone, Ph.D.
Health Physicist

Dear Dr. Piccone:

Further to discussions held here on 12 November with Mr. F. Costello and yourself, please be advised as follows:

- (1) I am enclosing herewith a summary of H(3) monitoring data for onsite bores #14 and 16 for period May, 1982 through October, 1986. Enclosed also is a copy of a drawing indicating the approximate locations of our onsite bores.

We have not, so far, been able to determine the cause of the extreme variations in the water activity levels for these particular bores. All precautions have been taken to avoid cross-contamination during sample taking and preparation for counting.

- (2) With respect to the Vance/Walton well water sample taken on 12 November, 1986, our analysis made on 14 November indicated a value of 1,800 pCi H(3) per liter of water. We would appreciate it if you would advise of the analytical results of your sample when this data becomes available.

I am not sure if you are aware of the fact that, because of the large volume of H(3) analyses we conduct routinely, we do NOT use a sample distillation step, but count the samples directly. However, we do program our LSC unit to provide simultaneous beta count rate data for energy ranges 0-19 keV (Channel 'A'), 2-19 keV (Channel 'B') and 21-2000 keV (Channel 'C') - thus if detectable levels of beta emitters having higher energies than that of H(3) are present, we can determine this fact from the Channel 'C' count rate.

- (3) Enclosed also, as requested, are copies of the following memos to our Radiation Safety Committee, relative to H(3) an emission incident which occurred on Friday, August 29, 1986:
 - (a) JTM memo of Saturday, August 30, 1986.
 - (b) NF memo of Thursday, September 4, 1986.
 - (c) JGM memo of Thursday, September 4, 1986.

/ Continued

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SAFETY LIGHT CORPORATION

U.S. Nuclear Regulatory Commission
Dr. J.M. Piccone
November 20, 1986
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(4) As promised, I shall send you the following data as soon as we obtain it from Clean Harbors of Natick, MA:

(a) Gross alpha and gross beta concentrations for the Vance/Walton well water sample taken on 12 November 1986.

(b) Gross alpha and gross beta concentrations for the Bore 1 sample taken earlier on 18 October, 1986.

Item 4(a) above will not likely be received by us until the latter part of next month; Item 4(b) information should be in our hands within the next couple of weeks.

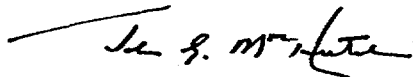
(5) With respect to the various organizations located on the Bloomsburg plant site, please be advised as follows:

(a) Enclosed is the requested copy of the Safety Light Corp. organization chart.

(b) We acknowledge your request to provide a site plan which will show (1) the various onsite companies and location of each and (2) location and levels of significant contamination or radiation found by survey. Facility drawings and identification of areas will take some time to prepare, but we hope to have this accomplished in a few months.

Please advise if you require any clarification of the above, or any additional information.

Yours very truly,
SAFETY LIGHT CORPORATION



John G. MacHutchin
Radiation Safety Officer

cc J.T. Miller

SAFETY LIGHT CORPORATION

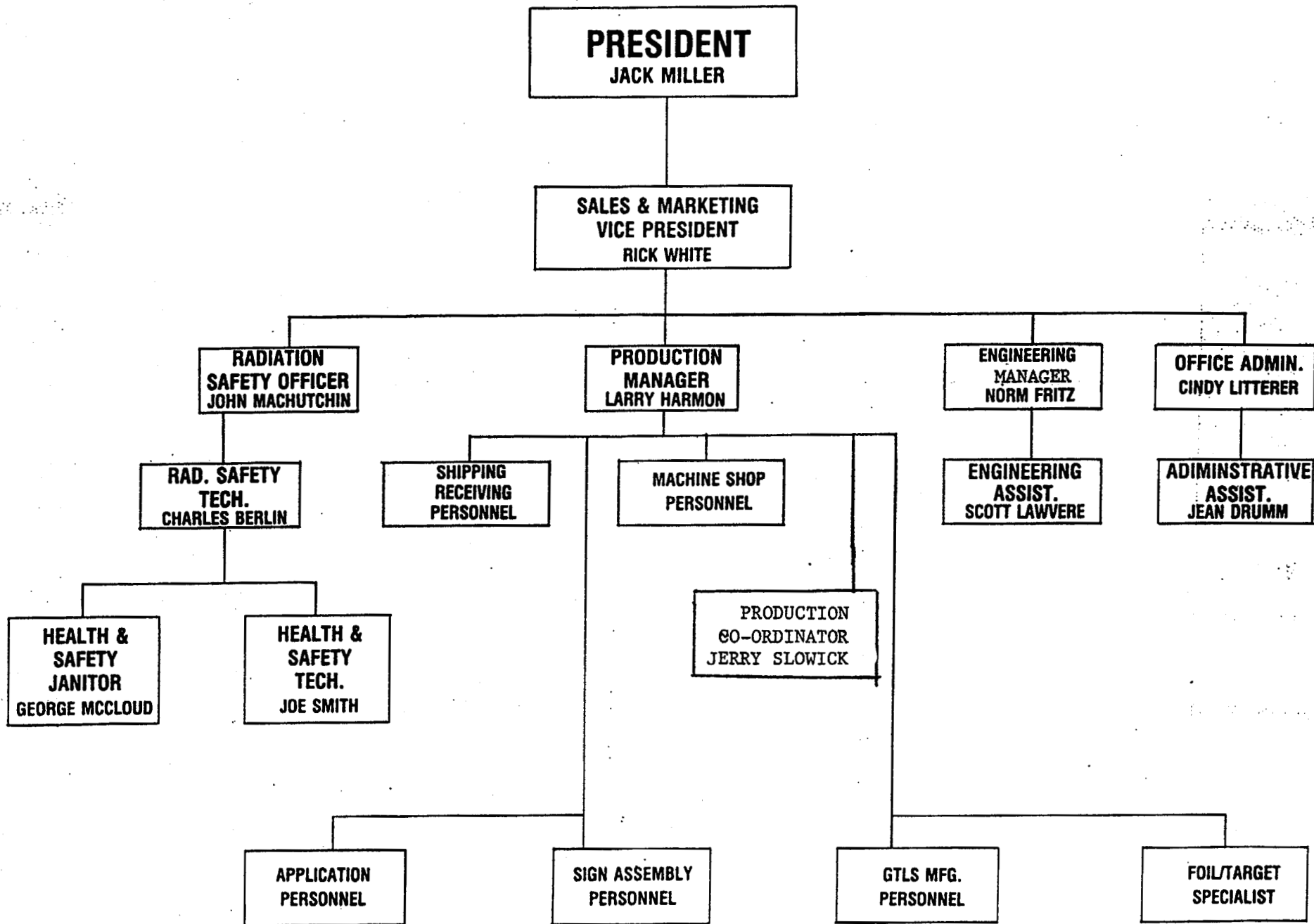


FIGURE 1.1

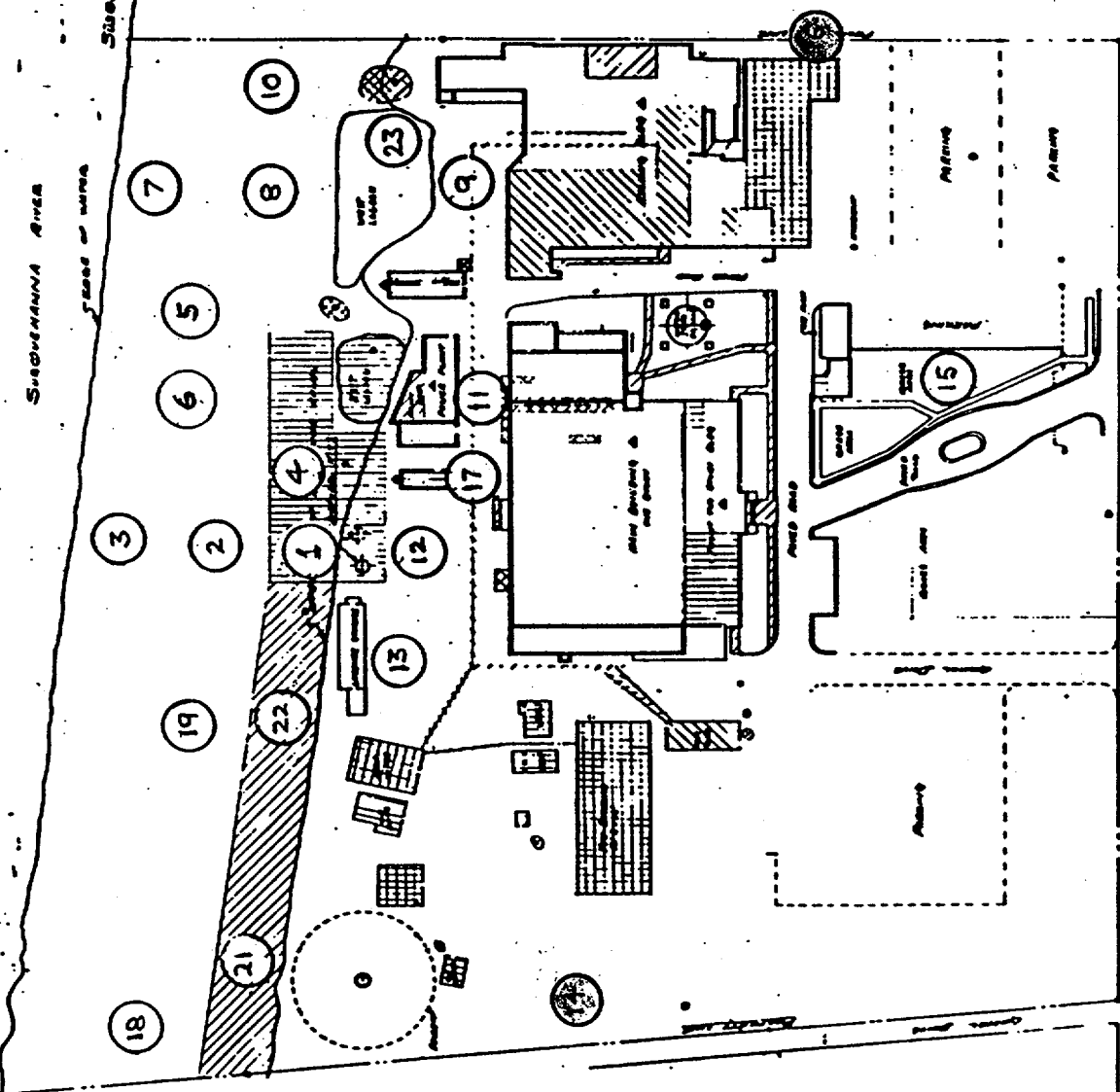
SLC H³ ENVIRONMENTAL MONITORING DATA

FOR
ONSITE BORES NOS. 14 & 16.
(Avg. H³/L OF H₂O)

MONTH	1982		1983		1984		1985		1986	
	#14	#16	#14	#16	#14	#16	#14	#16	#14	#16
JAN.	N/S	N/S	2,500	≤ MDA	24,500	4,800	9,200	3,800	23,600	23,200
FEB.	"	"	8,600	5,800	23,700	2,000	4,600	≤ MDA	113,000	21,000
MAR.	"	"	N/S	N/S	26,300	7,900	4,600	14,800	2,300	1,600
APRIL	"	"	19,600	26,300	26,800	4,600	7,600	3,600	26,300	11,400
MAY	18,000	4,000	≤ MDA	≤ MDA	20,700	3,900	4,700	2,800	18,700	5,200
JUNE	48,000	5,000	18,200	≤ MDA	18,900	17,800	11,900	8,200	8,400	8,400
JULY	45,060	≤ MDA	42,000	26,000	13,000	3,300	12,400	1,700	6,400	5,100
AUG.	11,000	7,800	6,100	2,100	18,700	8,400	4,700	3,700	7,100	≤ MDA
SEPT.	62,000	16,000	6,200	3,400	14,000	9,000	7,700	4,500	10,900	12,600
OCT.	5,900	2,800	5,200	2,000	7,600	≤ MDA	6,600	4,900	12,500	8,400
NOV.	3,600	2,200	8,500	3,200	44,500	17,900	26,200	21,000		
DEC.	5,100	≤ MDA	25,100	16,800	6,300	4,300	≤ MDA	9,700		

SLC
 11/14/86

SUCUENAMA AREA
 SUCUENAMA AREA



U.S. JOINT CHIEFS OF STAFF
 HEADQUARTERS U.S. JOINT CHIEFS OF STAFF
 WASHINGTON, D.C.

DATE	10/10/54
BY	J. G. ...
FOR	...
APPROVED	...
REMARKS	...

SCALE
 1" = 100'

YELIX: CB

SL COPY

8/30/86

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

RE: UNUSUAL INCIDENT 8/29/86 A.M. - PRELIMINARY REPORT

WE HAVE THIS A.M. DETERMINED, FROM PRELIMINARY ASSAYS OF OUR STACK MONITOR IMPINGER SOLUTIONS, THAT THE FOLLOWING RELEASES WERE MADE TO THE ENVIRONMENT DURING THE PERIOD 0710 HRS. 8/29/86 - 0610 HRS. 8/30/86 :

	Ci H^3	$\text{AVG CONC}^{\mu} (\mu\text{Ci H}^3/\text{ML AIR})^*$	$\times \text{MPC}^*$
$^3\text{H}_{\text{SUB}}$:	1,021.3	434.0×10^{-5}	108.5
$^3\text{H}_{\text{g}}$:	0.6	24.3×10^{-7}	12.1

* AT POINT OF RELEASE (i.e., STACK).

A REVIEW OF OUR STACK MONITOR CHARTS INDICATES THE FOLLOWING :

- (1) DURING PERIOD 0732 - 1010 HRS, IT WAS NECESSARY TO OPERATE THE STACK MONITOR ON THE 1V-3V RANGES - IT WOULD APPEAR THAT THE MAJOR PORTION OF THE RELEASE OCCURRED DURING THIS PERIOD.
- (2) DURING PERIOD 1010 - 1305 HRS., THE H^3 EMISSION LEVELS TAPERED DOWN FROM 52% FULL SCALE ON 300 MV RANGE TO 11% FULL SCALE ON 30 MV RANGE - INDICATING THAT RELATIVELY LOW LEVELS OF H^3 WERE RELEASED DURING THIS PERIOD.
- (3) AT APPROXIMATELY 1310 HRS., AFTER THE SYSTEM FOLEPUMP WAS AIR-BALLASTED, THE H^3 EMISSION LEVEL WAS INCREASED FOR A SHORT PERIOD TO ABOUT 32% ON THE 1V RANGE.
- (4) STARTING AT APPROX. 1400 HOURS, THE MONITOR WAS OPERATED OVERNITE ON THE 100 MV RANGE - THE

(2)

CHART INDICATES THAT THE EMISSION LEVEL DECREASED STEADILY OVERNIGHT & HAD REACHED NORMAL BACKGROUND AT 0610 HRS 8/30/86.

WE INTEND TO RE-CHECK THE ACTIVITY LEVELS IN THE $^3\text{H}_{\text{SUB}}$ IMPINGED SOLUTIONS ON 9/2/86 A.M. & SHALL ADVISE OF OUR FINDINGS THEREAFTER.

IN ORDER THAT THIS INCIDENT CAN BE INVESTIGATED PROMPTLY, IT IS REQUESTED THAT A BRIEF REPORT BE SUBMITTED FOR COMMITTEE REVIEW AS QUICKLY AS POSSIBLE. THIS REPORT SHOULD INDICATE :

- (1) CAUSE(S) OF THE PROBLEM, ONCE DETERMINED.
- AND (2) STEPS TAKEN (OR TO BE TAKEN) TO PREVENT A RECURRENCE.

THIS IS THE LARGEST $^3\text{H}_{\text{SUB}}$ RELEASE WHICH HAS OCCURRED TO DATE AT SLC. HOWEVER, OUR PRELIMINARY CALCULATIONS INDICATE THAT THE INCIDENT IS NOT REPORTABLE TO USNRC. IT IS IMPORTANT, HOWEVER, THAT WE HAVE ON RECORD DETAILS OF OUR INVESTIGATION & FINDINGS & ACTION TAKEN TO PREVENT A RECURRENCE.

— JGM
R.S.O.

P.S. A COPY OF OUR E/A ($^3\text{H}_{\text{SUB}} + ^3\text{H}_2$) CHART RECORDING IS ATTACHED FOR YOUR INFO.

YELK:  ✓

9/4/86

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

RE: COMMITTEE MEETING 9/2/86 P.M.

THE COMMITTEE MET ON 9/2/86 TO DISCUSS THE INCIDENT WHICH OCCURRED ON 8/29/86 A.M.

NF & SL REVIEWED THE EVENTS WHICH OCCURRED, AND OUTLINED SEVERAL POSSIBLE CAUSES, ONE OR MORE OF WHICH COULD HAVE RESULTED IN THE LOSS OF $^3\text{H}_2\text{SO}_4$ WHICH OCCURRED. BASED ON THE INFORMATION AVAILABLE AT THIS POINT, IT WAS CONCLUDED THAT THE CAUSE(S) OF THE RELEASE COULD NOT BE POSITIVELY DEFINED. IT WAS AGREED THAT NF & LH WOULD AGAIN INTERVIEW THE OPERATOR (MH) TO DETERMINE IF ANY ADDITIONAL INFORMATION COULD BE OBTAINED. FOLLOWING THIS, NF WAS REQUESTED TO ISSUE A WRITTEN REPORT SUMMARIZING THE SITUATION TO DATE, AND INCLUDING RECOMMENDATIONS RELATIVE TO WHAT ACTIONS SHOULD BE TAKEN TO PREVENT A RECURRENCE. COPIES OF THIS REPORT WERE ISSUED TO COMMITTEE MEMBERS ON 9/4/86.

JGM ADVISED THE COMMITTEE THAT RE-CHECKS ON THE H^3 ACTIVITY FOUND IN THE $^3\text{H}_2\text{SO}_4$ STOCK SAMPLING IMPINGERS WERE CONDUCTED ON 9/2/86 A.M. DUPLICATE 1 ML. SAMPLES OF THE IMPINGER SOLUTION WERE DILUTED (9/1 BY VOL.) WITH INACTIVE EG & MIXED THOROUGHLY. TRIPPLICATE 0.2 ML. ALIQUOTS WERE PIPETTED FROM EACH OF THE TWO DILUTED "STOCK" SOLUTIONS, 0.8 ML. DIST 2 H $_2$ O ADDED TO EACH, FOLLOWED BY ADDITION OF 10 ML 'SCINTIVISE E' SCINTILLATOR TO EACH OF THE 6 SAMPLES. FROM THE LSC DATA OBTAINED IT WAS APPARENT THAT EXCELLENT AGREEMENT WAS OBTAINED BETWEEN THE 6 ASSAY SAMPLES. BASED ON THE RE-CHECK DATA, THE CALCULATED AMOUNT OF $^3\text{H}_2\text{SO}_4$ RELEASED TO THE ENVIRONMENT WAS 815 Ci (AS COMPARED TO THE 1021 Ci REPORTED IN JGM NEWS 8/30/86). HOWEVER

8/29/86 3 H₂S EMISSION INCIDENT

9/2/86

ASSUMED: ① TOTAL 3 H₂S EMISSION (0710 8/29/86 - 0610 8/30/86) = 1021 Ci (ALTHO RE-CHECKS MADE TODAY INDICATED THAT THE EMISSION WAS 815 Ci 3 H₂S)

② RELATIVE WINDSPEED (u) = 1-2 m/SEC (USED 1 m/SEC IN CALCULATIONS)

(B) AV'G ATMOS. STABILITY CONDITION = "C" (CLEAR, SUNNY)

(C) FOR CLASS "C":

(1) MAX 3 H₂S CONC OCCURS @ ~ 175 m DOWNWIND FROM STACK

(2) AV'G WIND DIRECTION DURING DAY (0700 - 1530 HRS 8/29/86) = NNW → SSE

(3) σ_y = 21.0 m ; σ_z = 12.5 m.

(D) 0-8 HOUR RELEASE PERIOD.

CALCULATION:

USING REG. GUIDE 3.35 INFO (0-8 HR):

$$Q = \frac{1021 \text{ Ci}}{8 \text{ HR} \times 3600 \frac{\text{SEC}}{\text{HR}}} = 3.5 \times 10^{-2} \text{ Ci}^3 \text{ H}_{2}\text{S} / \text{SEC.}$$

$$\chi = Q \left[\frac{e^{-\frac{R^2}{2\sigma_y^2}}}{\pi(\mu)\sigma_y\sigma_z} \right] = 3.5 \times 10^{-2} \left[\frac{e^{-\frac{(18.3)^2}{2(21.5)^2}}}{\pi(1)(21.0)(12.5)} \right]$$

$$= 3.5 \times 10^{-2} \left[\frac{e^{-1.072}}{824.3} \right]$$

$$= 3.5 \times 10^{-2} \left[\frac{0.3}{824.3} \right]$$

$$= 3.5 \times 10^{-2} (3.6 \times 10^{-4})$$

$$= 12.6 \times 10^{-6} \text{ Ci}^3 \text{ H}_{2}\text{S} / \mu\text{L}$$

i.e. $\chi = 1.3 \times 10^{-5} \text{ Ci}^3 \text{ H}_{2}\text{S} / \mu\text{L}$

$$= \frac{1.3 \times 10^{-5}}{4 \times 10^{-5}}$$

$$= \sim 0.33 \times \text{MPD}$$

IF INCREASED OVER 24 HRS, χ WOULD BE PROVED TO $\sim 4.3 \times 10^{-6} \text{ Ci}^3 \text{ H}_{2}\text{S} / \mu\text{L}$

JR
R.S.O.

9-4-86

TO: RADIATION SAFETY COMMITTEE
JTM, LH, JGM, SL

SUBJECT: TRITIUM GAS LOSS - 8-29-86

NOTE: REFERENCE ATTACHED SKETCH

ON FRIDAY, 8-29-86, MARTHA HIPPENSTIEL APPLIED HEAT TO PYRO #1 TO GENERATE SUFFICIENT ^3H GAS PRESSURE IN THE METAL BELLOWS TO FILL TUBES. IN LESS THAN 5 MINUTES SHE NOTICED THAT THERMOCOUPLES #1 & #2 WERE UPSCALE. MARTHA THEN SHUT OFF HEAT TO THE PYRO AND QUICKLY CLOSED ALL SYSTEM VALVES EXCEPT #4 (TO ALLOW SOME ROOM FOR EXPANSION). WITHIN 2 TO 3 MINUTES THE SCRUBBER MONITOR WENT OFF SCALE, SIGNIFYING THAT ^3H GAS, IN SOME AMOUNT HAD GONE THROUGH ONE OF THE VACUUM PUMPS.

UPON CONSULTATION WITH J. SLOWICK AND N. FRITZ MARTHA LATER (20 MIN) CLOSED VALVE #4 AND TOOK GAS IN WALLACE ~ TIERNAN LINE BACK ONTO PYRO #2, AND SHUT OFF ROUGH VACUUM PUMP DUE TO SUSPICION OF VALVES #3 & #14 LEAKING THROUGH.

RESULTS OF LIQUID SCINTILLATION COUNTING OF STACK IMPINGER CONTENTS FOR THE ABOVE MENTIONED SAMPLING PERIOD RECORDED THAT 10.21 CURIES HAD GONE THROUGH THE VACUUM SYSTEM.

PRESSURE CHECKS USING HELIUM AT TWICE THE PRESSURE APPARENT IN THE INCIDENT SHOWED THAT VALVES #3 AND #14 HELD. THESE CHECKS WERE RUN FRIDAY 8-29 AND TUESDAY 9-2.

ON TUESDAY 9-2 SEALS ON VALVES #3 AND #14 WERE INSPECTED AND REPLACED. SEALS WERE FOUND TO BE IN EXCELLANT CONDITION.

INVESTIGATIVE MEETINGS WERE HELD ON A FORMAL BASIS ON TUESDAY, 9-3-86 AND 9-4-86 INCLUDING RADIATION COMMITTEE MEMBERS AND THOSE ASSOCIATED WITH GAS HANDLING. THE GAS FILL OPERATOR, MARTHA HIPPENSTIEL WAS INTERVIEWED. THOSE INVOLVED IN FORMAL AND INFORMAL DISCUSSIONS WERE JACK MILLER, LARRY HARMON, JOHN MACHUTCHIN, SCOTT LAWVERE, MARTHA HIPPENSTIEL, JERRY SLOWICK AND NORM FRITZ.

IT WAS DETERMINED THAT ONE OR MORE OF THE FOLLOWING COULD HAVE CAUSED THE TRITIUM GAS LOSS. NO PHYSICAL INDICATIONS WERE FOUND AND NO INFORMATION FROM PERSONNEL INVOLVED WAS SUFFICIENT TO POSITIVELY DEFINE THE CAUSE.

1. LEAK THROUGH OF VALVES # 3 & # 14 DUE TO FOREIGN MATERIAL AT SEAL POINT
2. VALVE # 3 LEFT OPEN & VALVE # 14 LEAKED THRU AS IN 1.
3. VALVE # 14 LEFT OPEN AND VALVE # 3 LEAKED THROUGH AS IN 1.
4. OTHER OPERATOR ERROR INCLUDING MANY POSSIBILITIES OF COMBINATIONS OF ERRORS.
5. OTHER UNDISCOVERED CAUSES

STEPS TO PREVENT RE-OCCURANCE -

1. STRESS EXTREME IMPORTANCE OF CHECKING & RE-CHECKING VALVE POSITIONS TO OPERATOR.
2. STRESS IMPORTANCE OF MONITORING GAUGE RESPONSE TO OPERATOR
3. CONTINUE TO KEEP VALVE MAINTENANCE PROGRAM ON SCHEDULE

Norm Fritz

THE HIGHER 1021 Ci VALUE WAS USED IN ESTIMATING THE HIGHEST AVERAGE DOWNWIND CONCENTRATION OF ^{235}U (SEE COPY OF CALCULATIONS ATTACHED)

BASED ON FINAL REVIEW BY COMMITTEE MEMBERS OF ALL INFORMATION ON HAND, IT WAS AGREED THAT:

- (1) THE RECOMMENDED STEPS TO PREVENT A RECURRENCE (PER PAGE 3 OF NF'S 9/4/86 REPORT) BE TAKEN IMMEDIATELY.
- (2) THE INCIDENT IS NOT REPORTABLE TO USNRC; HOWEVER, ALL RECORDS OF THE INCIDENT AND ITS INVESTIGATION ARE TO BE KEPT ON FILE FOR FUTURE EXAMINATION, AS REQUIRED.

R.S.O.
R.S.O.