GINNA

MAR 19 1982

Mr. Bob Pollard
Union of Concerned Scientists
Suite 1101 Dupont Circle Building
1346 Connecticut Avenue, N.W.
Washington, D.C. 20036

Dear Mr. Pollard:

I am writing in response to the questions asked in your letter of January 28, 1982 which addressed the recent steam generator tube leak at the R. E. Ginna Nuclear Power Plant and the general problem of steam generator tube degradation.

As a consequence of the Ginna event, staff was requested by the Commission to establish a Task Force to review and evaluate the event. The report that I expect from the Task Force by April 2 will deal with some of your concerns in more detail than is presented in the attachments to this letter.

I trust this letter is responsive to your inquiry.

Sincerely,

(Signed) E. Kevin Cornell

William J. Dircks
Executive Director
for Operations

Enclosures:
1. Chronology
2. Responses to Questions
3. Radioactive Material Releases

cc w/ encls:
Richard Udell
Paulette Meier

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Revised in OEDO, see previous ORC for concurrences

D/8

C	:NRR	:NRR	:EDO	:	:	:	:
ME	:TIppolito	:HRDenton	:WJDircks	:	:	:	:
TE	:2/22/82	:2/26/82	:3/18/82	:	:	:	:

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Preliminary Event Chronology

R. E. Ginna Steam Generator Tube Failure

Time	Event	Comment
9:25 a.m., 1/25/82	Charging Pump speed alarm; "B" Steam Generator (S/G) steam flow - feed flow mismatch; air ejector radiation monitor alarm; Pressurizer (PZR) low pressure alarm (setpoint - 2170 psig).	First indications of tube rupture in the "B" steam generator.
	Shift Supervisor orders power reduction: one operator fast closes turbine control valves; another operator commences normal boration.	Shift Supervisor (SS) and operator actions based on oral interview with the SS.
9:28 a.m.	Reactor trip on low pressure (setpoint - 1873 psig with a rate factor); automatic safety injection with a containment isolation (setpoint 1723 psig); Reactor Coolant Pump (RCP) seal injection return line pressurizes eventually lifting its relief valve; PZR level rapidly falling; S/G "A" and "B" low level alarms.	Seal return isolation valve closed on containment isolation causing line to pressurize. The contribution of this relief to the PRT is believed insignificant.
		The S/G low levels resulted from the combined effects of the power reduction and the reactor trip.
9:29 a.m.	Both RCP's manually tripped in accordance with Station Emergency Procedures E-1.1 and E-1.4; RCS pressure about 1750 psig and dropping.	Station procedures require tripping RCP's at $\leq$ 1715 psig; Westinghouse guidance specifies trip pressure as 1200 - 1300 psig for Ginna. Licensee trips pumps at higher pressure due to pressure instrument qualification status.

NOTE

This chronology, developed by Region I on February 5, 1982, represents an improvement over that prepared on January 26, 1982 and will be used by the Task Force in the development of the final chronology.

Time	Event	Comment
9:33 a.m.	NRC Operations Center notified by the licensee via the ENS phone; the licensee reported a reactor trip from 100% power as a result of a steam generator tube rupture. The faulted S/G and release information was not given by the licensee at this time.	Further discussion revealed that the licensee strongly suspected that the "B" S/G contained the fault, but the licensee chose to confirm the situation prior to notifying the NRC.
	Unusual Event declared by licensee.	Subsequent to the event, comparison of an extrapolated curve for Reactor Vessel Head temperature with saturation temperature for RCS pressure indicates a steam void developed in the head at this time.
9:35 a.m.	NRC Senior Resident Inspector arrived in the Ginna Station Control Room.	The SRI had been monitoring the ENS in his office since 9:33 a.m.
9:40 a.m.	Initial RCS pressure drop arrested at about 1138 psig.	Termination of pressure drop due to actions of the SI pumps along with attaining saturation conditions in the Reactor Vessel Head.
	"B" Main Steam Isolation Valve manually closed and the "B" S/G was isolated. Plant cooling down by dumping steam from "A" S/G to the Main Condenser.	

Time	Event	Comment
9:40 a.m.	Alert declared.	
9:46 a.m.	Ginna Plant Superintendent notified the State of New York.	
9:55 a.m.	NRC Region I Incident Response Center activated.	
9:57 a.m.	Safety Injection initiation circuitry reset; containment isolation reset; instrument air restored to the containment.	
9:58 a.m.	Ginna Technical Support Center manned.	
10:04 a.m.	Charging pumps restarted.	
10:07 a.m. (about)	Pressurizer PORV (430) manually opened to reduce the pressure differential between the RCS and the "B" S/G; Pressurizer Relief Tank (PRT) temperature and pressure rise.	Shortly after the PORV was opened, Pressurizer level was sufficiently high to cause the letdown orifice isolations and the inside containment letdown isolation (V-427) to open, resulting in lifting the let-down relief and adding water to the PRT.
10:08 a.m. (about)	Pressurizer PORV (430) manually cycled again.	
10:09 a.m. (about)	Pressurizer PORV (430) manually opened and failed to shut; RCS pressure dropped from about 1300 psig to about 900 psig; Pressurizer level rises; PORV Block Valve begins to close. Pressurizer level increased rapidly.	Rapid rise in PZR level without corresponding injection flow was first clear indication in the Control Room that a steam void had formed in the Reactor Vessel Head. The void was growing as RCS pressure dropped.

Time	Event	Comment
10:10 a.m. (about)	PORV Block Valve closed; Pressurizer level goes offscale high; Safety Injection increases RCS pressure.	
10:25 a.m. (about)	"B" S/G atmospheric relief placed in manual control and closed in accordance with procedure E-1.4.	
10:33 a.m. (about)	"B" S/G safety lifts (setpoint = 1085 psig) and reseats. Safety Injection Pumps secured to prevent further release through the "B" safety.	Based on conversations with operators.
	All charging pumps are running.	
10:42 a.m.	NRC Headquarters activated.	
10:44 a.m.	Site Emergency declared.	
10:45 a.m. (about)	PRT rupture disc ruptures, releasing water to the "A" Containment Sump.	Disc ruptured primarily due to PORV (430) and the letdown relief with a minor contribution from the RCP seal return relief.
11:00 a.m.	Plant cooldown now via the "A" S/G atmospheric relief.	Dumping steam to the condenser secured to minimize spread of contamination in the secondary system.
11:15 a.m. (about)	One Safety Injection Pump restarted; "B" S/G safety lifts and reseats. Safety Injection throttled to prevent further lifting of the "B" S/G safety.	Throttling of SI based on information gained through discussion with the licensee's Operations staff.
11:19 a.m.	The process computer fails. Remains out of service until 11:47 a.m.	Licensee reading incore and head thermocouples manually to verify adequate core cooling.

Time	Event	Comment
11:20 a.m. (about)	"A" RCP restarted; Reactor Vessel Head temperatures approach incore temperatures; the steam void in the head collapses.	Time based on graph of Incore and Head thermocouples. Data for this graph was obtained manually in the control room.
12:00 noon (about)	Steam bubble drawn in the Pressurizer. Normal letdown reestablished.	
2:00 p.m.	Licensee reported Containment Sump A at 9.3 feet (approx. 8000 gal.); PRT at 92%.	Channel 1 on Containment Sump indicated 5.3 feet (1900 gals.); Channel 2 indicated 9.3 feet. Later, it was discovered that Channel 2 read incorrectly due to a static charge on the indicator.
4:15 p.m.	NRC Region I Incident Response Team onsite.	
6:40 p.m.	Level in "B" S/G back within indicating range. Plant cooling down by dumping steam from "A" S/G to atmosphere. "A" RCP providing flow through the "A" loop and backflow through the "B" loop. "B" S/G being cooled by feeding the S/G with AFW while bleeding it via the ruptured tube to the RCS.	
7:17 p.m.	Site Emergency downgraded to Alert.	
7:05 a.m., 1/26/82	RHR initiated to continue the cooldown. "A" RCP remained in operation.	
10:45 a.m.	Alert downgraded to the Recovery Phase.	
6:53 p.m.	Plant in Cold Shutdown.	
5:30 p.m., 1/27/82	Containment Sump A pumped dry; total pumped - 1320 gallons.	

RESPONSE JCS LETTER OF JANUARY 28, 19

Question 1. What were the Commission's bases for allowing Ginna to continue in operation in the face of the unresolved steam generator problem and Ginna's history of steam generator tube failure?

Answer

The NRC staff has been evaluating steam generator operating experience on a case-by-case basis and for Ginna concluded that continued operation did not constitute an undue risk to the health or safety of the public. This finding at Ginna has been based on the following considerations:

(1) Requirements for inservice inspections to monitor steam generator tube degradation have been established. The frequency of inspection depends on previous adverse experience at Ginna. Although the ISI program allows 24 months between steam generator tube inspections, Rochester Gas and Electric Corporation (RG&E) has inspected the Ginna plant on an average of every 6.6 months since 1972.

(2) Acceptance criteria (plugging limits) have been established to ensure that degraded tubing will retain adequate structural margins over the full range of normal operating, transient, and postulated accident conditions.

(3) Should degradation develop completely (100%) through wall and leak, the resulting leakage is generally small as indicated by operating experience. Allowable limits on primary to secondary leakage (0.1 gallon per minute) have been established beyond which the plant must be shut down for appropriate corrective action.

(4) Information from operating experience and Unresolved Safety Issue (USI) Action Plan efforts will be utilized to update interim criteria and requirements.

(5) Wide dissemination of ALARA dose methods and techniques, based on up-to-date experience and further development efforts, can help minimize total doses when steam generator inspection, repair, and replacement are required.

Question 2: What guarantees can you offer the neighbors of plants afflicted with steam generator tube deterioration that these plants will not suffer a similar accident, or one more serious?

Answer

There is, of course, no absolute guarantee that steam generator tubes won't continue to deteriorate at the Ginna facility or at any other nuclear facility. We believe, however, that the required inspection program for steam generator tubes will keep the frequency of tube ruptures low and our efforts are aimed at reducing this frequency even lower. To date there have been four steam generator tube failures (greater than 50 gpm) at pressurized water reators in the U.S. The facility, date of the event and estimated leakage rate is as follows:

Plant	Date	Gallons/Minute
Point Beach Unit 1	02/26/75	125
Surry Unit 2	07/15/76	80
Prairie Island Unit 1	10/02/79	390
Ginna	01/28/82	700

The above data indicates that for all 48 PWRs licensed to operate in the U.S. (as of February 1), about one tube failure has been occuring every two years since 1975. Preliminary information indicates that the leakage rate from the Ginna failure is approximately the maximum possible for a single tube failure; therefore, leakage much in excess of this amount is not expected.

The second element of the NRC required review program includes the consideration of steam generator tube failures as design basis events; in fact small break loss-of-coolant accidents. Plant emergency procedures and safety systems are designed to safely handle the complete range of postulated failures including a double-ended failure of the main coolant piping.

Therefore, it is expected that a plant could be brought to a safe shutdown following a tube failure in a steam generator with insignificant offsite consequences.

Question 3. What were the on and off-site doses from the Ginna accident, and what is the explanation for different figures reported to the press?

Answer

Preliminary information regarding radioactive material releases as a result of the Ginna event is provided in the attached enclosure. This information is being investigated further and the results will be included in the 45-day Task Force report.

We have no information at this time of differing dose figures reported to the press.

Question 4. Was there a leak before rupture at Ginna? If so, how does this alter your analysis of the risk of such an accident?

Answer

Although preliminary information does not indicate any leakage immediately prior to the steam generator rupture event, this area is being further investigated and the results will be included in the 45-day Task Force report.

Question 5. What actions is the NRC now taking to reduce the possibility of more such accidents?

Answer

Our bases for licensing new plants as well as allowing continued operation of current plants is to assure that the steam generators have and retain tube integrity without excessive leakage. To provide assurance that plants can be operated safely, the steam generators are tested initially to confirm tube integrity and plant Technical Specifications include requirements for periodic inservice inspection of the tubes. The Technical Specifications also include operating limits on primary and secondary system activity levels. Tubes identified to be degraded beyond the limit specified in the plant Technical Specifications must be removed from service by plugging. For a few plants, repair f tubes by "sleeving" has been approved as an acceptable alternative to plugging thereby permitting the required tubes to remain in service. In addition, the plant Technical Specifications provide limits on allowable primary to secondary leakage, beyond which the unit must be shutdown for additional inspection and repairs.

In addition, in 1979, the NRC established Unresolved Safety Issues A-3, A-4, and A-5 regarding degradation in W, CE, and C&W steam generators, respectively. A draft report, NUREG-0844, presenting the proposed NRC staff resolution of these generic safety issues has been prepared and is currently under review. The report integrates technical studies in the areas of systems analyses, inservice inspection (ISI), and tube integrity to establish improved criteria for ensuring adequate tube integrity and safe steam generator operation under all conditions. The significant milestones for issuance of the final NUREG report are as follows:

Issue Draft NUREG for Public Comment	8/6/82
Receive Public Comments	10/1/82
Resolve Comments and Issue Final NUREG with Requirements	2/1/83

Further, the NRC has underway a confirmatory research program in the following areas:

(a) Steam Generator Tube Integrity

(1) Establish burst and collapse pressures and leak rates for degraded tubes.

(2) Efficiency of eddy current testing to locate and characterize defects in steam generator tubes.

(b) Stress Corrosion Cracking of Steam Generator Tubes

Develop data and models to predict stress corrosion cracking service life of Inconel-600 steam generator tubes under normal and abnormal service conditions.

(c) Improved Eddy Current Inservice Inspection for Steam Generator Tubing

Upgrade and validate eddy current inspection probes, techniques, and associated instrumentation for inservice inspection of steam generator tubing.

Question 6. What is the justification for issuing operating licenses to additional plants now nearing completion which contain similar steam generators?

Answer

Our basis for licensing new plants is provided in response to Question 5.

Radioactive Material Releases

- Releases via Steam Jet Air Ejector Vent
- Releases via Main Steam Line Safety Valves
- On-site Contamination
- Off-site Contamination

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GINNA

ESTIMATE OF RELEASES

(JANUARY 25, 1982)

RELEASE POINT	ISOTOPE	ACTIVITY RELEASED
Steam Jet Air Ejector	Noble Gases	475 - 525 Ci
	I-131	0.001 - 0.002 Ci
"B" Steam Generator	Noble Gases	5 - 6 Ci
	I-131	0.015 - 0.025 Ci
	Mn-54	0.030 - 0.050 Ci
	Co-58	0.030 - 0.050 Ci
	Ba-140	0.17 - 0.30 Ci

Note: Short-lived isotopes not included.

Definition of Curie (Ci): A unit of measure of the amount of radioactivity in a material. One curie is equal to 37 billion disintegrations per second from the nuclei of atoms.

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SUMMARY OF TLD ENVIRONMENTAL MONITORING AROUND GINNA - JANUARY 1982

THE ATTACHED SUMMARY SHEET CONTAINS THE RESULTS OF THE TLD MONITORING IN THE VICINITY OF GINNA FOR THE PERIOD WHICH INCLUDED THE JANUARY 25, 1982 INCIDENT. THE DOSE GIVEN IS THE GROSS DOSE MEASURED WITH NO CONTROL BADGE DOSE SUBTRACTED. THE ERROR GIVEN IS A ONE-SIGMA STATISTICAL ERROR ONLY. FOR COMPARISON, AN EXPECTED DOSE WAS CALCULATED USING DATA FOR THE FOURTH QUARTER OF 1981 AND PRO-RATING THIS DOSE FOR THE SHORTER EXPOSURE PERIOD. THE BADGES WERE IN THE FIELD FROM JANUARY 4-JANUARY 27, 1982, BUT THE EXPECTED DOSE WAS CALCULATED ON THE ASSUMPTION THAT THE BADGES WERE BEING IRRADIATED FROM THE TIME THEY WERE SENT FROM REGION I ON DECEMBER 22, 1981. NO DOSES WERE MEASURED WHICH WERE STATISTICALLY DIFFERENT FROM THE EXPECTED DOSES.

USNRC TLD'S
PERIOD OF EXPOSURE 1/4/82-1/27

LOCATION	MEASURED DOSE (m
1	6.8 ± 1.2
2	6.1 ± 1.0
3	6.5 ± 1.0
4	7.4 ± 0.8
5	7.2 ± 0.8
6	6.7 ± 0.8
7	7.8 ± 2.5
8	7.5 ± 0.6
10	6.8 ± 0.5
12	6.3 ± 0.4
13	6.5 ± 2.3
14	7.0 ± 1.8
15	7.2 ± 1.1
16	6.7 ± 0.2
17	6.9 ± 0.8
18	7.5 ± 0.5
19	7.2 ± 1.1
29	7.8 ± 2.8

PLUME TRAJECTORY BASED ON WIND DIRECTION READINGS
COLLECTED AT ONE ONSITE STATION

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STATE OF NEW YORK TLD'S

PERIOD OF EXPOSURE - 1/4/82-1/26/82

Location	Reading
Training Center	9.4 mR
West of Facility	3.9 mR

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1 2 3 4 5 6 7 8 9

GINNA

SURVEY LOCATION DATA

POINT, (#), REFERS TO TABLE 1.

DIGITIR SURVEY MAP

DATE: 1/26/82 TIME: 9:00 a.m. – 11:00 a.m.

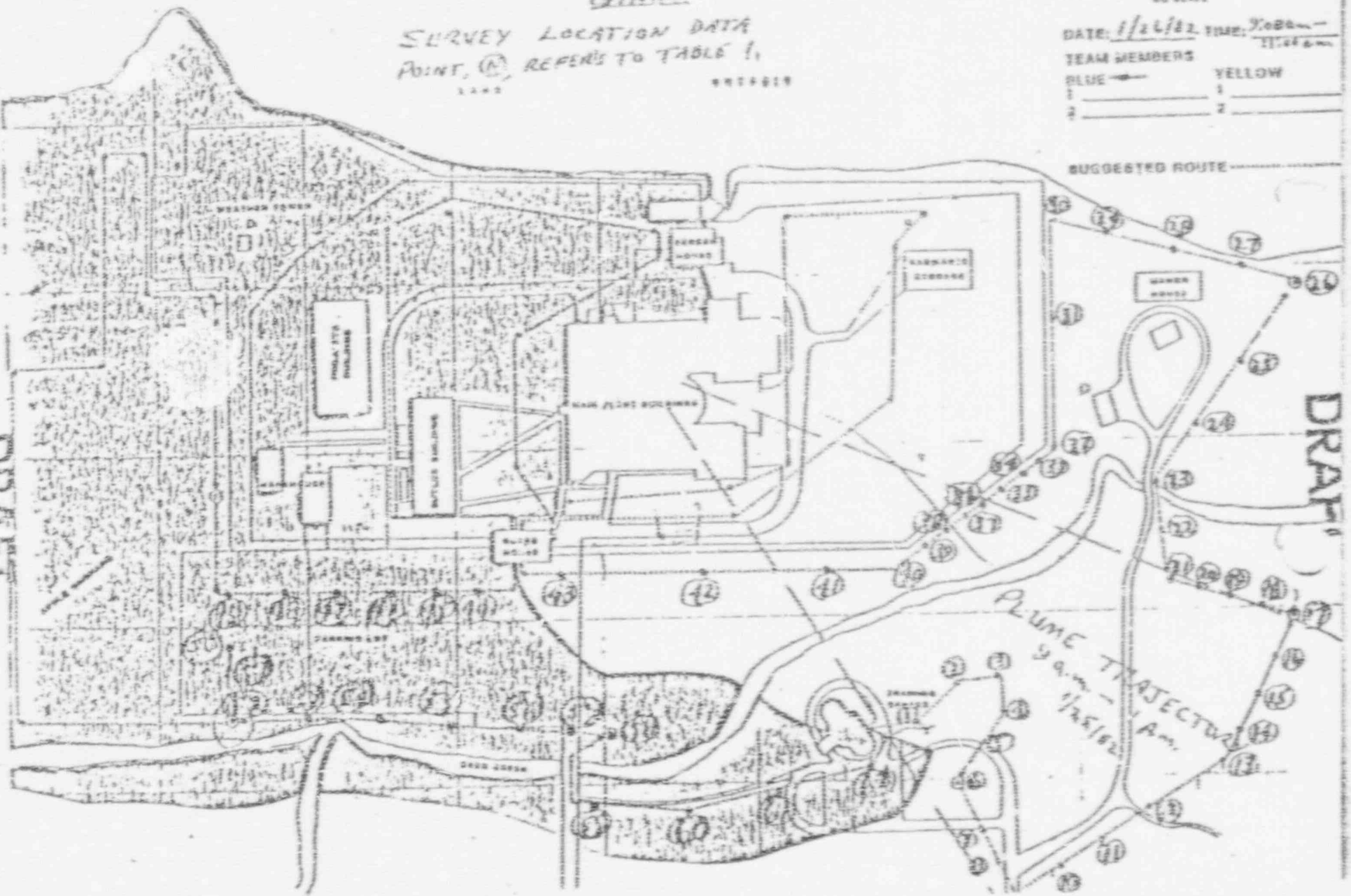
TEAM MEMBERS

BLUE — YELLOW

1 _____ 1 _____

2 _____ 2 _____

SUGGESTED ROUTE



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INCLUDE BACKGROUND - BACKGROUND ASSUMED TO BE 20 CPM (1 mr/hr ON 2200)

BLUE TEAM SURVEY OF ON-SITE [illegible] OF PLANT FENCE - READINGS TAKEN 1" AND 3' ABOVE GROUND ALL IN CPM

Point	1" Reading	3' Reading
1	700	500
2	1200	800
3	3000	2000
4	400	800
5	2200	2200
6	800	600
7	160	240
8	120	80
9	140	100
10	140	100
11	200	180
12	140	80
13	80	60
14	60	60
15	40	20
16	40	20
17	30	10
18	30	40
19	40	30
20	20	20
21	80	40
22	80	60
23	40	30
24	20	50
25	20	10
26	20	10
27	40	10
28	30	30
29	30	20
30	200	30
31	50	30
32	20	20
33	20	20
34	120	110
35	120	120
36	320	300
37	1000	800
38	1800	1300
39	300	300
40	90	180
41	80	60
42	50	30
43	50	40
44	30	40
45	40	40
46	30	10
47	40	20
48	20	20
49	20	10
50	20	40
51	20	20
52	[illegible]	10
53	20	20
54	40	30
55	20	10
56	20	10
57	30	30
58	10	10
59	30	30
60	20	20
61	20	30
62	20	20

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SNOW SAMPLES, GINNA

(micro-Curies/gram)

(10^{-6} Ci/gm)

ISOTOPE	TRAINING CENTER (ONSITE)	PUTNAM & FISHER RD.(OFF-SITE)
I-131	0.00009	0.0000005
I-133	0.00076	0.000004
Cs-137	0.00001	0.0000005
Cs-134	0.00007	0.0000003
Co-58	0.00011	0.000003
Cr-51	0.00006	0.000005

ANALYSIS BY NRC

ISOTOPE	TALLIES FIELD(NEAR SITE BOUNDARY)	RT. 104 & FISHER RD.(OFF-SIT
I-131	0.00001	< 0.0000001
I-133	0.00005	< 0.0000004
Cs-137	0.000001	< 0.0000001
Cs-134	0.0000008	< 0.0000001
Co-58	0.000009	0.0000003
Cr-51	0.000006	< 0.0000007

ANALYSIS BY NRC

ALL VALUES DECAY CORRECTED TO 9:26 a.m., 1/25/82

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