DOCKET 50-320

ORIGINATING OFFICE NRR

AUTHOR

DATE:(or time period covered) 2/28 - 4/6/79

DESCRIPTION OF DOCUMENT CONTENTS: HANDWRITTEN AND TYPED NOTES RE GENERAL INFORMATION IN HANDLING TMI ACCIDENT

OTHER IDENTIFYING PARTICULARS:

P

230 KV

A - 69 KV

T4 KV

@ 6 PM
3/31

492 - 8070.

4 x 2.5 MW at Navy Ship Yard

2 days or less ←

6.9

Mr. Miles - Naval Reactor   TM

3 - 1500 KW   4 KV   with switchgear
at West Milton
not in use   army base
flat bed trucks

8 x 2000 KW, 4 KV   Gas turbine

3 - California   skid mounted
can be air lifted
operators with them

3 - Norfolk Naval Shipyard
good availability

2 - On trailers Rockwell
N. Carolina   1 day to
deliver

6 over Jack
8

227 308

4/2 4:30 a.m. Ross

Have taken waste gas sample – no analysis yet.
local anal for H_2 → Bettis
25 cc sample reads 2 R/hr
Noise analysis – B&W tracking bubble
with it – guy in charge of analysis
says you can't conclude from noise
analysis that bubble is gone.

Denny & Ashok bubble calculation (same
simple one as before)

Hanauer worried over pressure trace
Bob Kryter at ORNL was contacted by Ross
Gil Ziegler is SAI expert on site – SHH says he's OK
The two are to consult (Bert Ackerman & Fry) Robinson
Kryter will in turn consult experts & one or
more will come up to review data
concern is with low pressure swing
on reactor pressure – plant computer
sees same thing – QA of noise
monitor confirms inst OK

Spare recombiner location is known to
the utility – ready to ship

Flow transmitter in idle hot leg
has gone bad – only one in that leg
Flow transm in operating loop is OK
B&W has advised that other instruments
can be predicted to begin to fail
about now, including pressurizer
pressure & level.
Can't work in present mode w/o
level ∴ procedure developed to
go water solid and vent su

227 309

HPSIS — don't know if RCP would be run — Astwick checking on status of procedure — NRC hasn't reviewed it yet

'crit'd — level indicator is in a more shielded position.

Warren Owen coming to trailer and to discuss strategy

primary pump OK, TCs OK

Personnel Side

Ross & Grimes favor rotation

Helps NRC safety expertise

People would go straight back to Op Center in Bethesda

Grimes & Ross could switch with Tedesco & Volmer

People here want to know how long they'll be here

Require at least as many as we have here now

12-12 cycle is good (really 10 on 10 off)

Israel & Novak could trade

Hannauer, Davis

Lowe

Should NRC have a focal point for the LEO mass advisory group (e.g. Ross)

NRC counterpart from SD to talk to Grimes

- licensee asked last night for help in decontamination — beyond their expertise — Joe Deal of DOE with HP consultants on the way to appraise the problem and see if DOE or DOD can help.

727 310

4/2 Gornick 6:10 a.m.

wants to call Comm... ^couple hours

wants to know what ... line is

for his press ... when he

shows up here ... check for

* story counter...

LVG wants to know what NRC story is. some stories in DG ... TMI is gone others say it is not

4/2 Denton 11:00 a.m. press ...

we are ... encouraging

calcs. be ...

no #s put out ... NRC get

bubble size ... s the interest

needs

RJM at press co...

5:40 a.m. Mosely Beth

ruffled feathers ... sample

... ible

all requests for ... should

be funneled ... command

center at ...

56.1 H

43.9 ... N_2

no oxygen

227 311

file queued ups

Summary of 4/6 day shift

@ ~ 9/6/79 ~ 9:10 pm

- Waste Gas Decay Tank transfer started about 11:00 am
- Agreed on NRC reps in controlroom
- Agreed on NRC organizational structure in Bethesda & Site
- RCP 1A tripped; 2A started.
- Prepared NRC manning profile for command, operations, and technical review. Prepared Denton Memo
- Ybarrondo on board & working for Ross
- Leak in Heise Gage fixed
- original Pz level transducer resurrected — others have noise, however.
- Ross Ordered 3 — Whole Body Counters
- Ross has Ybarrondo pulling all nat'l lab work together in a tematic form by 4/7 a'm.
- IRS — coming Monday

file general info

4/6 7:20 am

people into CR - need list - Novak

Jim Holman at IAG needs to communicate industrial waste pumped 1:30 - 3:30

2nd & 3rd level ⇒ instruments OK.

Heise Gage is leaking (elbow?)

* { B tank valve wouldn't open
  { A tank leaked. - will they now go to MUT and

hydrogen coming down in containment.

* confirm plans to spray Aux w/ ⇒ Sodium Hydroxide

transferred water to rad 2 - will tells us at

Noonan report on SG

rechecked dedicated OS lower in stairwell rad

up to 2100 man-rem integrated dose

work during nite is dull - shift schedule

need decision today { Carr wants to review system changes in DC
  { Denton will talk w/him
  { We need to get geared up today to review
  { in one place or another.

press conference at 4:00 - Vic will do chronology

* need plan for people changes

Status

10:00 PM Activation time for H_2 Recombiner Midnight

O_2	18.1	N_2 79.5	1330	H_2	2.1%
			1500		2.0%
	19	78.8	1800		2.0%

850 H_2 2.4
O_2 17.1
N_2 78.5

Noon 2.2
19
78.8

1330 2.1%
1500 2.0%
1800 2.0%

3:30 AM 4/2

Recombiner ready and can be available in hours

1000 ft³ @ 875 psi 300 °F 2.1×10⁶ ft³

15 psia 100 °F

If all gas in Vessel is H_2!

$$\frac{P_1V_1}{RT_1} = \frac{P_2V_2}{RT_2}$$

$$\frac{890(1000)}{760} = \frac{15(V_2)}{560}$$

$V_2 = 4.37 \times 10$

210 × 10

02%

2.4% H_2 × 2.1×10⁶

5.04×10⁴ H_2

+ 4.37×10⁴ H_2

9.41×10⁴ / 2.1×10⁶ = 4.5% H_2

7 MW

6.75

POOR ORIGINAL 227 315

STATUS 4/1

Into S-RB Time

10 PM — Activation Time for H_2 Recombiner — Midnight

10:45 PM — Containment Conditions

Noon	H_2	2.2 %
	O_2	19 %
	N_2	78.8 %
1330	H_2	2.1 %
1500	H_2	2.0 %
1800	H_2	2.0 %

11:05 PM — Bettis RCS Analysis was in error
Error Conc. is 1750 PPM and not 875

11:15 — 22:55 Bubble Size 298 ft^3

12:20 — Reviewing Recombiner Activation Plans
Comments prepared — Expect to be ready to agree on revised procedures in about 1 hour.
Met-Ed is ready to go except for leak test.

Single Recombiner to be tested
quick isolation from Control Room
Start Recombiner — Its Mgmt. Approval
Don't expect to begin Operation until next Shift
Recombiner Heatup time - 3 hrs.

Unit 2 CR intake Monitor (Kr)

330 AM - 400 cfm

10 AM - 2000 cfm

1300 - 500 cfm

IE not sure on evidence of a release. No evidence of chattering relief valve etc.

J

Time Scenarios

Loose Parts Monitor

McCabe uses us a Rod Survey

1.7 lbs
16.5 % Cs

Quality of Waste Gas
line A Contamination

Rod samples — Belt 8

6.9 % of I 131 in Co
6.0 % 1 I 133

.0033 % Sr 89, 90

No U → not a lot of fuel melted.

Ce 134 .20 %
Ce 136 2 %
137 1.7 %

Ba 140 .06 %

1. Correlate all fuel to fuel damage & percent exposure. DOE, EDE,
2. Any changes would also you indicate

(1)

227 318

This table includes a number of assumptions about activity and weather. These assumptions have been chosen conservatively. In an actual release, the release rate and weather should be evaluated as they are at the time, and the decision based on those values.

Event - Spontaneous failure or decision to perform a potentially risky maneuver

Find out what actually happened and what is functioning.

Predict what could result - different likelihoods

Predict release rate

} In tables

Determine present weather and forecast — Assumed constant in table

Dose Prediction — In table

Action Guidelines — Per Appendix 7

	EVENT	EXPECTED PLANT RESPONSE (RANGE?)	RELEASE AND TIME	WARNING TIME	EVACUATION SCENARIO	WHO DECIDES
1.	Loss of vital function or decision to perform a potentially risky maneuver. Examples 1. Reactor Coolant Pump Trip. 2. Leak in Aux Building. 3. Loss of off-site power 4. Loss of feed-water 5. Depressurization to go on RHR.	Restore Function Within 1 hour	No significant change		None*	
		Switch to Alternate Function involving Pri Coolant in Aux Building	Small leak less than 1 gal/hour		None*	
			Large leak in Aux Building 50 gal/min	2 hour	Evac 2 miles Stay Inside ~~to~~ 5 miles	
		Failure to restore vital function	Core melt; see item 2 below & Appendix 1			

*For sufficiently risky maneuver, do precautionary evac 2 mi and stay inside 5 mi; whether to do this or not depends on details of maneuver and plant situation.

227 321

	EVENT	EXPECTED PLANT RESPONSE (RANGE?)	RELEASE AND TIME	WARNING TIME	EVACUATION SCENARIO	WHO DECIDES
2.	Core Melt	Maintain Containment Integrity (likely) with Containment Cooling	Tech Spec Containment Leak Rate	4 hour	Precautionary Evac 2 mi all around and 5 mi sector; stay inside 10 mi	
		Containment Breached	Reactor Safety Study Categories PWR 4 - See Appendix 1	24 hour	Evac 5 mi all around and 10 mi sector, stay inside 15 mi	
3.	Hydrogen Explosion Inside Reactor Vessel	No significant change in reactor or primary system	No significant change		None	
		Core Crushed (unlikely)	Core melt See Item 2 & Appendix 1			

APPENDIX 1 MAJOR SEQUENCES OF EVENTS

Major sequences evaluated here are tied to the loss of forced circulation in the RCS. The loss of flow from the reactor coolant pump (RCP) is the generalized initiating event from which other initiating events such as loss of offsite power can develop.

loss of PORV

APPENDIX 1.a SEQUENCES OF POSSIBLE SYSTEMS FAILURES

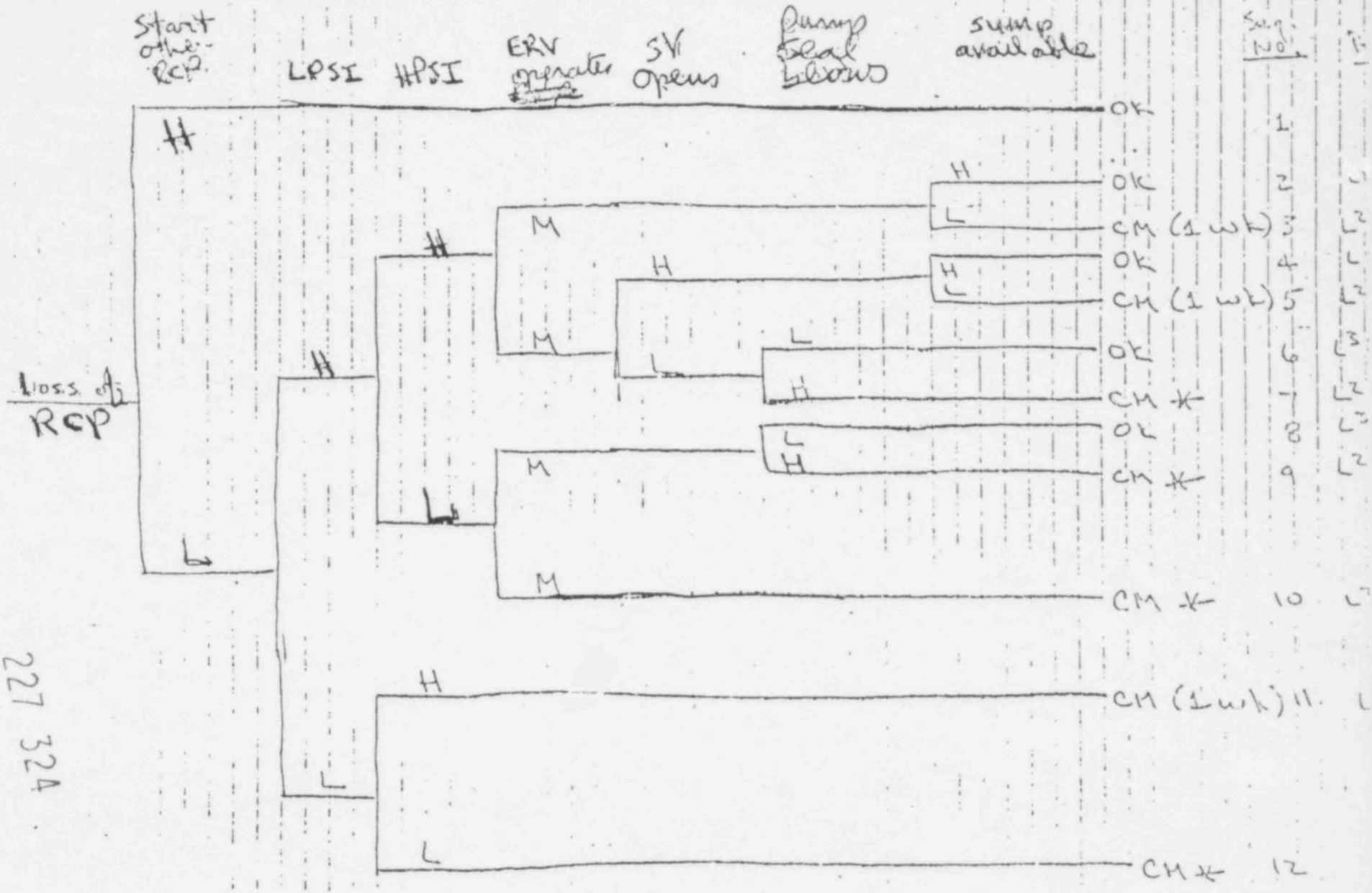
Figure 1.b-1 shows the loss of RCP event tree. This tree shows the various options available given the loss of the RCP, and indicates which combinations of events or failures would lead to core meltdown (CM). The sequences denoted with an asterisk are those which would be expected to follow the core meltdown progression discussed below, leading to the variety of atmospheric radioactive releases and consequences discussed later. Some core meltdowns could be expected to be delayed for roughly a week because of the availability of ECC injection over that period. This method of core cooling, however, is not expected to be adequate to prevent core melt; as such a core meltdown is assessed to occur at roughly a week. A rough measure of relative probabilities of the various outcomes is indicated by the notation of L, M, H (low, medium, high). The column on the right-hand side of the page indicates the relative probabilities of the sequences, with "LM" as the highest probability and L^3M as the lowest.

Sumps because unavail. DSS/DCR agree in a week we could get around this but release would be next because of decay in S/B bldg.

3 sequences lose sump 1 sequence loses EFW assume standard not effective — it helps it we do it, adds conservatism

Fig 1.b-1

Loss of Reactor Coolant Pump



APPENDIX 1.b

MAJOR EVENTS AND TIMING IN EVENT OF CORE MELTDOWN

Event 1 - Sprays and Coolers Operative

Time=0 Flow stops, core and water start heat-up

Time=100 min Core starts to uncover

Time=150 min Core begins to melt

Time=200 min Molten core is in lower head of reactor vessel, pressure is 2500 psia

Time=210 min Reactor vessel fails, containment pressure goes to 25 psia

Time=210 min Hydrogen burns, containment pressure goes to 67 psia
Steam explosion possibility - minor consequence

CONTAINMENT SURVIVES (Failure assumed 130 psia)

Time=10 hours Molten core has melted about 1 meter into basemat

Time=days Major problem - handle hydrogen, oxygen - maintain containment integrity

CAUTION:
- Keep sprays running
- Keep water many feet over molten debris
- WITHOUT RECOMBINERS Hydrogen continues to build up

BASEMAT SURVIVES

Event 1 Conclusion: This event should not produce major releases

Event 2 - Sprays and Coolers Failed Before Flow Stops

Time=0 to Time=210 min Same as Event 1 - containment pressure is 25 psia

Time=810 min Containment pressure is 70 psia

Time=1 day Containment fails due to steam (mostly) overpressure - about 135 psia

CONTAINMENT FAILS

Event 2 Conclusion: This event leads to major releases.

227 325

The event tree for core melt leading to various releases is shown in Figure 1.b.

The following are essential in the event of core melt.

1. Sprays and coolers are required to prevent major releases.
2. Hydrogen must be recombined or otherwise removed from containment.

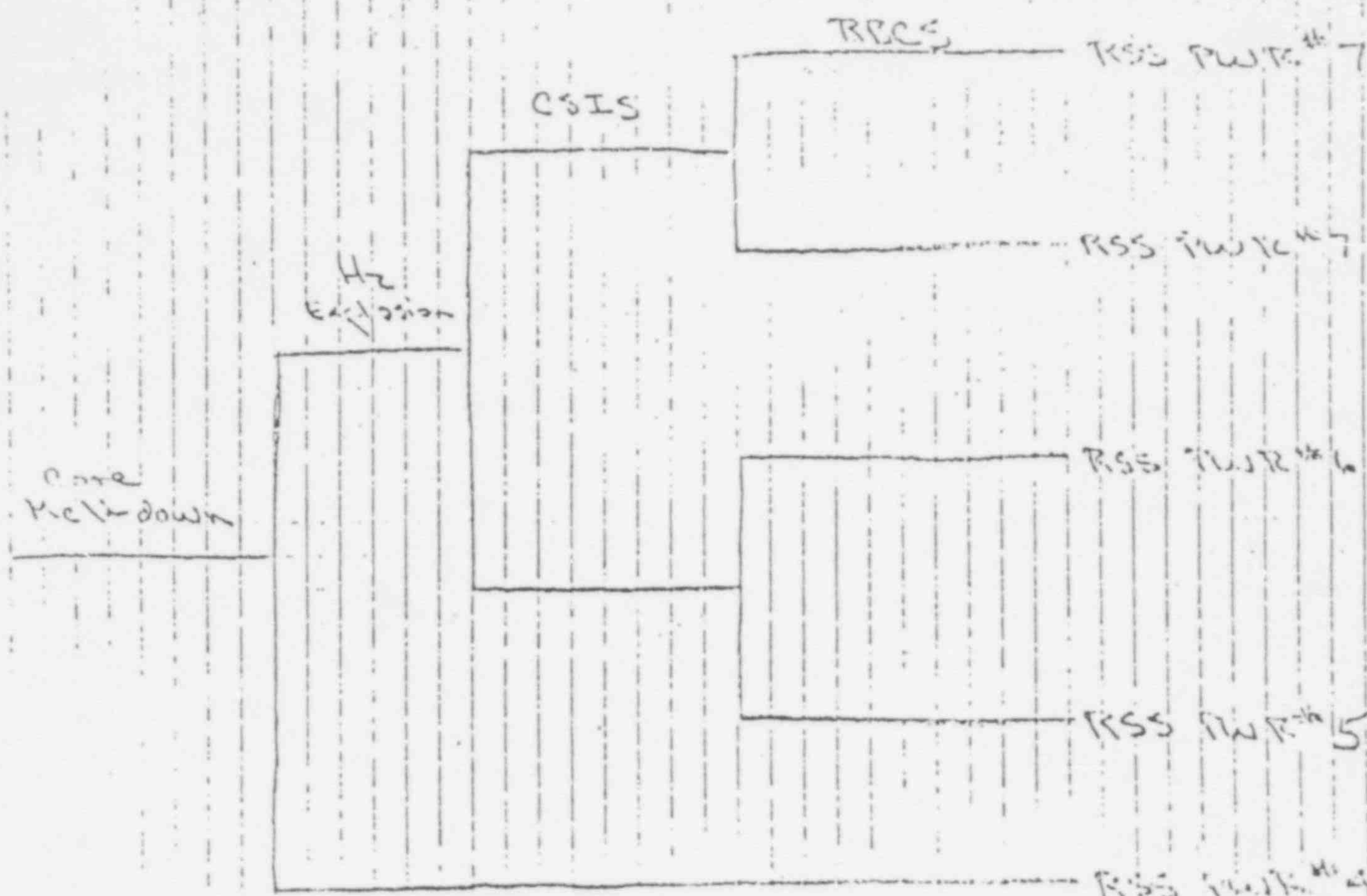

Core Meltdown
H2 Explosion
CSIS
RRCS
RSS PWR #7
RSS PWR #7
RSS PWR #6
RSS PWR #5
RSS PWR #4

FIGURE 1.b

1c. Large Leak in Auxiliary Building (AB)

The activity level in the reactor coolant is so high that substantial releases can come from small amounts spilled in the AB which requires once through ventilation. A leak of 5 gpm to the AB atmosphere is assumed for the expected level of leakage. A leak of 50 gpm is taken as a large leak to consider a major leak in pump shaft sealing or some similar mishap. Based on the leakage experienced already only the noble gases and no iodine are assumed to evolve. The AB ventilation exhaust is assumed to flow through the charcoal filters.

1d. Hydrogen Explosion in Reactor Pressure Vessel

A detonation of the hydrogen oxygen bubble in the reactor vessel could rupture the vessel and/or crush the core. Rough analysis indicates that the pressure vessel would not rupture. Postulation of the core response is difficult. If the core is crushed, it could effectively prevent core cooling leading directly to the core melt sequence described earlier. It is unlikely that compression would lead to criticality.

Action Alternatives	Evacuation	Stay Inside
1.		2 miles
2.	2 miles	5 miles
3.	2 miles all around 5 miles 90° sector	10 miles
4.	5 miles all around 10 miles 90° sector	15 miles

a. All sector choices governed by wind direction. If shifting, more than one quadrant may be affected.

b. These are initial values; as the release continues measurements may indicate the need for reconsideration of action up to 20 miles.

6. Weather

The table is based on F stability and 1 m/sec wind speed, in view of the April 1-3 forecast. At the approach to decision time for evacuation, the appropriate met. condition will be factored into the dose equations to determine the evacuation time, sectors, and distances for the evacuation.

NRC is predicting X/Q for current meteorology as the incident progresses.

7. Action Guidelines

a. Notify evacuation authorities two hours in advance to standby for a possible evacuation.

b. Predicted doses of 1R whole body or 5R thyroid in 8 hours - mandatory evacuation of children and pregnant women.

c. Predicted doses of 5R whole body or 25R thyroid in 8 hours - mandatory evacuation of all persons.

Assumes general warning already that some form of evacuation may become necessary.

227 331

(3:?) 4/2 // 1
[illegible]
1600 psi

Telford
492-8160

Jim Moore GPU - Control Room

B&W - formula for computing bubble.

Billy Bingham

804-384-5111

Ext 2196

1- 5 min of syst. state data to assure steady state

2- raise P_{press} + 75 psi use heater

NOTE if lvl. < 150 in. stop test.

3- 5 min of data at P_0 + 75 psi
& 1 min intervals

P_{press}, Level, T_C

T_{press}, letdown flow, makeup flow, seal injection flow } or MU Tank level

227 332 Maintain SG level constant.

Decay NT [illegible]

French Miraltia phoned in data from Howie Pickings.

4/1 4 PM

Decay Ht. 0.21 % power (2772 MWt

4/7 4 AM 0.15%

4/11 4 AM 0.09%

227 333

(1)

4/1/79

RB atmosphere sampling procedure

H2 / O2 / N2

9:45

$800 ft^3$ @ 1000 psi & 270 °F
460
730 R = 400 K

3:00 1.9 / 21.2 / 76

7:00

$$M = \frac{PV}{RT} = \frac{\left(\frac{1000}{15}\right)\left(800 ft^3 \times 28.3 \ell / ft^3\right)}{0.082 \ell\text{-atm}/{}^{\circ}K \cdot 400}$$

= 4.6×10^4 moles

4.6×10^4 g moles × 96 g/m

= 4.4×10^6 g

= 4.4 MT of ...

25 ...

Vol + conc of water they pumped to ... from

Rad field for recombiners

Vol = 6 and 9 ft^3

9 ft^3

		µCi/ml	× DCF	= R/sec	
Xe	-133	675	0.00906	6	166 Ci
	133m	15.8			
	-135	8.1	0.0567	0.46	
I	-131	0.063	0.0872	0.006	
I	-133	0.03	0.154	0.005	
				6.5	

3 bleed tanks filled - low concentration in 2

pump to unit 1 11000 ft^3

10^{-2} µC/cc

condensate storage tank 10^{-4}

4 mR/hr through dome 3 mR

20000 R/hr inside $\frac{1}{10^4}$ R

3 1/2 ft of concrete

$$R = \frac{22.4 \text{ liters} \cdot 1 \text{ atm}}{273^{\circ}} = 0.082 \ell$$

200 R/hr at surface

10 - 70 R/hr at 1 cm

can recombiner be leak tested

drain from recombiner

227 334

Control Center 492-8111 Jon Telford
Cygnus/Gross/Marsh (492-8060)
Zoltan in Office

(1) Bubble Process

55' (2) NaOH Tank level change — not added
30' How long sprays on? 6 min

(3) Matt Taylor call Tedesco 27783

Letdown path concern —
goes to Reactor Bleed Holdup
varies with pressure is this cracked

where are they getting 40 flow rate
where are they getting m/u flow rate

BS 1
5,000 gal
1 hr : 200 gal
1 min : 3 gal

FACS NO. 492-7928 Bethesda
944-2483

Activation Time for Recombiner - 1200

cracked vent valve - constant since Friday AM @ 3:00
1 RCP

227 ~~336~~
335

$0.045 \frac{\mu Ci}{ml} \times \frac{50\ ft^3}{min} \times \frac{28300\ ml}{ft^3} = 8.9 \times 10^4\ \mu Ci/min$

$\frac{8.9 \times 10^4\ \mu Ci}{18\ g} = 4900 \frac{\mu Ci}{g} = 10.9 \frac{mCi}{g}$

1500 hrs 224 ft^3 in bottle normalized to 875 psig

1900 hrs 340 ft^3

Bobby Joe Davis – DOE
in NRC trailer other side of
IE trailer
ORNL wants to know if they can get
hydrogen analyzer back

$\frac{13 \times 10^{-8}\ \mu Ci/ml\ Kr}{.063\ \mu Ci/ml\ in\ air} = 2 \times 10^{-5}$

equip hatch + personnel access hatch reading
50 mr/hr
area monitor 10 mr/hr

C

227 ~~350~~
336

3-31-79

HLD briefing JEC

need expert technical help
J. West, F. Stern CE

H_2 assistance
What if H_2 explodes in vessel head?
Should we evacuate?
RJM says: not enuf O_2 radiolysis

pressurizer bubble - is it changed? Met Ed says yea
We say nay

Important changes in process cleared with us.

Need sample from tank?

Not yet recombining
- still shielding

Need diesel Stby power?
from NR

Off Site power dedicated to here

227 ~~331~~ 337

TO H. DENTON IMPORTANT!

FROM: JOHN R. JOHNSON
MANCHESTER OHIO
DATON LIGHT & POWER PLANT
TELE NO. 1-513-549-2309

227 ~~338~~ 338

THE FOLLOWING INFORMATION WAS QUOTED OVER THE TELEPHON BY JOHN R JOHNSON TO THE OBSERVATION CENTER FOR MR. H. DENTON.

QUOTE: WE HAVE CAMERAS TAKING PICTURES OF UNIT giving PROBLEMS WITH 2 LARGE ILLUMINATING LIGHTS. WE HAVE A double WINDOW IN THE TOP OF THE CHAMBER WHERE THE CAMERAS LOOK THROUGH. THERE IS ANOTHER WINDO IN THE RADIATION SHIELD AND IN THE bubble CHAMBER WHERE THERE IS boiling Liquid H_2 INSIDE. WE HAVE A Liquid Cooling TANK FOR THE Liquid H_2, WE HAVE A BEAM OF PARTICAES INSIDE MAIN CHAMBER. WE HAVE HEAT EXCHANGE WIRES INSIDE MAIN CHAMBER, THESE ARE OUTSID MAIN CHAMBER. WE HAVE A Big bubble AT TOP which is CAUSING OUR TROUBLE. THERES A VACUUM UNIT IN IT OVER HERE, WE HAVE A PISTON. THAT PISTON COMES UP FROM BELOW. NOW this IS ALL IN THE bubble CHAMBER. NOW, AROUND THE WHOLE THING WE HAVE A Liquid N_2 COOLED RADIATION SHIELD. WE HAVE AROUND THE WHOLE THING A 200 TON IRON CYLINDER shielding THE SURROUNDINGS FROM STRONG MAGNETIC FIELD. NOW WHAT WE HAVE GIVEN You Right HERE IS A Liquid H_2 bubble CHAMBER. THE CENTRAL CHAMBER CONTAINS H_2 MAINTAINED IN Liquid FORM ABOVE ITS NORMAL Boiling POINT. THATS MAINTAINED BY THE PRESSURE OF A PISTON, THE MOMENTARY RELIESE OF THE PRESSURE LEAVES THE H_2 IN A SUPER HEATED STATE AND THE PASSAGE OF PARTICALS PRODUCES A STREAM OF

This INFORMATION CAN BE FOUND ON PAGE 375 - book #3
OF THE ILLISTRATED SCIENCE AND INVENTIONS ENCYCLOPEDIA.

227 ~~340~~
339

FLIGHT 3/28/79-1F SHIPMAN/WATSON TIME: 1600-1700

East edge of the plume was at Hummelstown, west edge at Rutherford Heights. Levels were about 0.2 mr at 7 miles north of plant. 0.1 mr at 16 miles north. Plume extended at least as far as the ridge to the north of Harrisburg. Flown at 150 to 1000 feet. No change in count rate.

FLIGHT 3/28/79-2F SHIPMAN/WATSON TIME: 1900-2000

East edge of the plume was at Rutherford Heights. West edge was at Camp Hill. Levels were slightly lower. Top of plume was at about 3000 feet.

FLIGHT 3/29/79-1F SHIPMAN/WATSON TIME: 1000-1100

West edge of the plume was at Mechanicsburg. East edge was at Hershey with the maximum at a point about 2 miles west of the river. The top was at about 3200 feet, the max at 2100 feet and the bottom at 500 feet.

FLIGHT 3/29/79-2F SHIPMAN/WATSON TIME: 1600-1700

The east edge of the plume was at Hummelstown. The west edge at Mechanicsburg at 10 miles. The maximum was about 0.2 mr. Near Hummelstown the top of the plume was at 1200 feet, the maximum at 1000 feet, and the bottom

at 800 feet. The plume/cloud to the north of the plant appeared to be dissapating and a new plume was forming to the south. At 1/2 mile south at 500 feet, the highest level was 0.5 mr. At the site boundary to the south at 500 feet the levels were 10 mr.

FLIGHT 3/29/79-3F SHIPMAN/TIPTON/EICHER TIME: 0700

Circled plant at a distance of 8 miles. Saw no plume; only residules of about 100 ~~micror~~ μR/hr to northwest of airport.

FLIGHT 3/29/79-4F TIPTON/WATSON TIME: 2230-2330

Plume low and close to plant. Top at about 500 feet. Level at 1/2 mile of about 1/2 mr. Plume did not extend more than 5 miles from plant. Wind from 130 degrees at 8 knots. Ridge to northwest split plume with some trapped behind ridge and some going up river at very low altitude.

FLIGHT 3/30/79-1F MAGUIRE/WATSON TIME: 1030-1130

Maximum level of 20-30 mR at 300' altitude and 1/4 mile SW of plant. From 1/2 mile out plume is SE of plant. At 1 mile from plant highest levels are in the SW to the NNE. Approximate 0.5-1.0 mR/hr at SE. Top at 1 mile approximately 1500' altitude. Did not extend more than 5-6 miles in SE direction. At 1/4 mile 500' altitude 8 mR, WSW of plant.

FLIGHT 3/30/79-2F SHIPMAN/ZICHER TIME: 1600-1800

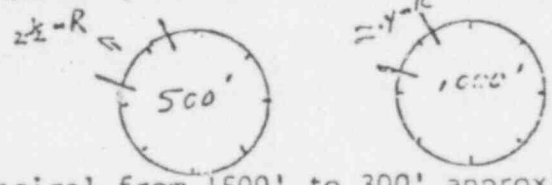
Plume is very narrow. Leaving plant on a bearing of 280 degrees. Hottest point near ground. Top at 1200'.

DISTANCE FROM PLANT (Mi)	Mr
1	9
1.5	8
2	8
2.5	8
3	7
3.5	4
5	2

Predominently up river valley.

FLIGHT 3/30/79 TIPTON/WATSON TIME: 2130-2230

Flew a circle around the plant at 1 mile out at 500' altitude and 1000' altitude. Cloud approximately 30degrees-40 degrees wide going to the NW. Maximum reading approximately 1/2 mR (with scintillation counter)



Flew altitude spiral from 1500' to 300' approximately 3 miles from plant at a heading of 330 degrees. Entered the cloud at approximately 1000', maximum at approximately 500', decreasing down to 300' where had to level off.

Flew a radial at a heading of approximately 330 degrees out from th
Seeing levels varying from 100 to 200 /hr all the way out, 18 mil
plant until broke off line due to ridge. Radial flown at 500' altitude.

Flew half circle at distance of 5 miles out from plant. Still approximately 30-40 degrees wide. Altitude 500'.

227 342

FLIGHT 3/31/79 TIPTON/WATSON TIME: 0015-0105

Perform a circle around the plant at 1 mile out at 500' altitude, and 1000' altitude.

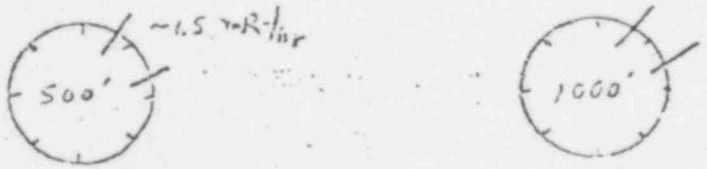
Wind out of 240 degrees

Flew a radial at 500' altitude in a direction of approximately 020 degrees out for 18 miles before breaking off. Did not run out of the plume. Levels were about 100 μR/hr along the path of the plume. Measured approximately 20 degrees angular spread out at 18 miles as did at 1 mile.

Did an altitude spiral about 6 miles out from the site in a direction of 020 degrees from 1500' to 300'. Entered the cloud at 800'. Continued to increase all the way down to 300' where had to level out. Maximum reading at 300' was 150 μR/hr.

FLIGHT 3/31/79-2 MAGUIRE/EICHER TIME: 0300-0400

Flew a circle around the plant at 1 mile out at 500' altitude and 1000' altitude.



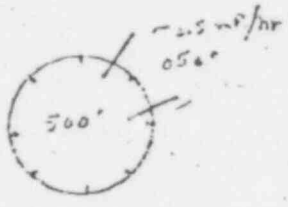
Wind out of 245 degrees (25 knots) @ 500' alt.

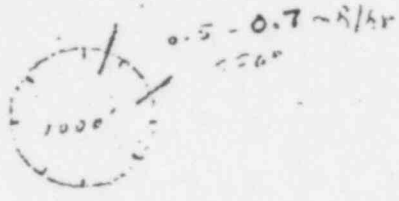
227 343

Flew a radial at 500' altitude in a direction of approximately 060 degrees out for 20 miles. Plume extends past 20 miles. Narrow cone (approx. 5 degrees) at 14 miles had levels of 100-200 μR/hr.

Flew altitude spiral at 2.5-3 miles out in a direction of 060 degrees from the plant. At 1100'-1500' altitude ~20 μR/hr - 700' - 1100' altitude 30 μR/hr. Sharp top between 600' and 700'. Levels rise to approximately 1 mR between 600' and 700' altitude. Stay constant down to 200' altitude.

FLIGHT 3/31/79 MAGUIRE/EICHER TIME: 0600-0715





Ground winds 8 knots @ 245 degrees

Flew out along 050° radial. Levels dropped from 1 mR/hr at approximately 1.5 miles out and dropped to 100-200 μR/hr at 13 miles. Levels stayed constant out to 30 miles from the plant. Top of plume is sharp at 600'. 100-200 μR/hr levels were present to the ground. Width of plume appeared the same at 4 miles out and 20 miles out (approximately 2 miles wide).

All along plume top appeared at 600' with constant levels from 0-500' altitude.

FLIGHT 3/31/79 SHIPMAN/WATSON TIME: 0900-1000

At 1 mile and 600' plume was between 030 and 060 with maximum at 045 of 3 mR/hr. At 1 mile and 1100' plume was between 030 and 060 with maximum at 045 of 0.5 mR/hr. At 3 miles in center of plume top was at 800 feet and went to ground level. Dose rate nearly constant throughout valve of 1 mR/hr.

227 327 344

At 3 miles plume was from 030-050 radial away from plant on 045 was 3 mR/hr out to 2 miles, 2 mR/hr at 3 miles dropped to 1 mR/hr by 10 miles.

Followed plume to Myerstown, about 22 miles where the level was about 0.1 mR/hr.

FLIGHT 3/31/79 SHIPMAN/WATSON TIME: 1215-1330

No major change. No I^{31}. Plume at 500' and 1 mile between 030 and 060 maximum value of 1.5 mR/hr. At 3 miles plume between 030 and 060 maximum value of 1.5 mR at 300' top of plume at 2800' bottom on ground. At 10 miles maximum value of 0.2 mR/hr maximum at 1800'.

DOE AND NRC TEAMS

1640	Rt 441 + ENGLE RD	0.6 MR/HR.
1650	Rt 441 + FALMOUTH RD	0.5
1705	KEENER RD, 1/2 mi EAST 441	0.5
1715	Rt 441 AND KINGS RD	0.12
1720	ANDSITE RD .3 mi EAST OF 441	0.6
1730	Rt 441 + 241	0.4
1735	RACE ST AT MAYTOWN	0.17
1740	STOVE MILL Rt 441	0.17
1745	BAINBRIDGE RD AT 441	0.2
1800	INSIDE NRC VAN	0.15
1820	Rt 441 ACROSS FROM COOLING TOWERS	1.5

MET. DATA:

1544	From 315°	12 MPH
1740	" 280	4-5
1829	" 135	2
1846	" 220	4
1900	" 225	2

ARMS FLIGHT REQUESTED AT ~1830

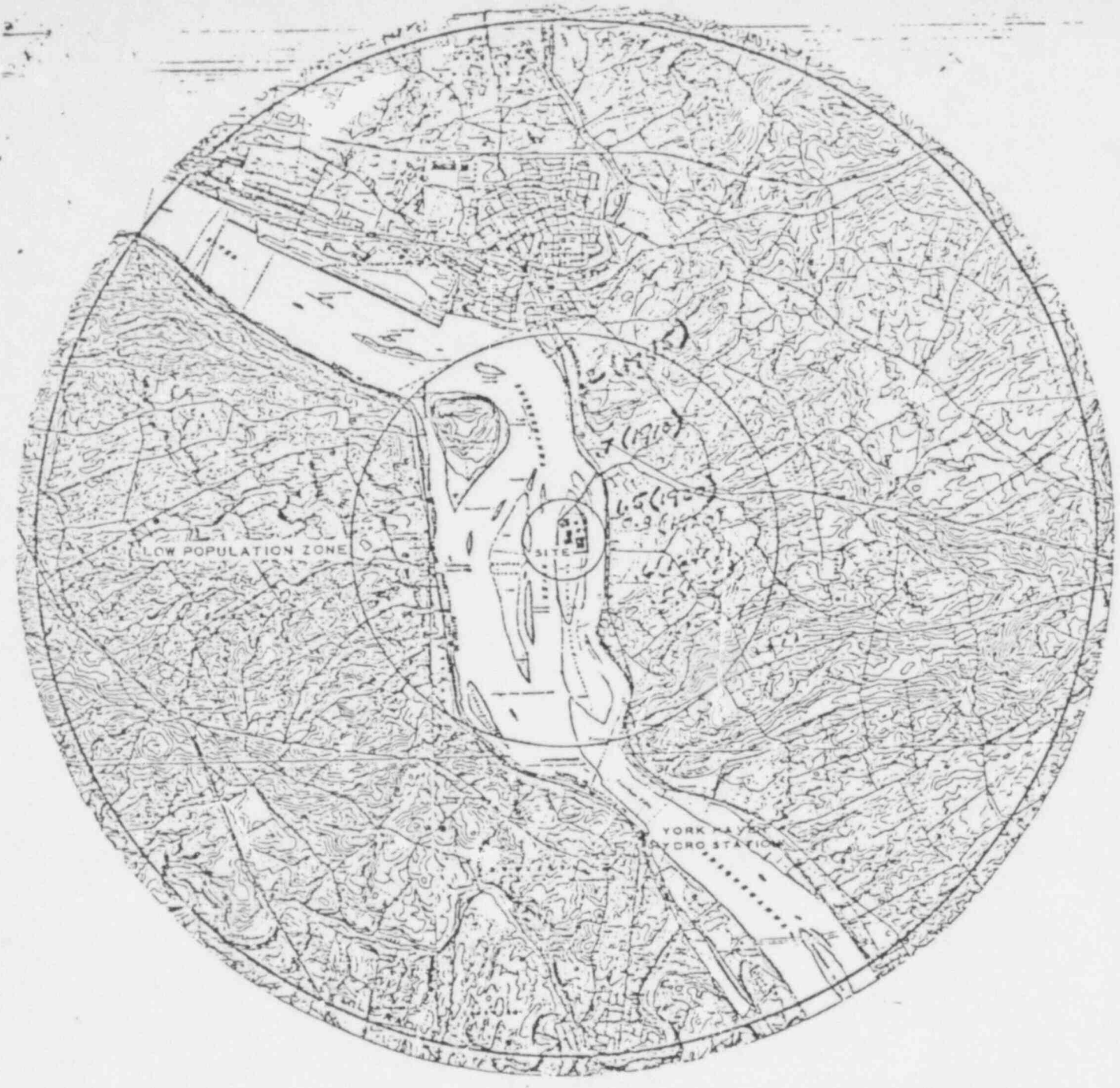
1945 DOE TEAM DEPLOYED ON WEST SIDE OF RIVER, NO DATA YET. NEAR GOLDSBORO AREA

227 346

36 ENVIRONMENTAL STATIONS HAVE BEEN ESTABLISHED

1975 FUEL BLDG AREA MONITOR 140 mR/hr.

227 347



— RAT - DOE
— NRC

CONTOUR INTERVAL 20 FEET

1 ½ 0 1 MILE

0 4000 8000 FEET
2000 6000

SITE TOPOGRAPHY 5 MILE RADIUS

THREE MILE ISLAND NUCLEAR STATION UNIT 1

FIGURE 2-2
(AM. 41 7-16-73)

227 348

Referral from N.J. Nat. Dirctr

10:45 AM 4/1/79

Dr. Joseph Hanak
RCA Labs.
Princeton, N.J.
609-882-6906

Claims to be able to assist in hydrogen gas bubble problem. Apparently something about synthetic 1 unsaturated hydrocarbons. RI did not talk to Hanak.

transmitted to Budnitz

2:40 PM

4/1

C.

227 349

227 [illegible]

If RECOM run
,190/Day = capacity

EMER POWER:
Navy 3 15 MW, 4KV diesels
on skids

need 5 MW

ask Betkoster if needs
also 8 2 MW, 4KV gas
around

no gasoline

Dedicated offsite power

Chivarnal 6 pm

In Core Probe & H-8
Newbein will do meas.
(1) is channel damaged?
(2) if peaks where is fuel

See Carl on Cont. Plans
Hulman

Is PORV, block valve on vital power yes.

Time - Cap Bubble plot

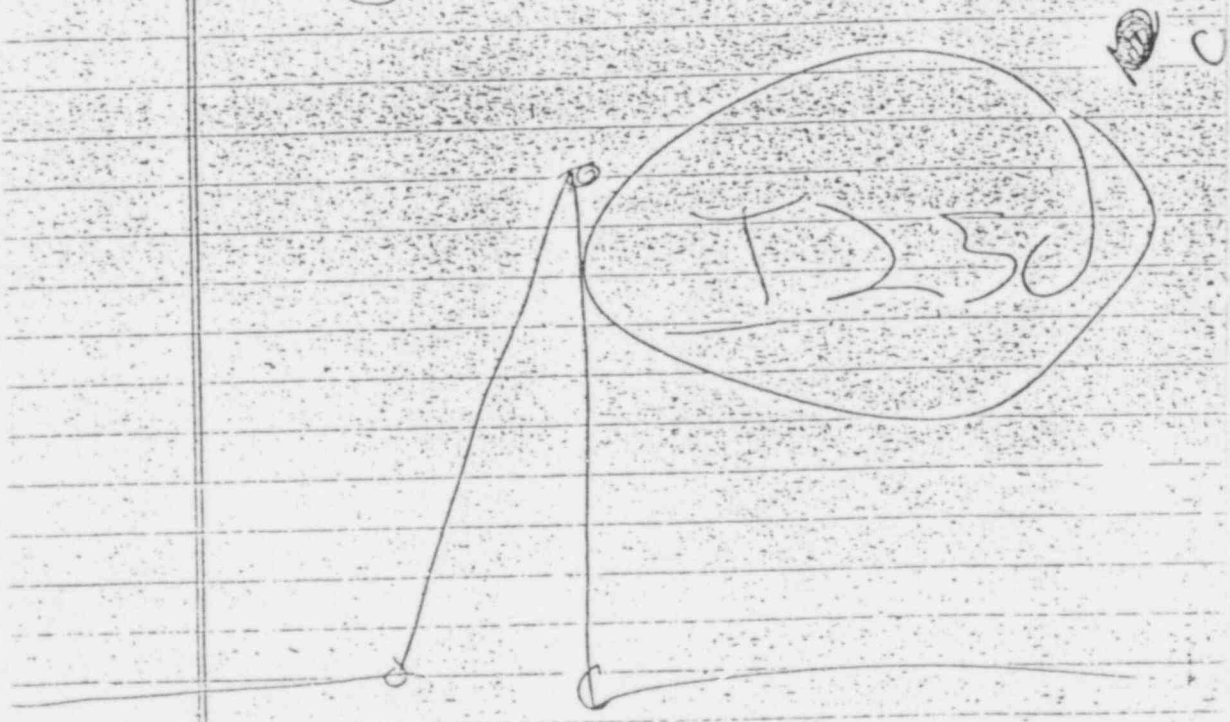
Loose Parts Monitor

LPM loose parts

denes an alarm going on

noise is quiet

850765



D-10	490.4 °F
E-11	421.4
K-11	369.3
H-5	289.6
H-8	381.7
E-7	337.5
F-13	303.0

Write Gas

I&E / CMT ED - status in letter wh

SG-B fill water discussion operation w/ B&W in Aux B

Did Utility ever give us procedures for recombiner operation?

If we get primary coolant samples, who wants them + how much?

		H_2	O_2	N_2
H_2 in cont at	10:00	2.0%		
	12:00	2.2%	19%	78.8

Bubble Calc w/ GPU — H_2 change since explo - 100

Measurement over 1 hr

change Press Pres

no change to inventory

to maintain P - add water - about same as bubble shrinkage

Bubble should be gone by Noon 4/2

227 352

4-1-79 (2000 – 2400)

METEOROLOGY DATA.			MONITOR
2000	DIRECTION 036	SPEED 4 MPH	100 MR
2035	030	3	
2100	080	4	100 MR
2122	120	15	
2200	135	15-25	
2230	130	15-20	200 MR
2300	110	10-15	

PLUME SURVEY

AIR GRAB SAMPLES TAKEN BY DOE R (CHARCOAL FILTER)

1843 0.2 miles NORTH OF 262 AND RIVER ROAD

RESULTS: NO ACTIVITY ABOVE BACKGROUND

MINIMUM SENSITIVITY: 2×10^{-7} μCi/ml

1903 0.5 miles NORTH OF INTERSECTION 262 AND RIVER ROAD.

RESULTS: NO ACTIVITY ABOVE BACKGROUND

MINIMUM SENSITIVITY SAME AS ABOVE.

MISC

2140 IT REPORTED INCREASE IN CONTROL ROOM RADIATION LEVELS FROM 0.1 TO 1.0 MR/HR. AIR SAMPLE STARTED. ATTRIBUTED TO WIND SHIFT.

1800 ARMS FLIGHT: 1 MR/HR @ 500 FT 1 mile FROM plant.

227 353

Map shows areas within five- and 10-mile radius of the Three Mile Island nuclear power plant.

— TLD READINGS IN mR
AVERAGE TIME OF EXPOSURE 22.5 HOURS

227 354

SUSQUEHANNA
RIVER
PENN CENTRAL
Royalton
Poplar Island
Henry I.
Kohr I
Goosehorn I
Snelley Island
Goldsboro (Etters PO)
Alpine Rd
Brinser Rd
Felker Rd
Gingrich Rd
Zion Rd
Peck Rd
Laurel
Meadow Lane
Covered Bridge
Sub Station
4PM

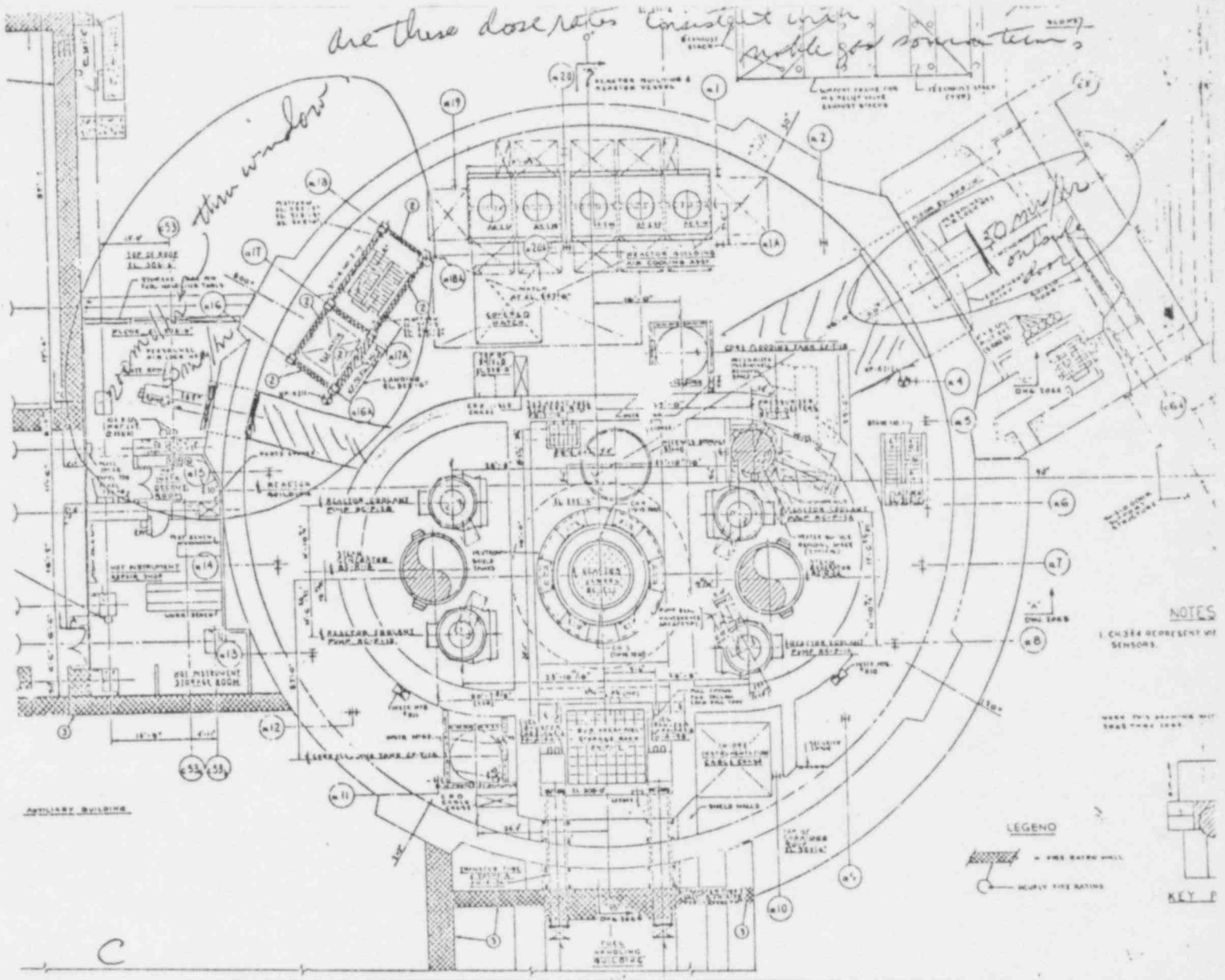
227 355

Pages out!

H_2 Problem

1. Venting Press' now [illegible]
2. Off gas to cont. from letdown tank
3. Hydrogen in containment ?
4. Radiolysis ~ 45 ft³/[illegible]
5. Continued M-W ?
6.

* When to activate the recombiner


Are these dose rates consistent with
the window
NOTES
LEGEND
Auxiliary Building

227 357

Special Problems

— Boron Concentration ?

D C Harmon — How reliable are in core TC

Richings — Can we beat uncertainty due to present state of core? & Best estimate decay heat?

Develop better understanding of events that have occurred aimed at evaluating core damage.

— Procedures for H_2 explosion vessel, pressurizer, containment

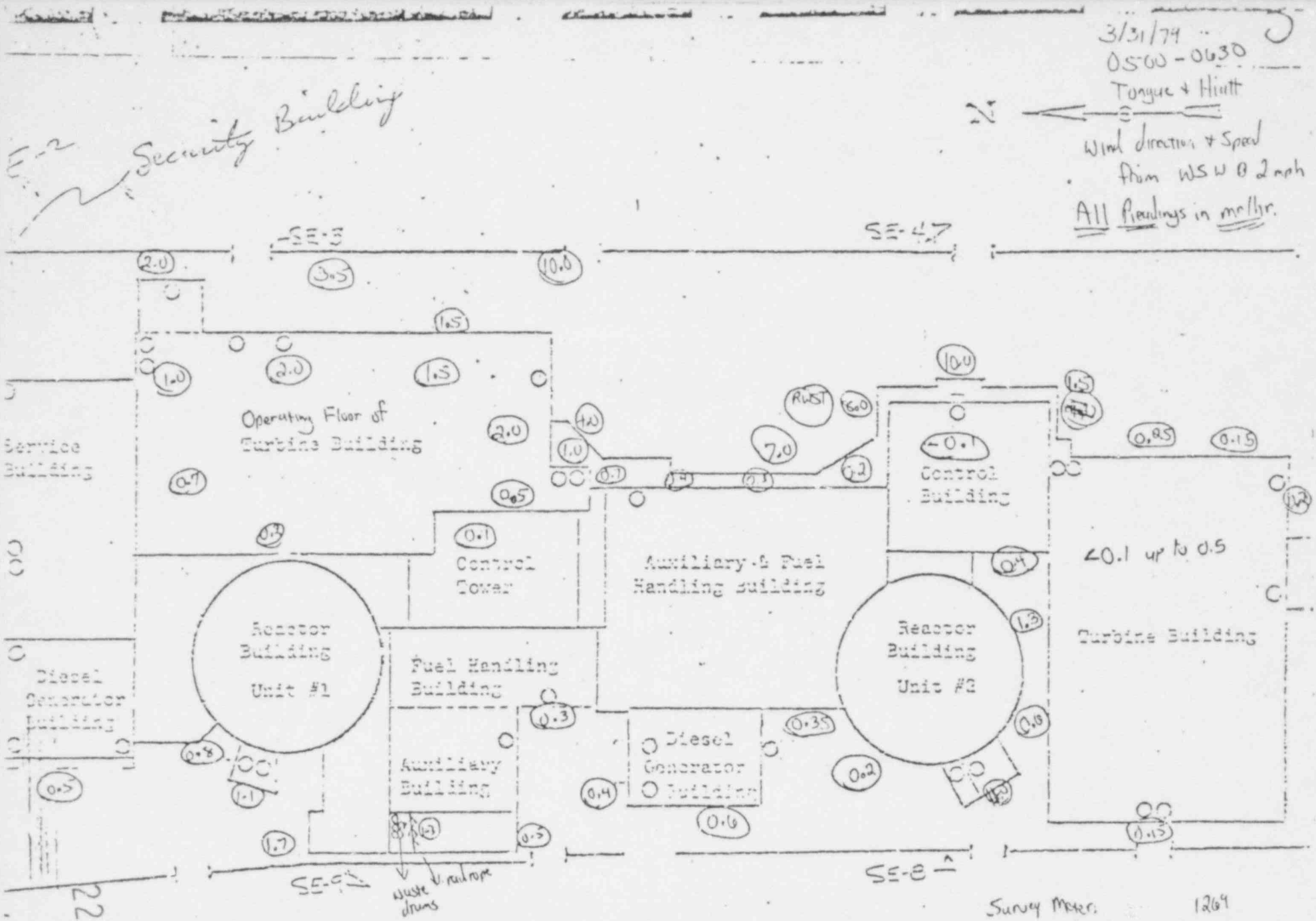
— Small portable filtration for decay heat removal pits. St Lucy has one

3/31/79
0500 - 0630
Tongue & Hiatt

N

Wind direction & Speed
from WSW @ 2 mph

All Readings in mr/hr.



PEACH TREE ISLAND
NUCLEAR POWER PLANT
BUILDING LAYOUT AND
RADIATION SURVEY TIMES

GPU SERVICE CORPORATION

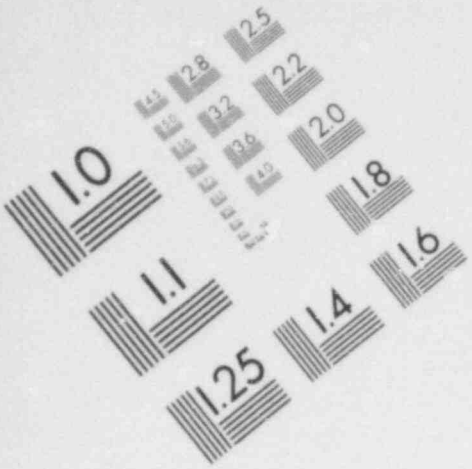
W. B. MURRAY

Venting Problems

Aux Bldg

1. Loss of off-site power
2. Spills
3. High rad. fields
4. Loss of crit instrums + controls
5. Overlooked release paths
6. Component / System failure
7. Access to Aux Equipment & Equipment

227-360



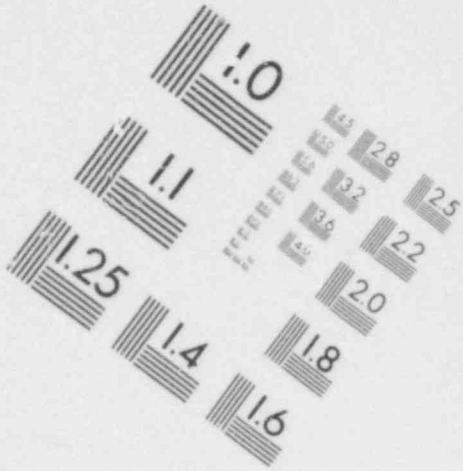
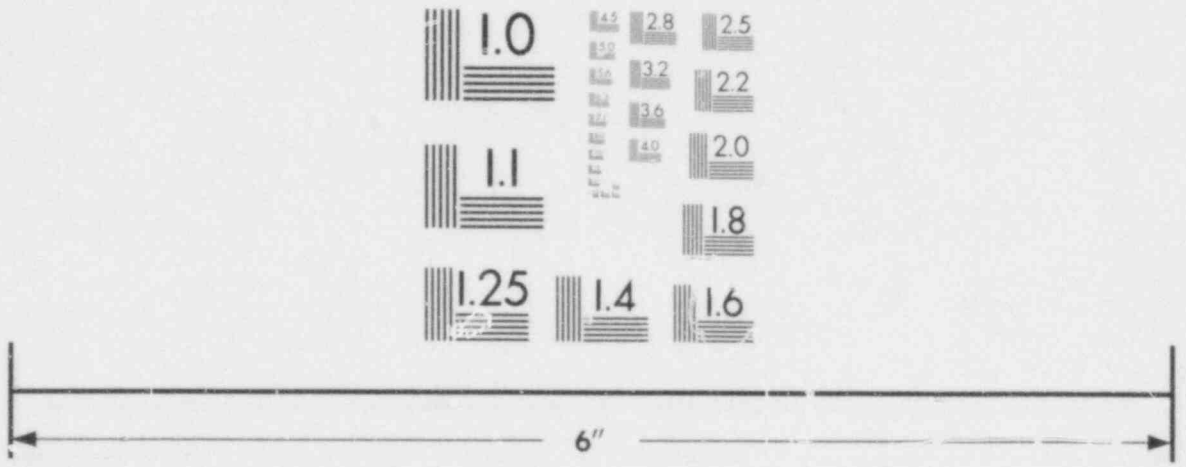
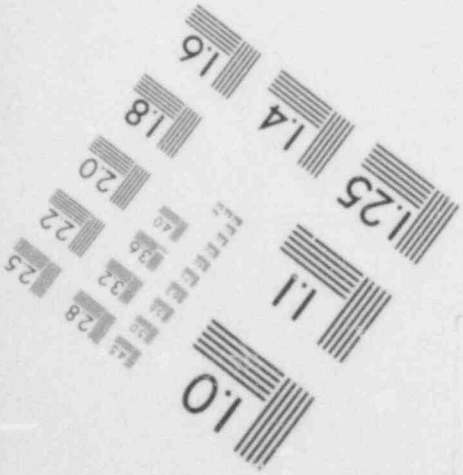
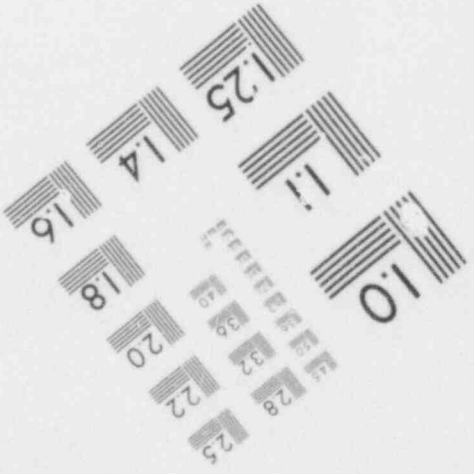
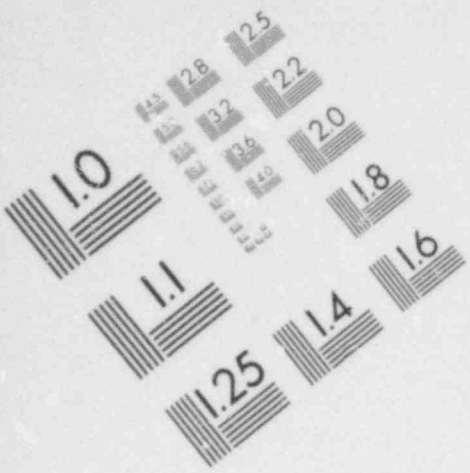


IMAGE EVALUATION TEST TARGET (MT-3)









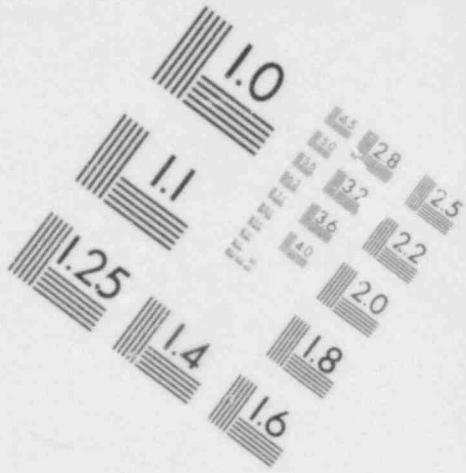
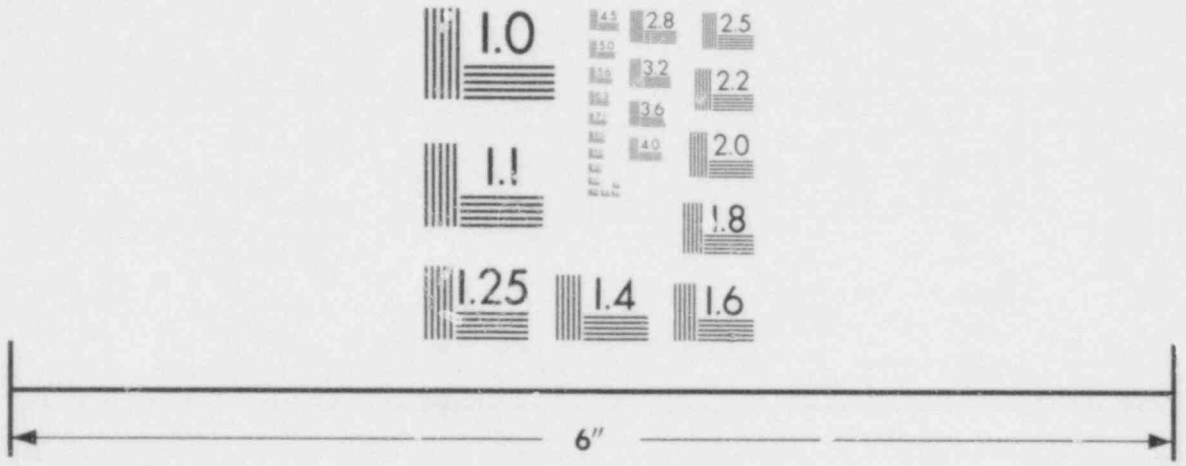
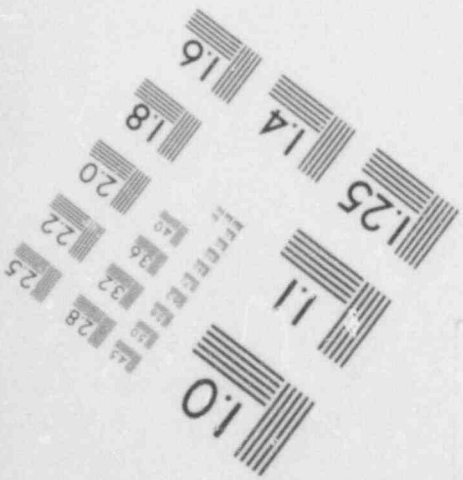
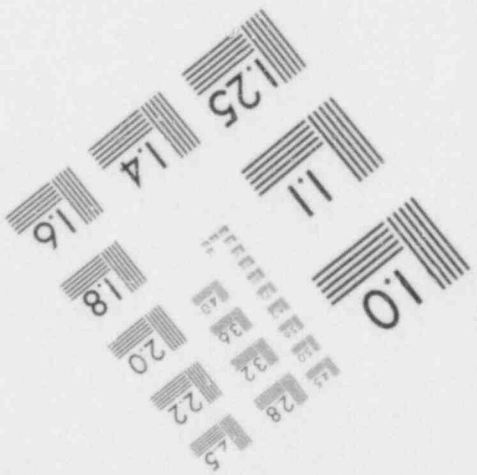
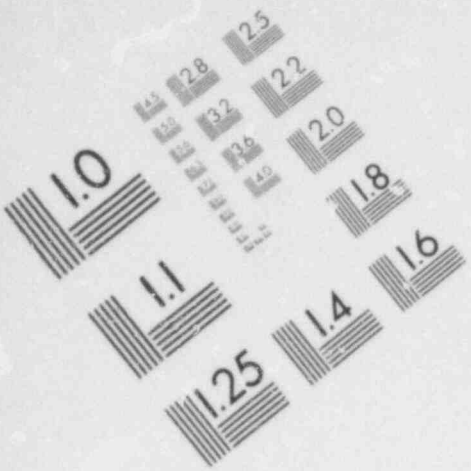


IMAGE EVALUATION TEST TARGET (MT-3)









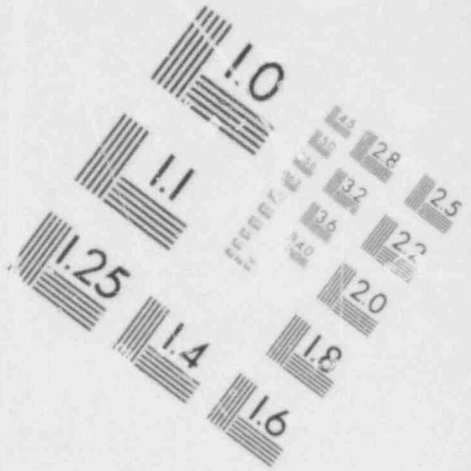
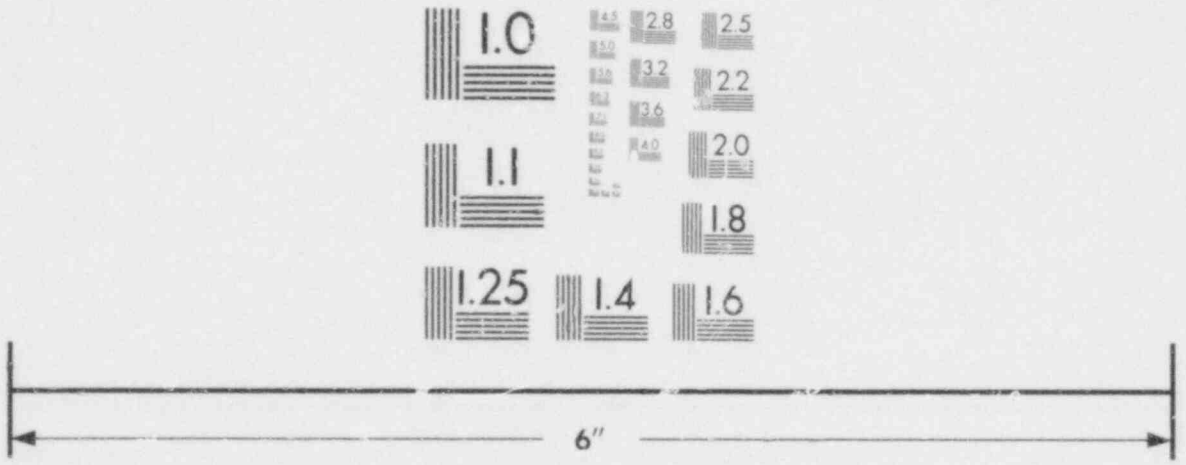
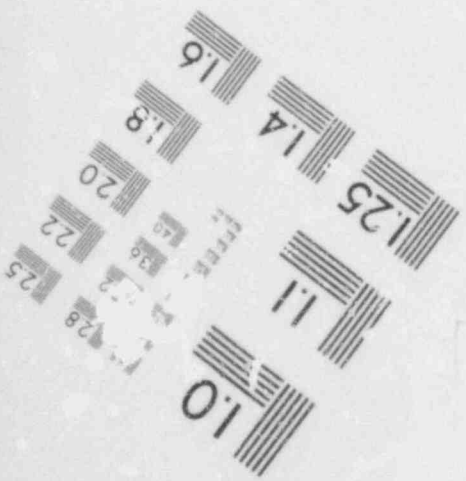
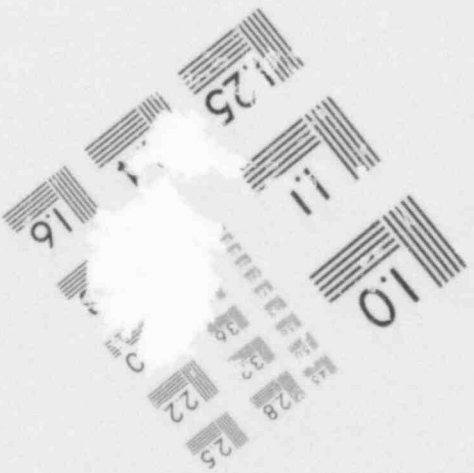


IMAGE EVALUATION TEST TARGET (MT-3)







Loose Parts Monitor

① Bubble movement will be monitored + we will be alerted

② Any structural degradation will be monitored

③ Loose parts will be monitored

Now Very Quiet

RC pumps smooth

Not if 3 legs

- trip pumps
- move valve
- reduce pressure

Agenda - Plan priorities

6:00 Bldg 26, 4th Fl Air NG

(1) NRC [redacted] Status of Plant that we understand
(2) GPU Comment
(3) Summary of Problem Areas:
Zudrowski — Fuel situation
& Hydrogen
Lennon — what do we know
about current mode of
cooling w/bubble
Owen — contingency for loss
of current mode

[redacted]

(4) Other Activities
Boron precipitation
Waste Management

(5) Summary of Decisions to be made
or information to be gathered:

[redacted]

(1) ✓ Betts report on water chemistry
✓ [redacted] Airborne gas sample in containment
✓ Recombiner status, Tech Specs & plans
— (both installed, not purged)
✓ Planning for transfer to decay heat
✓ H_2 bubble & O_2 evolution
Environmental Qualification
inside & outside containment

228 002