

PDR

SEP 28 1979

MEMORANDUM FOR: Chairman Hendrie  
Commissioner Gilinsky  
Commissioner Kennedy  
Commissioner Bradford  
Commissioner Ahearn

THRU: Lee V. Gossick <sup>(Signed) T.A. Rehm</sup>  
Executive Director for Operations

FROM: Harold Denton, Director, Office of Nuclear  
Reactor Regulation  
Victor Stello, Jr., Director  
Office of Inspection and Enforcement

SUBJECT: INCIDENT AT NORTH ANNA ON SEPTEMBER 25, 1979

By memorandum dated September 26, 1979, initial responses were provided to the Commission's requests for information concerning the incident at North Anna on September 25, 1979. Additional information with regard to two of those requests is presented below:

1. Request

Provide a detailed chronology of the measures taken by the licensee and the NRC staff to notify appropriate state and Federal officials of this incident, and an analysis of how well the notification system functioned.

Response

A detailed chronology of the measures taken by the licensee and the NRC staff to notify appropriate officials is set forth in Enclosure 1. An analysis of how well the system functioned is in progress.

2. Request

Assure that the Commissioners be kept informed of all new significant information on an on-going basis.

Response

The sequence of events which occurred at North Anna is described in Enclosures 2 and 3. Enclosure 2 covers reactor systems even ; and Enclosure 3 covers radiological release and monitoring events. In addition, descriptions of the principal radiological events are given in Enclosure 4.

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The information presented in these responses is preliminary and will be revised, corrected, or supplemented as our knowledge of the incident and the circumstances surrounding it increases.

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Director  
Office of Inspection  
and Enforcement

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Harold Denton 9-28-79  
Director  
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Reactor Regulation

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Personnel Notification and Action

Event 6:09 a.m.      Reactor Trip

Event 6:13 a.m.      Safety Injection from low pressurizer pressure.

6:13 a.m.      Control room operator calls On-duty supervisor, the North Anna Operating Supervisor, after plant trip. Safety injection occurred while on phone. The operating supervisor recommended MSIV closure.

Control room received call from IE Incident Response Center inquiring as to plant status, the caller was informed that the reactor was tripped and that a low-pressure safety injection has just been received. (see response to item 2, Commission reply dated 9/27)

6:20 a.m.      The North Anna Station Manager, arrived on site, went to control room. Safety injection was still in progress.

6:40 a.m.      The North Anna Superintendent of Operations, arrived on site and went to control room. First reactor coolant pump had just been restarted.

6:50 a.m.      VEPCO Director of Nuclear Operations, notified of plant trip by the Station Manager.

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- 6:55 a.m. The Operating Supervisor arrived at the control room, got briefing, reviewed plant status.
- Event 7:00 a.m. Auxiliary Building radiation monitor increased to 1000 times background. Auxiliary Building evacuated.
- 7:05 a.m. Auxiliary building air samples taken.
- 7:20 a.m. The North Anna Health Physics Supervisor arrived and went to control room. Reviewed radiological problems, proceeded to direct efforts by H. P. staff.
- 7:30 a.m. Auxiliary building posted as an airborne radiation area.
- 7:30 a.m. Resident Inspector arrived at site.
- 7:50 a.m. The Station Manager notified the NRC Resident Inspector of reactor trip and safety injection current status.
- 7:58 a.m. The Resident Inspector notified a RONSB Section Chief, Region II of trip and safety injection, plant status. Proceeded to control room to assess plant status and obtain details of event.
- 8:00 a.m. The Director of Nuclear Operations called plant management regarding status and plans for remaining shutdown and begin refueling outage or return to operations.

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8:20 a.m. The VEPCO Superintendent of Technical Services, arrived in control room after visit to station services office. Received briefing on way to control room. Started reviewing reportability of event, dispatched engineer to gather information on it, checked on H. P., chemistry activities; initiated an engineering evaluation of rapid cooldown of reactor coolant system due to safety injection. Westinghouse contacted on this.

8:50 a.m. The Resident Inspector called a Region II RONSB Section Chief to provide more details on event and plant status. The plant had been returned to no-load Tavg and was stable.

Event 9:00 a.m. Auxiliary Building radiation monitor indicated background.

9:00 a.m. The Director of Nuclear Operation informed station management of decision to remain down to begin outage. Problems observed during trip and safety injection reviewed further.

10:40 a.m. Region II informed IE Headquarters/Field Coordination of the event.

10:50 a.m. The Resident Inspector related additional information to his Section Chief; activity levels, plans for shutdown, excessive cooldown rate.

11:00 a.m. Region II initiated the transmittal of Preliminary Notification PNO-II-79-1 to H Street, Maryland National Bank Building, Phillips Building and East-West Towers. Transmittal completed at 11:20.

11:00 a.m. Commonwealth of Virginia (Bureau of Radiation Health) was informed by Region II.

11:15 a.m. A second contact was made with Commonwealth of Virginia by Region II to correct PN statement on news release.

11:45 a.m. IE Field Coordination informed IE Technical Programs.

12:00 p.m. Additional exchange of information between Technical Programs and Region II.

12:15 a.m. Technical Programs briefed the Director of Inspection and Enforcement.

12:15 a.m. Field Coordination informed the NRR Chief of Operating Reactors Branch 1.

12:30 p.m. Region II informed NRR Licensing Project Manager.

12:45 p.m. Technical Programs informed Nuclear Reactor Regulations.

1:00 p.m. IE Deputy Director notified Congressional Affairs between  
10:00 a.m. and 1:00 p.m.

1:00 p.m. Region II, also, informed NRR Chief of Operating Reactors  
Branch 1.

1:00 p.m. VEPCO notified County administrations of Lousia and  
Spotsylvania Counties.

1:15 p.m. NRC Operations Center was manned.

1:30 p.m. NRC Operations Center obtained status of plant from  
Resident Inspector.

1:30 p.m. The NRC Operations Center notified the following persons  
of the event:

Chairman's Technical Assistant  
Executive Director for Operations  
Commissioner Bradford's Technical Assistant  
Commissioner Ahearn's Technical Assistant  
Commissioner Gilinsky  
Director of Nuclear Reactor Regulation

2:29 p.m. NRC Operations Center obtained status of plant from  
VEPCO Vice President.

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2:30 p.m. NRC Operations Center reached Commissioner Kennedy's Technical Assistant.

2:54 p.m. VEPCO Vice President and the Plant Manager discussed the event and plans with the NRC Operations Center. VEPCO agreed to put the plant in the cold shutdown mode per normal procedures and to issue a press release.

3:00 p.m. VEPCO notified Commonwealth of Virginia Office of Emergency Services.

4:07 p.m. White House Situation Room was notified.

4:15 p.m. Director, IE, called Governor's Office

4:57 p.m. Commonwealth of Virginia informed of PN supplement.

7:30 p.m. DOE was briefed.

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ENCLOSURE 2

SEQUENCE OF REACTOR EVENTS

Much of the following information was taken from the data acquisition system. Because of system limitations, the times given are approximate.

- 0544      Reactor power was at 78%. A tube rupture in the drain cooler for low pressure feedwater heater 5B caused drain cooler dump valve LCV-SD-124B to cycle. The valve apparently failed closed causing extraction steam condensate to back up into the feedwater heater.
- 0609      The turbine tripped on high nigh level in feedwater heater 5B. The reactor tripped because of the turbine trip. The main steam dump valves opened automatically to reduce the reactor coolant temperature below the no-load setpoint which is 547°F. One of the main steam dump valves failed in the open position causing the reactor to cool down rapidly below 547°F.
- 0610      The low pressurizer pressure alarm actuated at 2022 psig. The temperature in loop 2 of the reactor cooling system was 537°F, 100° below the saturation temperature. At least one bank of pressurizer heaters actuated and an auxiliary feedwater pump started.
- 0611      Pressurizer pressure was 1901 ± 16psig. The temperature of the reactor coolant system cold leg was 533°F, 94° below the saturation temperature. Condensate pump 1C tripped. Main feedwater pump C tripped because of low condensate pressure. Steam generator low level alarms actuated.

- 0612 The temperature of the reactor coolant system cold leg was  $522 \pm 2^{\circ}\text{F}$ .  
The level in the volume control tank was low at 17%.
- 0613 Safety injection initiated automatically because of a low pressurizer pressure signal, the low pressurizer level signal had been previously administratively tripped based on IEB 79-06A. The event resulted in a decrease in pressurizer level below the trip setpoint. Pressurizer level was at 0.2% and the alarm setpoint is at 9%.
- 0614 The reactor coolant system cold leg temperature was  $507 \pm 3^{\circ}\text{F}$ .
- 0615 High pressure safety injection pump B started. The low pressure safety injection pumps started. Main feedwater pump A tripped because of the safety injection signal.
- 0617 Pressurizer level was at 9.4%.
- 0618 Pressurizer pressure was  $2161 \pm 5$  psig.
- 0619 Main steam trip valves had been closed to stop steam dump. Steam pressure was 596 psig. Safety injection was reset. Charging pump (HPI) B was tripped.
- 0620 Reactor coolant system cold leg pressure was 2314 psig.
- 0621 Pressure in steam generator 2 was 596 psig. Feedwater pump C was started.

- 0623 Net volume of water charged into the reactor coolant system in the preceding 10 minutes was 2564 gallons.
- 0625 Auxiliary feedwater pumps 3A and 3B were stopped.
- 0627 The power operated relief valve cycled to limit the pressure rise in the reactor coolant system. Letdown to the chemical and volume control system was initiated.
- 0628 Pressurizer pressure was 2340 psig. Steam generator 3 pressure was 612 psig.
- 0629 Reactor coolant pump 1B was started. Auxiliary pressurizer spray was initiated.
- 0631 Pressurizer level was 63%.
- 0639 Pressurizer power operated relief valve was closed.
- 0648 The relief valve on the volume control tank lifted, thus transferring reactor coolant to the high level waste drain tank and releasing dissolved noble gases to the auxiliary building via the waste system vent. An incorrectly connected vent line allowed venting directly to the auxiliary building.

## ENCLOSURE 3

Radiological Sequence of Events

<u>Date</u>	<u>Time</u>	<u>Item</u>	<u>Results</u>
9/23	0730	Reactor Coolant Sample	I-131-3.9 E-2 uc/cc
9/25	0000-0400	Auxiliary Bldg. Air Samples	No significant activity
	0609	Reactor Trip	
~ 0700		Auxiliary Building Air	Increased to ~ 1000 times
		Monitors Increase	background - returned to
			background by 0900
~ 0700		Evacuated Auxiliary Building	Two people
0705-0710		Auxiliary Building Air	100-150 times MPC
		Samples	
0720-0803		Auxiliary Building Vent	
		Sample Results	
		Vent A	Xe <sup>133</sup> - 2.0 E-5 uc/cc
			Xe <sup>135</sup> - 9.6 E-6 uc/cc
			Xe <sup>133</sup> - 1.0 E-5 uc/cc

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Vent B

Xe<sup>133</sup> - 1.0 E-5 uc/cc

0830-1430      Auxiliary Building Air      Noble gas activity  
                    Samples                      < 10% MPC by 1030

0940      Reactor Coolant Sample      I-131-8.1E-2 uc/cc

1400      Containment Entry and Air      Activity - 240 x MPC  
                    Sample                      (not unusual for  
    operating PWR facility)

1600      Reactor Coolant Sample      I-131-1.4E-1 uc/cc

~1700      South Fence Line TLDs Changed      No exposures above  
    background

RADIOLOGICAL EVENTSRadioactivity Released From the Plant

The vent stacks and process vent were continuously monitored by the installed monitoring system for noble gas and particulate activity during the transient. Continuous cartridge collection sampling systems for iodine were in operation. Noble gas monitors increased about a factor of 200 over ambient, returning to ambient levels by 0900. All monitor systems remained operational and on-scale throughout the release.

In addition, grab samples were collected from the auxiliary building vents. Based on an analysis of these samples, it is estimated that approximately 7.5 curies of noble gases (primarily Xe-133) were released over a period of three hours. No iodine activity was detected in the samples. The release amounted to approximately 0.1 percent of the applicable license limit. (i.e., 0.1% of the maximum allowable instantaneous release rate)

Offsite Radiological Impact

During the period of release the wind was blowing from the North to the South. Using site meteorological data, the dispersion factor ( $X/Q$ ) at the site boundary was  $4 /10^{-6} \text{ sec/m}^3$ . Based on a total estimated release of 7.5 curies over a three hour period, the dose to an individual at the site boundary would be less than .01 millirem. Fourteen (14) TLDs at the site boundary were pulled subsequent to the transient and showed no exposures above background.

Plant Personnel Exposure

No significant personnel exposures resulted from the transient. A total of five plant personnel were involved with the evacuation and re-entry of the auxiliary building. (Two people had to be initially evacuated.) The maximum radiation dose received by any single plant personnel was 10 millirem as measured by pocket dosimeters.

The TLDs of the five personnel involved were read with the following results for the exposure periods involved:

Personnel	Total Dose	Exposure Period
A	157 mrem	Sept.
B	71 mrem	Sept.
C	17 mrem	July/Aug/Sept
D	13 mrem	Sept.
E	3 mrem	10-26 Sept.

Radioactivity Evaluation - In Plant

Shortly after reactor trip, air samples of the auxiliary building indicated Xenon at approximately 100-150 times MPCs. Levels reduced to less than 10 percent of MPC, by 1030.

Primary coolant samples showed only slight increases in iodine concentrations which are expected to occur following a reactor trip.

In plant area direct radiation monitors and direct radiation surveys showed no significant increase above normal levels.