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Mr. Thomas Ploski  
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and Operations Support  
U.S. Nuclear Regulatory Commission  
Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Dear Tom,

## DAVIS-BESSE NUCLEAR POWER PLANT EMERGENCY EXERCISE REPORT

Enclosed is the finalized report of G. W. Bethke, C. D. Corbit, W. F. McCready, J. G. Myers, and W. V. Thomas, who were Pacific Northwest Laboratory (PNL) participants during the Davis-Besse Nuclear Power Plant Emergency Preparedness Exercise, April 13 and 14, 1983. Only minor changes were made from the rough draft supplied to you prior to leaving Davis-Besse. Areas covered by PNL are as follows:

G. W. Bethke	Technical Support Center
W. F. McCready	Control Room
C. D. Corbit	Operations Support Center
J. G. Myers	Offsite Monitoring Teams
W. V. Thomas	Operations Support Center

If you have any questions regarding the report, please contact W. V. Thomas on FTS (509) 375-2088.

Very truly yours,

*C. Martini*

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## Operational Support Center

A. Name: W. V. Thomas

B. Assignment: OSC, Health Physics Monitoring Area

The Health Physics (HP) Monitoring Office was manned promptly upon declaration of Alert. Accountability in the HP area was completed in less than 10 minutes and relayed to the OSC Supervisor upstairs on the turbine deck. Supervision in the HP office was promptly assumed by the HP Foreman. A head set was hooked up to the Gaitronics and communication was maintained with the OSC Supervisor. Additional communication was maintained by telephone. HP logs were maintained by the HP Foreman and the Communicator.

HP monitoring teams were dispatched by the HP Foreman to assist maintenance and repair teams. All teams were briefed prior to departure as to radiation levels in the plant and plant status conditions. Prior to dispatch accumulated exposures for team members were determined and allowed exposures were assigned. In plant radiation surveys were performed in a professional manner. The RCS activity was observed, the sample was collected and analyzed within three hours.

C. Comments

A number of scenario problems were noted:

1. Dose rates and radiological conditions within the plant as evidenced by the RMS should have been given in the scenario.
2. Accumulated personnel radiation exposures to the maintenance team and HP team members, while closing the MSL relief valve and obtaining the RCS, should have been included in the scenario.
3. An additional controller should have been assigned to the HP monitoring office. Instead, one controller was assigned to the two areas which compose the OSC.

F. Chronology

<u>Time</u>	<u>Observation</u>
1415	Call to CR to report RCS results: 65 $\mu$ Ci/gm I-131 equivalent.
1445	Second coolant sample obtained and counted.
1515	Call to CR to report 310 $\mu$ Ci/gm I-131 equivalent.
1520	Assembly in Rad Chem area.
1525	Accountability complete all accounted for.
1530	All rep's pulled. No entry to RACA permitted.

<u>Time</u>	<u>Observation</u>
1536	Dispatch 2 rad/techs to search Rm. 100 for 2 UE employees missing during accountability.
1537	UE employees report to RACA.
1550	Request for 2 HP/testers to ECC. Plant chem. reports.
1610	Sample and letdown area RMS: 5 R/hr, no airborne.
1613	Request to confirm RMS readings; #1 ECCS 1003 A&B.
1617	Dose rates confirmed. Monitoring teams recalled.
1620	OPS requests additional RCS sample.
1620	1003 A&B 60 cpm increased. Decision made to take air sample.
1622	Rad/Chem team dispatched for additional RCS.
1627	Request for check of reactor power level 67%.
1635	Report to CR: 310 $\mu$ Ci/gm I-131 equivalent; 310 $\mu$ Ci/cc noble gas in third RCS.

<u>Time</u>	<u>Observation</u>
1645	No. 1 diesel generator tripped - cannot restart. Problem with overspeed trip.
1655	Request for Rad. Tech. at DBAB to open counting lab.
1703	Announcement: loss of station computer and annunciator in Control Room-Site Area Emergency declared.
1710	TSC requests resurvey of Auxiliary Building. Briefing by OSC Director, instructed to carry respirator equipment.
1715	Proceed with HP monitor and maintenance team to shut main steam relief valve (MSRV).
1745	Return to HP monitoring room.
1746	OSC Coordinator briefed on MSRV activity; MSRV still open.
1756	Requests for radiation survey and air sample of Turbine Building and 603 ft level of Auxiliary Building.
1815	MS monitors still background.
1820	Simulated RCS; same results reported to CR.

<u>Time</u>	<u>Observation</u>
1920	Report of tube failure.
1925	General Emergency declared.
1937	13.5 mR/hr at site boundary; normal readings on turbine floor.

End of Day 1

Drill Time

2230	Reassemble in HP monitoring room.
2245	Report to OSC. KI distributed to security force.
2250	Check of CAM and RMS. No background increase on CAM. Auxiliary Building monitors read 5 R/hr.
2253	Request survey of main steam relief valve. Still 500 mR/hr at door, 2.5 R/hr door open, 7.5 R/hr at valve.
2254	One man reports iodine allergy; told to leave area.
2304	Four 2-man maintenance teams working on valve closure; 2-man HP coverage provided.

<u>Time</u>	<u>Observation</u>
2337	Continuing work on steam line valve; ~1/2 hr work remaining. Condenser vaccum started. Area roped off. Will dump polishers, at 150 mR/hr general area, to rad waste holdup tanks.
2349	Recheck of CAMs, check polisher general area, reset ARMs to prevent nuisance alarms in Control Room.
2402	Main steam line relief valve has been closed. Rad survey requested in area.
2430	Drill terminated.

## TSC

A. Name: G. W. Bethke

B. Assignment: TSC

C. Positive Comments

1. Electrical engineering efforts in the TSC were very detailed and well thought out.
2. The Chem/HP Manager performed analysis and calculations in a very professional manner (although it is questionable whether he should be doing this rather than concentrating on management).

D. Negative Comments

1. The TSC at Davis-Besse, although operated in accordance with site procedures, is quite different in concept from any perviously observed.

Examples:

- The role of Emergency Director passed directly from the Shift Supervisor to ECC Management.
- The Plant Manager was never the Emergency Director.
- The TSC had no consistent, strong management presence.
- Various people in the TSC (e.g., Chem Manager/HP) are not in the chain of command of the "Operations Assessment Manager" (i.e., "Senior" man in TSC).



2. General TSC comments:

- It took about an hour after Alert declaration to post the first plant parameters and status.
- No TSC activation checklist was in use.
- No general announcement was made by anyone "in charge" in the TSC.
- Reactor systems analysis in the TSC did not receive the type of detailed effort that electrical problems received (e.g., treatment of analysis of coolant mass balance as an impossible task).
- The Chem/HP manager had to perform the majority of the "accurate" dose calculations personally. His primary assistant was in the ECC. He should have a small team in the TSC. Had there been significant in-plant radiological problems, it is not apparent how he could have dealt with them.
- No consolidated official log was maintained in the TSC.
- The lack of prepared forms (such as offsite dose calculation forms) necessitated people writing in their books. Recommend providing a supply of forms and worksheets.

3. Dose assessment calculations received from NRC over the ENS did not contain information on assumptions made. Since the calculations did not agree with those made by the licensee, they decided to ignore them. They should have compared results and assumptions over the HPN.

4. It took approximately 45 minutes after the start of the release to perform accurate dose projections.

5. The technical personnel in the TSC did not have adequate knowledge of records or personnel to retrieve technical data (e.g., results of latest ILRT).
6. No formal plans were made (on day 1) to provide for long term shift manning, logistics, etc.
7. The return of RCP's to service following the return of offsite power was treated fairly lightly. This in fact would be a closely scrutinized procedure. TSC management verbalized a lack of concern for RCP seal failure.
8. The decision to start steaming #1 S/G to the condensor (after drawing a vacuum with steam from #2 S/G) was made with little regard for radiological consequences in the B.O.P. This discussion (with the Chem/HP Manager) took place at a point in time after which they would have started steaming the S/G. This problem was somewhat scenario related.
9. The matrix management organization could result in command and control problems during a real emergency.

## Control Room/TSC

A. Name: W. F. McCready

B. Assignment: Control Room, TSC

C. Scenario Problems/Controller Problems

1. Containment airborne activity and corresponding radiation level data (due to normal leakage with elevated coolant activity) was ignored - i.e., no data provided.
2. Airborne activity and general area radiation levels around letdown system components in the Auxiliary Building were ignored - i.e., data not provided. Note: Control Room Controller created data when necessary.
3. MSL radiation monitors on 1-1 steam line (analyze - gross) were not provided. Note: Control Room Controller later created data as necessary.
4. Direct gamma dose rates from steam safety tailpipe were not considered in data generation.
5. Only one set of  $T_c$  and  $T_h$  data was provided. (Presumably unaffected loop.) This will present a problem later in the exercise. Note: TSC Controllers were not sure which loop the data applied to.

6. The 1300 briefing of controllers on April 12 was the first training the scenario developers had given the controller team. This may result in problems. Controllers pointed out these scenario problems at the briefing but it was too late.
7. Confusion was caused (at least at NRC) by the lack of explanation in the scenario for failed fuel (i.e., no transients, no loose parts, monitor readings, etc.). This created a potential security sabotage scenario in parallel.
8. The Controllers gave out 7.5 R/hr at MS safety relief valve about 2 hours before the tube rupture. This caused great confusion in the CR.
9. The scenario did not include off centerline plume data, nor did it include open/closed window readings.
10. The Controllers may not have provided chemists with complete coolant isotopic analysis. This caused great confusion in the TSC and CR since they had only Xe-133 and I-131 equivalent data.
12. The Controllers did not explain the clock vs. scenario time convention to the players before the 0830 restart on day 2. This will ultimately cause problems. They did not because they decided later to go to clock time.

13. The Controllers in the TSC did not pay any attention to the participants plan to draw a vacuum in #1 S/G to terminate the release. Therefore, they were not in communication with each other to make data adjustments.
14. The scenario did not accurately reflect the time necessary to recover from loss of offsite AC power and the re-initiation of RCP's. It was not clear that that action should even be taken right away due to one idle leg, cold water injection, or boron levels, etc.
15. The Control Room needs two Controllers: one to pass out cue cards and data and one to be in overall control of the exercise and to handle scenario problems. The Control Room Controller did an excellent job in this exercise, considering the work overload.

D. Comments on EPIP EI 1300.07, TSC Activation

- Formal logbooks were not distributed (or used) as required per section 5.4.7.
- The Tech. Engineer (or anyone else) did not verbally brief TSC personnel on plant or radiological conditions as required per section 5.6.5.
- B&W was contacted late (~ 2110)
- Bechtel was not contacted.
- NSAL was not contacted (as per section 5.9.5)

- No formal record of TSC activities was maintained. One stenographer was keeping a record in a spiral notebook of items passed by the two technical communicators. The more formal looking log was not used as required per section 5.9.6.

## Offsite Monitoring

A. Name: John Myers

B. Assignment: Observe offsite monitoring team(s) activities

C. Summary: Radiation monitoring teams were well versed in use of radiation detection and air sampling equipment. Instruments were functionally checked prior to use. All had been calibrated within the prescribed schedule. Teams were able to quickly locate sampling locations assigned by ECC. Air samples were correctly taken and filters were properly field read, bagged, and tagged with results recorded.

Continuous communications were maintained via radio between teams and ECC.

Soil and vegetation samples were properly taken, bagged and tagged. Installed dosimeters were in weather proof containers.

D. Findings:

- Problems with security at the Administration Building (i.e., lack of adequate communications) caused a delay of ~15 minutes in delivery of an air sample to the RTL.
- Air samples were taken during a severe rain storm. If this had been an actual event, most if not all, of the iodine in the plume would have been washed out and the air sample would have been meaningless.

- Maps showing sectors, roads, and sampling/dose rate points were printed on 8 1/2 in. x 11 in. paper. Information (e.g., road designations, sample points, etc.) could not be quickly identified due to the reduced size.
- Teams were recalled to the RTL to deliver air samples resulting in time lost from assigned task (i.e., offsite monitoring). One team could have handled this by picking up samples from other teams.
- Sedans were used and equipment was placed in the trunk. There were no offroad/4 wheel drive vehicles available for use off established roads.
- There was no backup communications (i.e., walkie talkies) available. Had the vehicle radio failed, communications with the ECC would have been impossible. Note: walkie talkies are stored in the instrument cabinet in the RTL but were apparently out-of-service.
- No observer or controller was assigned directly to the RTL. Team observers/controllers functioned only when teams came in from the field.
- Teams did not routinely keep track of their exposure (read pencils) or report same to the ECC. Note: ECC asked for this information only once. Teams kept no exposure log.
- Personnel dosimetry did not include self reading dosimeters with ranges higher than 0-1.0 R/hr.



- At the only permanent sampling station visited, no calibration tag was noted on the continuous air monitor.
- The ECC failed to keep offsite teams apprised of plant conditions in a routine manner.
- Plume centerline data was not transmitted to the offsite teams. Teams were never informed by the ECC where the centerline was in relation to assigned sampling locations or if assigned locations were indeed in the plume. Plume tracking was inadequate.

#### E. Chronology

<u>Time</u>	<u>Observation</u>
<u>Day 1</u>	
1575	Functional checks of offsite instruments started.
1611	Functional checks completed.
1700	Offsite teams dispatched.
1719	Reported to and held at intersection of Rt. 2 and Russell (entrance
to	to Administration Building). Took dose rate measurements and an
1939	air sample.
1939	Ordered to return to RTL to deliver air sample.

<u>Time</u>	<u>Observation</u>
1958	Delivered sample to RTL.
2040	Arrived at Rt. 19 and Genzman in Sector L. Took dose rate measurements and air sample; reported to ECC.
2113	Requested to bring air sample to RTL.
2126	Arrived at RTL and delivered air sample.
2132	Team released. End of day 1.

Day 2

0908	Offsite teams dispatched.
0921	Arrived at Magee Marsh (Rts. 2 and 23). Dose rates taken and reported to ECC.
0928	Arrived at Crane Creek State Park. Dose rates taken and reported to ECC.
0936	Arrived at Crane Creek Store (Rt. 2). Dose rates taken and reported to ECC.

<u>Time</u>	<u>Observation</u>
0949	Arrived at Rts. 208 and 579. Dose rates and air sample taken.
to	Results reported to ECC.
1017	
1019	Ordered to report to RTL.
1033	Arrived at RTL. Team released.
1110	Team dispatched to obtain soil and grass sample (simulation)
1131	Arrived at sampling station T8 (Morris Orchard). Simulated soil and grass collection.
1150	Arrived at RTL. Team released.

### OSC, Maintenance

A. Name: C. D. Corbit

B. Assignment: OSC, Maintenance Team

D. Summary: The Unusual Event was announced in the OSC at 1421. Just prior to the announcement of the Alert at 1520, the Maintenance Engineer asked the offgoing shift to remain at the plant until further notice because high iodine concentrations had been found in the primary loop. By 1925, the first-aid team, fire brigade, and OSC were fully manned and accounted for. OSC personnel were generally responsive to all support activities requested, and the OSC Manager was clearly in charge at all times. All controllers, observers and participants properly conducted their roles. OSC logs were properly maintained.

The first call to the OSC, from the Diesel Generator Room, had a bad connection. The OSC Manager had the caller recall the OSC on another line and that cleaned up the connection problem. The communications system functioned well throughout the remainder of the exercise.

Two communication problems were observed. The first arose during a response to gag a steam vent valve (SP 17B1). At 1649 it was announced that the OSC could not send a team to gag the valve because the foreman did not know where the steam suits were. Nonetheless, the OSC sent a team to gag the valve and the observer went with them. After picking up a valve gag (and simulating a

screwdriver and crescent wrench), the team found that their security passes did not open door 605. A security guard was called, who arrived in less than 3 minutes and opened door 605 with a key. The maintenance craftsmen explained that steam suits would not be needed.

The second communications problem related to the station access control point (Guard Station). The OSC was told that the Guard Station had been taken over by outside forces. This turned out to be false. The OSC promptly called the security force and obtained permission to gain access in and out of the plant via the "old" guard station, permission was granted. Miscommunication occurred in spite of the fact that the exercise scenario did not contain any security events.

#### D. Findings

- Two personnel communications problems were observed, one involving the need for steam suits, the second, a security problem that did not exist. The licensee should review the methods for rumor control within the plant during emergency simulations and events. At a minimum, the in-plant security control point (CAS) should be contacted for information on security events.

#### E. Chronology

<u>Time</u>	<u>Observation</u>
<u>Day 1</u>	
1420	UE was announced over PA system/alarm. "No assembly is required at this time."

<u>Time</u>	<u>Observation</u>
1515	High primary coolant iodine concentrations (above technical specifications) was announced. OSC Manager requested offshift personnel to remain onsite until further notice.

1520	Alert was called, iodine concentrations in primary coolant increased.
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1525	OSC operational. Fire brigade in place and first-aid team in place. OSC Manager had bad phone connection, recall on different line cleaned it up.
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Following rapid accounting for personnel by various assigned leaders, cross checking with the computer print-out occurred. This was a lengthy process lasting about one hour. The computer program does not place personnel by organization, whereas the accountability does. Further, only one pre-developed accountability checklist was observed by the inspector.

1604	Contractor personnel were evacuated.
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1621	All cross checks of accountability were completed.
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1633	Reactor trip announced.
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1635	Maintenance team sent to Diesel Generator.
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<u>Time</u>	<u>Observation</u>
<u>Day 2</u>	
0830	Drill resumption announced. OSC manned.
0851	Resurvey of steam valve location requested; the OSC Manager ordered it done.
0856	OSC survey shows no problems.
1100	Downgraded emergency to Alert.
1123	Secured OSC.

<u>Time</u>	<u>Observation</u>
1649	Cannot send team to repair steam valve. Foreman does not know where steam suits are.
1704	Site Area Emergency declared; Control Room annunciators and computer lost.
1730	Observed maintenance team simulate valve gag. Door 605 would not respond to security cards of team (nor observers). Security was called and they opened the door. At door 602, the Radiation Tester made dose rate measurements. Controller gave information from wrong scenario page: the Tester calculated 45 minutes of stay time was the maximum allowed. Maintenance Craftsmen said they could gag valve in 2 minutes unless the disk was broken. Gaging was not allowed at this time. Five minute delay required to determine which valve required gaging.
1820	General Emergency announced.
2006	Radiation readings showed OSC had no habitability problem. Before they left the OSC, the Testers were asked what the airborne readings were--they did not know. The OSC Manager requested readings on dose rates and air samples every 30 minutes.
2200	Activities ceased, exercise terminated for the day.