U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-346/84-14(DRSS)

Docket No. 50-346 License No. NPF-3

Licensee: Toledo Edison Company
Edison Plaza
300 Madison Avenue
Toledo, OH 43652

Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection Conducted: July 30 through August 1, 1984

Inspectors: J. P. Patterson (Team Leader) — Date: 8/23/84

M. J. Smith — Date: 8/22/84

Approved By: M. P. Phillips, Chief, Emergency Preparedness Section — Date: 8/22/84

Inspection Summary

Inspection on July 30 - August 1, 1984 (Report No. 50-346/84-14(DRSS))
Areas Inspected: Routine announced inspection of the following areas: Davis-Besse Nuclear Power Station emergency preparedness exercise involving observations of key functions and locations during the exercise by seven NRC representatives; and licensee actions on previously identified emergency preparedness items. The inspection involved 165 inspector-hours onsite by three NRC inspectors and four consultants.
Results: No items of noncompliance or deviations were identified; however, exercise weaknesses were identified which are specified in the appendix to the transmittal letter. Other areas for improvement are included at the conclusion of each area observed.

DETAILS

1. Persons Contacted

NRC Observers and Areas Observed

F. McManus, Control Room
K. Leposer, Technical Support Center (TSC)
W. Thomas, Operational Support Center (OSC) and Onsite Radiological Monitoring Teams
M. Smith, Emergency Control Center (ECC) and Joint Public Information Center (JPIC)
J. Pisarcik, Medical Drill - St. Charles Hospital
M. Phillips, TSC and ECC
J. Patterson, Control Room and Offsite Radiological Monitoring Teams

Toledo Edison Company (TED) and Areas Assigned

R. Crouse, Emergency Director, Davis-Besse Administration Building (DBAB)
J. Dyer, Public Information Director, JPIC
T. Murray, Emergency Operations Manager, ECC
S. Quennoz, Acting Station Superintendent, Control Room
*W. O'Connor, Operations Engineer, Control Room
*D. Miller, Operations Engineering Supervisor, Control Room
*S. Wise, Shift Supervisor, Control Room
D. Briden, Radcon Operations Manager, TSC
J. Wood, TSC Manager, TSC
*B. Beyer, Station Operations Manager, TSC
L. Grime, Emergency Duty Officer, ECC
T. Novak, Nuclear Services Director, ECC
J. Hirsch, Emergency Planning Supervisor, ECC
*R. Wymer, Director, OSC
*J. Grochowski, Maintenance Supervisor, OSC
*J. Ferguson, Radiation Testing Laboratory (RTL) Coordinator, RTL
*J. Syrowski, Offsite Radiation Monitoring Teams Coordinator, ECC
G. Reed, Lead Controller, Control Room
*T. Beeler, Lead Controller, TSC
*M. Horne, Health Physics Controller, OSC

*Denotes those not attending the exit interview on August 1, 1984

2. Licensee Action on Previously-Identified Items Relating to Emergency Preparedness

a. (CLOSED) Open Item No. 346/83-03-09: Lack of fixed emergency lighting in the OSC has been corrected by the licensee by moving the main OSC assembly area to the fifth floor conference room in the Service Building which does have permanent, fixed lighting. This was verified during this exercise by the NRC observer. This item is considered closed.

b. (CLOSED) Open Items No. 346/84-02-01, 346/84-02-03, and 346/84-02-10. The first and third open items originally referred to Administrative Procedure (AD) 1827.10, "Emergency Offsite Dose Estimates," although the context related to protective action recommendations which are addressed in AD 1827.12. The inspector reviewed Revision 15 of AD 1827.10 and Revision 12 of AD 1827.12 and found the revisions satisfactory. These revisions include incorporation of the "keyhole" approach to identify affected offsite regions for protective action recommendations. Evacuation and sheltering options are referenced in AD 1827.12. The second open item, 346/84-02-03, refers to Revision 12 of AD 1827.12. This revision has incorporated sheltering within a two-mile radius and to five miles downwind when a General Emergency is declared. All three inter-related open items are considered closed.

c. (CLOSED) Open Item No. 346/84-02-05: Emergency Plan Implementing Procedure EI 1300.05 has been revised to include in the initial message a description of the recommended protective action, referencing procedure AD 1827.12 for its determination. Procedure 1827.12 contained sufficient guidance to make appropriate protective action recommendations. This reference to AD 1827.12 should be emphasized in future training sessions for emergency response personnel who utilize this procedure. This item is considered closed.

d. (CLOSED) Open Item No. 346/84-02-06: A supply of copies of current revisions to the EDO/Shift Supervisors checklists for each emergency class including the initial message format and related periodic update record forms were available in the Shift Supervisor's office. This item is considered closed.

e. (CLOSED) Open Item No. 346/84-02-07: The Administrative Memorandum No. 37, ECS Pager and Telephone Numbers, has been updated and reissued. Revision 34, dated July 2, 1984, included all key emergency response personnel, their alternates, pager numbers, and the method to page mutual aid support and offsite agencies. This item is considered closed.

3. General

An exercise of the licensee's Emergency Plan (EP), EP Implementing Procedures, and EP Station Supporting Procedures was conducted at the Davis-Besse Nuclear Power Station (DBNPS) on July 31, 1984. State and local governmental organizations did not participate in this exercise as specified in the exemption issued to Toledo Edison by NRC's Office of Nuclear Reactor Regulation. The exercise tested the licensee's capability to respond to a hypothetical accident scenario resulting in a release of radioactive material to the environment. The enclosed attachment describes the scenario.

4. General Observations

a. Procedures

This exercise was conducted in accordance with 10 CFR Part 50, Appendix E, requirements using Davis-Besse's EP, EPIPs, and Station Supporting Procedures.

b. Coordination

The licensee's response was hampered by problems associated with modifying the scenario during the exercise; however, if the event had been real, the actions taken by the licensee would have been sufficient to permit the State and local authorities to take appropriate actions.

c. Observers

Licensee observers monitored and critiqued this exercise along with seven NRC observers.

d. Exercise Critiques

The licensee held a critique at the Davis-Besse Energy Education Center (EEC) on August 1, 1984. The NRC critique followed the licensee's at the same location. The NRC and licensee identified weaknesses in their respective critiques as detailed in this report. Weaknesses identified by the NRC that require a licensee response regarding corrective actions to be taken, are summarized in the appendix to this report's transmittal letter. These major weaknesses and other minor weaknesses are described in Paragraph 5, "Specific Observations."

5. Specific Observations

a. Exercise Scenario

The licensee met the deadline for submission of the exercise scope and objectives and narrative summary of the scenario; however, the complete exercise scenario package with plant data, messages and monitoring data was sent by the licensee within the appropriate time frame, but was so incomplete as to be useless. This final submittal also contained numerous errors. Many plant data sheets were missing and some did not correlate with other messages (e.g., field monitoring data states B stability, corresponding plant data sheet states D and E stability).

These and other scenario inconsistencies were discussed by telephone between Region III and the licensee's staff approximately eleven days prior to the exercise date. An updated final exercise package was presented to each of the NRC team members on July 31, 1984 at the pre-exercise briefing too late for a detailed technical review by NRC. A similar criticism was reported by the NRC following the April 1983 exercise (Section 5.a of Inspection Report No. 50-346/83-07).

One scenario weakness detected was that the leak rate indicated in contingency messages was apparently in error, in that the values indicated in the contingency messages were greater than corresponding injection flow to the primary coolant system even though the reactor coolant was undergoing shrinkage and all level indications were stable. Based on scenario data, the release rates indicated in the contingency messages were significantly too high. During the exercise, Control Room data sheets were being improvised by the Lead Controller, but these new data values were not made available to the TSC or the supporting Emergency Response Facilities (ERFs). As a result, the lack of coordinated data eventually resulted in the TSC being told to stop participating in the exercise. This improvisation of data to accommodate developing conditions, while acceptable, needs to be coordinated with all locations where primary data distribution occurs. By the time the controllers forced the declaration of a General Emergency, the TSC was told to stop participating and the plant conditions were essentially conducive for recovery operations.

Greater effort must be made to include in the scenario development and review process personnel who are skilled in reactor operations, reactor maintenance, DBNPS EALs, and inplant and offsite radiation monitoring procedures at least one of whom has a Senior Reactor Operators (SRO) license. This was recommended also in the 1983 exercise report. In addition, a complete scenario package should be submitted to the NRC for review within the specified time frame so that comments on the technical adequacy can be incorporated into the scenario prior to the exercise.

Based on the above findings, the following action should be taken:

. The licensee should make a more concerted effort to provide NRC Region III with a complete exercise scenario package following the guidelines of FEMA Guidance Memorandum No. 17 which was incorporated in a January 12, 1982, letter from James G. Keppler, Regional Administrator, to Toledo Edison Company. In addition, scenario development and review should include at least one individual skilled in plant operations, preferably an SRO. (346/84-14-01)

b. Control Room

The Shift Supervisor (SS) on duty correctly classified the fire in the drumming area as a Notice of Unusual Event (NUE). All emergency classification notifications were made in a timely manner; however, a contingency message was needed to prompt the SS/EDO to notify the Ottawa County Sheriff's Department when the reactor tripped at 1843. Management staffing was quickly and efficiently implemented at the NUE level to augment the on duty staff and put others on a standby status, with the exception of one reactor operator (RO) who was missing, forcing use of an onshift RO for part of the exercise. The communicators demonstrated familiarity with notification procedures, including the taping of messages at the different emergency level classifications to the Toledo Edison operator. Some difficulty was encountered in playbacks requiring the message to be taped two or three times in certain instances to get an audible message. Recorded

messages were also used to activate the Davis-Besse call system for emergency personnel to report. These activities were handled well; however, as the emergency escalated and more personnel responded, the noise and activity levels increased.

Reaction to the actual failure of the fire alarm was effective and repairs were made quickly. At the initial stages of the exercise, the Controllers had difficulty keeping up with the operators. Work on the Steam Feed Rupture Control System was stopped by the SS, which required restart by the Controller in order to continue the exercise. An operator de-energized the electrical panels in the vicinity of the fire fighting activities due to water in the panel. The controller later had to have the panel re-energized in order to continue the exercise. As a result, confusion resulted in the Control Room as to which panels were energized and which were de-energized. A third Controller in the Control Room would have been helpful to better control the course of the exercise. Although freeplay is a noteworthy aspect to utilize, some discipline and control is needed in this crowded noisy area to ensure that the exercise runs smoothly. At times, it was difficult to determine who was in charge. It appeared that management operating personnel were taking actions and giving orders to an operator independent of the SS.

The exercise failed to achieve the General Emergency level until directed by the Lead Controller at 2310. At 2120, the leak rate was calculated at 208 gallons per minute (From Data Sheet #44); however, the corresponding contingency message showed the leak rate at 600 GPM. At 2153, a 1% fuel gap failure was reported. Although this 1% gap failure was reported, coolant sample activity was not beyond the level sometimes encountered for the iodine spike after reactor trip, and a subsequent primary coolant sample was within normal limits. Therefore, the joint review with TSC/ECC of EAL initiating conditions did not clearly indicate that all fission product barriers were lost. The Lead Controller finally interceded to declare the General Emergency at 2310. The EALs should clearly indicate what is meant by the phrase "fuel clad is ruptured."

Changes in the data sheet through contingency message by the Lead Controller lead to confusion on plant status that, in turn, adversely affected the TSC's response actions. This item is discussed also in the TSC and ECC observations.

A Protective Action Recommendation (PAR) given by the Control Room to the County Sheriff resulted in some confusion at the Sheriff's office as to whether the PAR was for evacuation or for sheltering up to a two-mile radius. The PAR given was to shelter up to a two-mile radius and five miles downwind. Control Room logkeeping was not precise or timely. It is doubtful if a correct sequence of events could be reconstructed from the log. Also the inspector observed that a log of all communications to offsite support agencies or other consequential telephone calls was not being made as a separate

entity. Status updates to emergency Control Room personnel were not made on a periodic basis by the SS or his replacement as EDO. The request for first aid to assist the heart attack victim at approximately 2053 was not proceeded by "This is a drill."

Based on the above findings, the following item should be considered for improvement:

. The SS should ensure that a comprehensive log of activities and notifications is made, and that briefings of personnel are periodically conducted.

c. Technical Support Center (TSC)

The TSC was officially activated in a timely manner following the Alert declaration; however, personnel did not begin to function in their assigned positions until several minutes after the TSC was declared activated. Although some personnel assignments were made by the TSC Manager shortly after the activation announcement, emergency personnel responding to the TSC seemed slow in assuming their assigned positions and in becoming functional. After about 22 minutes following the TSC activation announcement, many of the 16 people there were still milling about. Better training in activation plus vocal direction from the TSC Manager would have made activation run in a more smooth and expedient manner.

Only three plant status briefings were made by TSC management representatives during the exercise. These were by the Radcon Operations Manager and the Primary System Assessment Manager. The overall assessment of the accident and various plant status indications should have been provided periodically. As it was, the Radcon Operations Manager was not aware that the steam line monitor had pegged high until after the TSC was told to stop participating. This data had been posted on the status board starting at 2055 and was continually repeated on the board for several hours. If the Radcon Operations Manager had been aware of this earlier, he may have had a clue as to the possibility of fuel damage.

No mention was made of contingency plans to augment the TSC staff in the event the emergency extended over several shifts or even days.

TSC staff efforts to support reactor cooldown below 212°F seemed to assume that there was no condenser vacuum. At 2113, the TSC learned that there had been condenser vacuum. This indicated that there was a lack of sufficient coordination between the Control Room and the TSC in assessing the problem and developing corrective action. The Technical Data Loop (red loop), a telephone network between the Computer Room, the Control Room, Emergency Support Center (ESC), and the ECC was well maintained. Communications were made in a brisk and efficient manner by the communicator; however, the Technical Management Loop (Green loop) was not fully activated. The assigned communicator seemed unsure of his duties, spending considerable time reading a procedure and checking a telephone listing. He eventually informed the TSC Manager that there was "nobody downtown," obviously meaning

the ESC. The TSC Manager told the "Green Loop" communicator only to set up the line to the Control room, which he did. Reinforced training and drills on protocol and functional responsibilities for these two communication loops are recommended. Headphones with an attached microphone for each of these two communicators would be helpful to allow them to record messages while maintaining contact with the person called.

No efforts were made to trend the primary to secondary leak rate and corresponding release rate as it progressed during the exercise. Relevant data affecting scenario plant status were changed in the Control Room, but were not correspondingly changed in the TSC. This disparity adversely affected the realism of the exercise in the TSC and essentially halted the exercise in the TSC. One of the TSC participants noted that it was like exercising with two different scenarios. The TSC did not discover the disparity between the data sheets until about 2253, indicating insufficient coordination of information between the TSC and Control Room.

The Radcon Operations Manager provided strong and positive direction for personnel outside the TSC including recommendations for protective clothing and respiratory protection for inplant teams. The Problem Analysis Status Board appears to be an excellent tool for assigning and tracking specific tasks within the TSC.

Based on the above findings, the following actions should be taken:

. TSC activation procedures should clearly indicate how personnel are assigned to their initial positions and tasks so that activation will occur smoothly. (346/84-14-02)

. TSC and Control Room communications need to be sufficiently coordinated to ensure that each group is aware of the plant status and the status of actions to mitigate the consequences of the event (e.g., TSC is aware of Control Room valve lineup changes, etc.). (346/84-14-03)

. All critical plant data, including that which must be calculated such as primary to secondary leak rate, should be trended during an event to evaluate whether conditions are degrading or offsite releases are increasing. (346/84-14-04)

d. Operational Support Center (OSC)

The OSC was promptly staffed and maintained in an orderly manner. Noise levels were low and communications with the ECC and the TSC were very good. Status boards of plant conditions were updated periodically and a log of personnel and corrective action/damage control teams was maintained. The overall functions of the OSC from an activation and organizational standpoint were good. The new location in the Fifth Floor Conference Room of the Service Building with new fixed permanent lighting was a major improvement for location of OSC activities.

The most important weakness identified by the NRC observer was the complete lack of inplant radiation monitoring data supplied to the OSC. Lack of this TSC supplied information prevented the OSC Director and his emergency staff from providing radiation monitoring data to repair/maintenance teams and any Chemistry & Radiation Testers (C&RT) who were dispatched from the OSC assembly areas. At about 2034, the TSC requested that the Main Steam Safety Relief Valves (MSSRV) be gagged. The team was dispatched without a C&RT person to monitor for radioactivity into an area where the dose rate could have been about 750 mR/hr. A second team was dispatched on the same mission about 2110. At 2248, the second team reported that they were unsuccessful in gagging the MSSRV. Cumulative radiation doses were not supplied to any of the maintenance teams. Radiation exposures for each job were not established by the TSC for each assigned task. At 2305, five minutes before the General Emergency was declared, the NRC observer prompted the Status Board Communicator to request inplant radiation levels from the TSC. Until then, no effort was made by participants or Controller to ask these questions. The reply was that there were no radiation monitoring alarms and that all radiation levels were normal, even though the Main Steam Line No. 2 radiation monitor had been pegged high for several hours.

The NRC observer also monitored the activities of the Fire Brigade and procedures implemented by the response team which was sent to assist the two injured employees before they were sent to the hospitals (Reference Paragraph 5.g). A post-accident reactor coolant sample taking was also observed. All of these activities were demonstrated satisfactorily and procedures were followed.

Based on the above findings, the following action should be taken:

. Procedures should be developed to ensure that all teams dispatched into the plant during an emergency are accompanied by a C&RT person and are provided with a detailed briefing on maximum dose allowable for the task, anticipated dose rates, and appropriate ALARA considerations such as route to follow to minimize dose. (346/84-14-05)

e. Emergency Control Center (ECC)

The Emergency Duty Officer (EDO) and staff members arrived and assumed command and control from the Control room within one hour of the Alert declaration. Although this activation was accomplished in a timely manner, the staff appeared to be unfamiliar with their emergency procedures and some seemed unsure which emergency position they were to fill. The Control Room had requested that the ECC take control of offsite notifications and related duties earlier, but the EDO refused. Even though several persons were present in the ECC, it did not appear that the EDO was aware of which positions were necessary to assume ECC functions. The ECC was neither organized nor functioning in an orderly manner until one hour after assuming command and control from the Control Room. No clear procedures were established to provide for the orderly activation of the ECC. Several individuals

were instructed to simultaneously perform functions having received direction from multiple sources. In one instance an individual was told to perform three different functions; in another instance, an EDO qualified person was asked to be an offsite communicator to which he replied that he didn't know how to use the equipment.

The EDO assigned an individual to perform offsite dose calculations. The PRIME computer system was online in 20 minutes and was used as the computation devise. Communication with plant personnel regarding dose assessment was not established until prompted by the NRC inspector. Leak rates and corresponding release rate information was never trended by personnel in the TSC or in the ECC. Since the release rate was not trended in the ECC, it would have been impossible to determine in a timely manner the total value of radioactive material released. Adequate plume tracking was performed by ECC personnel as well as communication with the RMTs maintained.

Notification of Federal, State, and local emergency response organizations was simulated. Communication was established with the Control Room by the EDO who then assigned a staff member for this communication link. Another staff member assumed the position of log book controller. Appropriate health physics personnel were assigned to perform offsite dose assessment. RMTs were called on the automatic dial telephone and arrived in the ECC in a timely fashion. Two plotters were assigned to provide input to the status boards. Offsite monitoring teams were directed from the ECC

The Site Area Emergency Alarm was sounded at 7:59 p.m.; however, personnel accountability was not declared complete until 9:54 p.m. Location of all missing personnel, which was complicated by the ongoing medical drill, was completed before personnel accountability was considered complete. This accounted for the long delay. Search and rescue to account for missing personnel should be initiated after the completion of personnel accountability. The EDO failed to determine if any nonessential personnel were on duty in the plant, therefore the decision to evacuate them was never considered as part of the events.

The first Protective Action Recommendations were made by the Shift Supervisor in the Control Room through the Acting Station Superintendent. Subsequent protective action recommendations were made in the ECC after discussion with CR and ECC personnel after the General Emergency declaration was made.

The habitability of the ECC was confirmed by a continuous air monitor and was periodically assessed. Security was well maintained. The RTL demonstrated good contamination control; however, one procedure needs revision in order to alleviate the problem of the SAM-2 counting backwards.

Administrative support was generally adequate in the ECC. A clerk was available to record the status board information and type hard copy; however, these copies were not duplicated or distributed to personnel. Briefings by the EDO regarding plant status were infrequent.

Based on the above findings, the following actions should be taken:

. ECC activation procedures should be modified to include some type of system, such as a tag board for assignments that will clearly indicate how personnel are assigned to their initial positions and tasks, and specify the minimum positions which must be filled so that activation will occur in an efficient and timely manner. (346/84-14-02)

. Critical data affecting offsite protective action recommendations, such as release rate and radionuclide composition, should be plotted during an event so that evaluations involving total material released and potential offsite dose can be made. (346/84-14-04)

. The EDO's procedure for Site Area or General Emergency should clearly indicate that a determination of nonessential personnel will be made after accountability is completed, and further indicate that these personnel will then be evacuated unless radiological or environmental conditions prohibit an evacuation. (346/84-14-06)

f. Joint Public Information Center (JPIC)

The JPIC is located in the Davis-Besse Administration Building (DBAB). Security measures for the JPIC were well maintained. All personnel were badged and screened before entering the ECC/TSC area. A reporter (simulated) was apprehended trying to obtain entrance into the ECC/TSC area.

Activation began in the corporate office and then moved to the site. The press area was very large and contained good visual aids. These aids were used to explain the systems of the plant to media personnel. A bank of nineteen telephones were available for the press. Excellent press packets were available for distribution and a large Public Relations staff was available to assist the media.

The EPZ maps were available but not placed on display until the press questioned the technical spokesperson regarding plume direction. The Technical Spokesperson needed more information regarding weather conditions, release rates and dose assessment information. This data was not completely available (see previous section). Sufficient plant status data was available and the technical spokesperson was able to provide information understandable to the public.

Based on the above findings, the following item should be considered for improvement:

. The Technical Spokesperson should have available weather conditions, radiation release, dose assessment information, and other non-plant operations type information.

g. Medical Drill (St. Charles Hospital)

The medical drill was observed at the hospital. The medical staff was activated and assembled in a short time following the notification from the plant that a contaminated injured person was enroute by ambulance. Personnel with assigned responsibilities, (e.g., calibration of dosimeters, setup of radiation areas), performed these tasks well with little direction. Also these emergency workers took time to explain to staff members who were observing the drill for the first time. Radiation detection instruments were in current calibration, properly checked for operability, and utilized correctly. The Health Physics technicians maintained good radiation zone control for access to and from the decontamination room during the event.

No signs were posted to indicate an emergency drill was in progress. This could result in patient concerns and rumor control problems. A body map was not transmitted to the offsite medical facility as required by Procedure AD 1827.02, Section 6.3.6. The initial hospital message received about the injured patient enroute was that the individual had 160,00 RADs to the left arm. No one at the hospital questioned or was alarmed at these units. Verification of the emergency call and data received did not correct this number. The person receiving the call as well as additional staff members briefed on this value were not certain what these units meant and indicated an unfamiliarity with radiation units. As part of the follow-up critique on this phase of the exercise, brief, but concise explanation of the proper radiation terminology used should be given to hospital personnel.

Medical personnel questioned were not sure at what point urinary, bioassay, or whole body counts would be required. Procedure AD 1827.02, Section 6.3.8 states that these should be begun when uptake is approximately 10% of the maximum permissible body burden. The Health Physics technician with the medical personnel and patient was not aggressive enough in telling the medical staff where contamination was present and what it might mean to nursing care staff. If a controller were present to indicate contamination levels on the patient, it would have helped No question was made of the preliminary contamination levels reported by onsite personnel. The Health Physics team left the hospital after the patient was released from the Emergency Room. Hospital staff were not certain of the radiological status of the room or the equipment. Also they were not certain where the bag of contaminated wastes should be taken.

In summary, the St. Charles Hospital staff demonstrated good emergency techniques for handling an injured, contaminated person. The Emergency Department Director was well qualified for a radiological injury requiring hospitalization. The staff were enthusiastic and displayed

a positive attitude throughout the medical drill. While all personnel questioned stated that they had obtained a good basic orientation in radiation protection, their unfamiliarity with radiation quantities (units) indicated that this specific training should be reviewed.

Based on the above findings, the following items should be considered for improvement:

. The hospital should be instructed to place a sign "Emergency Drill in Progress" or something similar during future drills or exercises.

. The next training session for the hospital staff should include a review of radiation level terminology and correct units for radiation exposure.

Plant Health Physics Technicians should not depart the hospital until they have completed a survey of the ambulance and treatment area and collected all potentially radioactive waste.

h. Offsite Radiological Monitoring Teams (RMTs)

Poor organization and lack of command and control was evidenced during and after the offsite teams arrived at the RTL for assignment. Personnel arriving were not certain of their emergency assignment. To add to the confusion there were examples of conflicting instructions to team members from the Radiation Testing Laboratory (RTL) Coordinator and the Offsite Radiation Monitoring Team (RMT) Coordinator. The RMT Coordinator appeared briefly from his post at the ECC and then reappeared later to give directions. The RTL Coordinator was participating in his first exercise which added to the uncertainty of responsibilities. It took about 35 minutes from when the team members arrived until one team was in a vehicle departing for its assignment. Checking out of radiation monitoring equipment was a disjointed effort. The check out procedure was neither done in a concise manner nor was it done with precision. The NRC observer did not see evidence of any inventory list to check the contents of the emergency kits. Lack of familiarity with their responsibilities on the part of both supervisors and team members was evident.

Once dispatched, the teams demonstrated good radiation survey techniques and used their instruments properly. Proper techniques were demonstrated in taking air samples, either by using silver zeolite (simulated) or charcoal filter cartridges as the situation demanded. Cross-contamination of air samples was avoided by using cloth gloves when required. Survey meters were turned on while traveling to the assigned survey location. Samples taken were labelled, packaged, and returned to the RTL properly. The observer noted that the date was omitted on some samples.

Communication and direction from the ECC dispatcher could have been more meaningful. One team, in searching for the plume, ran parallel to it but never received explicit instructions. The NRC observer felt that the ECC dispatcher could have utilized the field teams better. Much dead time was apparent as well as a re-traversing of plume

tracking and repeat surveys with no radiation level changes. This may be partly due to scenario limitations. The team should be consistent in communicating with the ECC in prefacing all messages by "This is a drill." The accepted radio protocol slipped measurably towards the end of the exercise due to this omission.

Based on the above findings, the following action should be completed:

. RTL and RMT activation procedures should be developed to include some type of system, such as a tag board for assignments, that will clearly indicate how personnel are assigned to their initial positions and tasks. (346/84-14-02)

6. Exit Interview

The inspectors held an exit interview following the licensee's critique on August 1, 1984, with licensee representatives (denoted in Section 1) to discuss the scope and findings of the inspection. The licensee agreed to examine the inspectors' concerns. The Team Leader also reported that five NRC open items were closed as part of this inspection. The Vice-President Nuclear in his summation pointed out that several new people and alternates were participating for the first time in this off-hours exercise.

The inspectors also noted that the most recent revision to the Davis-Besse Emergency plan had deleted a description of the public information program as this had been included in the recently issued Public Information Plan for emergencies. Since this area is required to be included in the Emergency Plan to meet 10 CFR 50.47(b)(7) requirements, the licensee agreed to submit three controlled copies of this public information plan to NRC Region III and two copies to NRC Headquarters to comply with 10 CFR 50.54(q) requirements.

Attachment: Exercise Scenario

EVENTS SUMMARY

Any emergency exercise must have a significant effort put forth in research and development to ensure that the events depicted are as realistically possible as can be simulated through the use of message sheets, signs, etc. For discussion purposes, these events can generally be broken down into two categories:

1. Human Error, and

2. Equipment Malfunction.

The first, human error, is the easiest and more flexible of the two categories to identify in a scenario, however, no one likes to assume that they will make mistakes, especially of the magnitude to cause significant plant damage with offsite consequences. This does not, however, preclude using this means to provide input into the scenario, since the possibility for human error does exist based on the amount of human judgement involved in implementing emergency response actions for off-normal plant events.

The second category, equipment malfuntion, is much harder to incorporate into a scenario, especially where it is needed to cause plant damage that creates a problem to the offsite environment. This is true because of the tremendous effort placed on equipment reliability and redundancy during design, fabrication and installation at nuclear power facilities. A Safety Analysis Report, written for all nuclear facilities, including the Davis-Besse Nuclear Power Station, analyzes the capabilities of plant systems to maintain control over radioactive material within the plant during all types of off-normal plant incidents. Thus, in order to incorporate equipment related problems into the scenario, some unrealistic assumptions must be made.

Additionally, the public's perception of the exercise scenario often times leads them to believe that these events may very well be probable. However, it should be known that if the events in the exercise scenario were at all possible, an unanswered safety question would exist and immediate actions would be taken to rectify the situation.

Thus, in order to achieve a sequence of events that will lead to a significant plant problem, the exercise scenario must contain an incredible plant situation, and unlikely series of equipment failures, or an improbable operator error combined with equipment failures. For this scenario in particular, the following assumptions have been made in order to force the participants into an unusually high level of response activities that may never normally be required.

A. Justification and Basis for Event

As is indicated in the written summary (Part B. of this section), the simulated events sequence is generated mainly from five principle occurrences. They are:

1. A fire
2. A SFRCS channel half trip
3. A medical emergency
4. A SG tube sheet LOCA
5. A GAP release from the fuel

Data from all five situations was generated mainly through the imagination, experience, and technical capability of the Scenario Development Committee members. Some of the plant data provided for occurrence No. 2, however, was taken from an actual event which occurred at the Davis-Besse Station earlier this year. The following is an excerpt from a letter (Serial No. 1-411) sent by TED to the NRC describing the event:

"At 12:20 hours on March 2, 1984, Davis-Besse Unit 1 was operating at approximately 99% of full power. The plant was in full automatic control and Instrument & Control (I&C) personnel were performing a surveillance test on the Steam and Feedwater Rupture Control System (SFRCS) Channel 2. When the I&C technician relieved the pressure on the switch being tested at 12:21 hours, the No. 2 Main Steam Isolation Valve (MSIV) closed due to an undetected failure in SFRCS Channel 4, simultaneous with the test of SFRCS Channel 2. The rapid increase in No. 2 Steam Generator pressure, due to the No. 2 MSIV closing, increased the Reactor Coolant System (RCS) cold leg water temperature of the No. 2 Steam Generator. The increase of No. 2 Steam Generator pressure caused the feedwater to increase into the No. 1 Steam Generator. Steam Generator No. 1 level reached a maximum level of 85%. This dropped the No. 1 Steam Generator cold leg temperature causing reactor power to increase. A reactor trip on high flux occurred at 12:20 hours. On Steam Generator No. 2, pressure was observed to be decreasing well below the expected post trip value. A local observation of the Main Steam Safety Valves determined a safety valve had failed to close on Steam Generator No. 2. The SFRCS was manually initiated at 12:38 hours on low Steam Generator level as required by procedures."

As you read through the scenario sequence of events, you'll find many similarities with the actual event sequence. However, as indicated in the following excerpt (from the same TED letter), in the real event, appropriate Operator actions and the reliability of the plant systems prevented the situation from getting out of

control.

"By 12:42 hours, pressurizer level was restored to approximately 100 inches, and the RCS pressure had been stablized out at approximately 2100 psig. The No. 1 Steam Generator was being used to remove the pump heat and core decay heat, and the No. 2 Steam Generator was dry and depressurized.

By 07:20 hours on March 3, 1984, the RCS temperature had been cooled to 340oF. The stuck open safety valve was replaced with a spare, and at 07:30 hours, the refill of the No. 2 Steam Generator began. By 07:45 hours, the No. 2 Steam Generator was restored to operable status. The plant continued its cooldown, entering Mode 4 at 12:40 hours on March 3, 1984.

The primary and secondary plant responded as expected for the transient. Engineered Safety Features Systems actuated within the Technical Specifications limits, and performed their designed functions. An evaluation of the transient event by Babcock & Wilcox concludes that each of the primary pressure boundary components still meet all of the requirements of the ASME Boiler and Pressure Vessel Code, Section III."

Thus, as in all exercise scenarios, some unrealistic assumptions were made in order to generate the necessary off-normal consequences that would generate enough of a problem that could adequately test the entire emergency response organization. Some of the more significant assumptions made were:

1. That an inadvertent excessive cooldown of the Reactor Coolant System would cause a SG tube sheet leak.

2. That a 1% fuel gap release would occur at the indicated time in the event sequence.

These assumptions, although unrealistic, were necessary to set up the abnormal scenario conditions only, and are not to be construed with a requirement on the part of the Exercise players to determine the exact event that initiated or caused these things to happen. On the contrary, controllers should ensure that the players do not become obsessed with finding the cause of these events. As in the case of many real emergencies, the cause may not be fully determined until many months after the event had initiatally occurred.

In this situation, it is expected that the exercise players accept the fact that the events have occurred as simulated; that the response effort be directed towards getting the plant into a stable and safe condition; and that the necessary actions are taken

to protect station personnel and the general public. Discussions on determining the cause of the accident should be held, but they should not distract the emergency organization from their main objectives.

B. Written Summary

The Exercise begins with Davis-Besse Nuclear Power Station operating at approximately 99% of full power. The plant is in full automatic control. Instrument and Control (I&C) personnel are performing (simulated) a monthly surveillance test on the Steam and Feedwater Rupture Control System (SFRCS), which began at 1:15 P.M. in the afternoon. A small primary to secondary leak exists in No. 2 Steam Generator.

Plant equipment that is given as being out of service is minimal. The wind is currently blowing out over the lake (may be simulated), as is the usual situation for the Davis-Besse site.

At 6:15 P.M., a fire is discovered near the scaffold storage area on the 585' level. A report is made immediately to the Control Room where the Control Room Operators summon the Fire Brigade Team.

Once the Fire Brigade Team arrives at the scene of the fire and informs the Control Room that offsite assistance may be needed, the Shift Supervisor declares an UNUSUAL EVENT.

Offsite notifications are made regarding the Unusual Event to Toledo Edison personnel via the Emergency Call System. The Ottawa County Sheriff is also notified, as well as the NRC.

As part of the SFRCS surveillance test, an I&C Technician vents pressure off of the pressure switch being tested. This results in a partial activation of the SFRCS and automatically closes the Main Steam Isolation Valve (MSIV) for the No. 2 Steam Generator (SG). Pressure rapidly rises in the No. 2 SG and causes the Main Steam Safety Valves (MSSV's) to open. This causes the reactor to trip due to the Reactor Protection System signaling a high flux condition. (See Figure VI-1.)

The Shift Technical Advisor (STA) and NRC Resident Inspector are notified of the event by the Control Room, which is also taking action to get the plant under control. At this time one of the MSSV's has failed to close upon pressure returning to normal in No. 2 SG.

At 6:45 P.M. the Fire Brigade Team reports that the fire is out.

Personnel begin investigating the extent of possible fire damage. Also, at this time, the Control Room orders work to be stopped by the I&C technician and notifies the Ottawa County Sheriff of the plant trip.

Plant indicators show that the No. 1 Main Feed Pump is controlling improperly and an operator is dispatched to take local control. The operators recognize that the No. 2 Main Steam Line pressure is well below the expected post trip value and take steps to isolate the No. 2 SG.

The No. 2 SG pressure reaches 612 psig, activating SFRCS automatic action to realign the Auxiliary Feed Pumps to No. 1 SG.

At 7:00 P.M., the No. 2 SG has boiled dry. The Fire Brigade informs the Control Room that two personnel have become seriously injured on the 565' level. The Control Room sounds the Initiate Emergency Procedures Alarm, summons the First Aid Team, and notifies SAS to obtain offsite medical assistance. The First Aid Team responds to treat the victims and a Chemistry & Radiation Tester (C&RT) monitors for contamination.

At 7:15 P.M., the wind shifts and is now blowing NNW to SSE.

Then several equipment problems arise. The NI-1 Source Range Channel fails low. Due to the perturbation caused by the transient, the primary to secondary leak in No. 2 SG increases, which results in a low level release to atmosphere out the stuck open MSSV. (See Figure VI-2.)

At 7:30 P.M., the Shift Supervisor declares an ALERT and initiates all required offsite notifications. At approximately 8:25, the Technical Support Center, Emergency Control Center, Operations Support Center, and Energy Education Center are activated. Radiation Monitoring Teams are dispatched to check for radiation releases. As the No. 2 SG tube sheet leak increases, attempts are made to gag the stuck open MSSV valve, but are unsuccessful.

The leak increases beyond the capacity of the Makeup Pumps, requiring High Pressure Injection to be initiated. (See Figure VI-3.)

At 8:45 P.M., a response individual at the Davis-Besse Administration Building suffers a heart attack. A First Aid Team responds and calls are made (simulated) for offsite assistance. Then, a significant increase in the radiation levels passing through the stuck open MSSV is registered on the Main Steam Line No. 2 Radiation Monitor. Also, increased radiation levels near the site boun-

dary are picked up by the Radiation Monitoring Teams.

At 9:15 P.M., the Emergency Duty Officer declares a SITE AREA EMERGENCY and initiates all required offsite notifications. Personnel accountability is also performed.

Operations personnel may place the plant in a "piggy-back" mode of injection (see Figure VI-4) and isolate the core flood tanks as reactor coolant pressure is reduced.

Briefings are held for local officials and the news media. A member of the media attempts to enter the restricted area of the Davis-Besse Administration Building by penetrating the building security.

The tube sheet leak rate continues to increase and the Post Accident Sampling System (PASS) is used to draw a primary coolant sample for analysis. Results from this sample later indicates approximately a 1.0% gap failure.

At approximately 11:00 P.M., the Emergency Duty Officer declares a GENERAL EMERGENCY and initiates all required offsite notifications. The early warning system sirens are sounded (simulated) to notify the public. Also, at this time the Operators succeed in cooling down and depressurizing the plant preventing further damage and reducing the plume release rate to below protective action guide values.

By 11:30 P.M., the Radiation Monitoring Teams are reporting only background levels in the offsite affected areas.

Plant conditions continue to improve through 12:00 A.M., and become manageable. The emergency condition is downgraded and restoration and reentry activities are planned for and initiated. Offsite agencies (simulated) are updated on the plant conditions.

By 12:30 A.M., onsite reentry measures are completed and recovery efforts begin, as required. The Exercise is then terminated.

DAVIS-BESSE NUCLEAR POWER STATION EXERCISE SCENARIO

INITIAL CONDITIONS

At 6:15 P. M., Davis-Besse, Unit 1. is operating at approximately 99% power. The plant is in full automatic control. Instrument and Control (I&C) personnel are performing a monthly surveillance test on the Steam and Feedwater Rupture Control System (SFRCS) (as per section 6.2 of ST 5031.14). Work began on this evolution at 1:15 P.M. this afternoon.

A 0.02 gpm primary to secondary leak exists from No. 2 Steam Generator.

Meteorological conditions have the wind blowing out over the lake just north of Port Clinton as follows:

- Wind Direction = 301^{o} to 121^{o} (WNW to ESE)
- Wind Speed = 11.4 mph
- Stability = ΔT of $-1.7^{o}F$ = D

Out of service equipment includes:

1. The No. 1 Decay Heat Removal Pump for motor bearing replacement. Bearing parts are on order and not expected to arrive for another day.
2. The No. 3 Service Water Pump due to power supply breaker repair job.
3. The Letdown Line activity monitor (Failed Fuel Detector) RSH-1998 due to a faulty detector.
4. The electric-driven Startup Feedpump due to an inoperable discharge valve.

DETAILED SEQUENCE OF EVENTS

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
6:15 P.M.	0:00	The plant is simulated to be operating at power.	MS-1
		NOTE: The actual Operating Shift personnel will not be participating in the exercise due to plant operational safety concerns; however, additional Operations personnel will be present to perform the actions necessary to respond to the simulated plant conditions. They will be briefed on the initial conditions at this time.	
	0:05	A fire is discovered on the 585' level near the scaffold storage area.	MS-2 CS-1
		A report is immediately made to the Control Room. Following receipt of the information, the Control Room Operators rapidly summon the Fire Brigade Team.	
6:30 P.M.	0:15	The Fire Brigade Team arrives at the scene of the fire and informs the Control Room that offsite assistance may be required. The Control Room Operators immediately call for offsite assistance.	MS-3
		The Shift Supervisor declares an UNUSUAL EVENT.	MS-4
	0:18	Offsite notifications are made regarding the UNUSUAL EVENT to Toledo Edison personnel via the Emergency Call System, the Ottawa County Sheriff (may be simulated), and the NRC.	MS-5
	0:25	As part of the SFRCS monthly surveillance test (previously in progress), an I&C Technician vents the pressure off (simulated) of the pressure switch being tested.	MS-6

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
		This causes a partial activation of the SFRCS, and automatically closes the Main Steam Isolation Valve (MSIV) for the No. 2 Steam Generator (SG). This rapidly increases pressure in the No.2 SG and causes the Main Steam Safety Valves (MSSV's) to open. The reactor trips from a signal sent by the Reactor Protection System due to a high flux indication.	MS-7
	0:26	The Rapid Feedwater Reduction circuit closes the main feedwater control valves, terminating an excessive feedwater flow condition to the No. 1 SG. NOTE: Main Feed Pump No. 2 lost its steam supply when the No. 2 MSIV closed.	
	0:27	NOTES: (1) An emergency medical squad ambulance may respond with the fire team and remain on standby outside the Protected Area security access point. (2) A C&RT may take a RCS sample following the trip.	MS-8 MS-9
	0:28	The Control Room notifies the Shift Technical Advisor (STA) and the NRC Resident Inspector of the event, and takes action to get the plant under control.	MS-10
		NOTE: At this point, it is simulated that one of the MSSV's has failed to close upon pressure returning to normal in No. 2 SG.	CS-2
6:45 P.M.	0:30	The Control Room notifies the Ottawa County Sheriff's Department (may be simulated) of the plant trip, and directs I&C to stop work on the SFRCS.	MS-11
	0:32	No. 1 Main Feed Pump begins controlling improperly and an Operator is dispatched to take local control.	MS-12 CS-3

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
	0:35	The Fire Brigade Team reports to the Control Room that the fire is out.	MS-13 MS-14 MS-15
	0:40	The Operators recognize that the No. 2 Main Steam Line pressure has decreased well below the expected post trip value, and take steps to isolate No. 2 SG.	MS-16
	0:42	No. 2 SG pressure reaches 612 psig, activating SFRCS automatic actions to realign the Auxiliary Feed Pumps to No.1 SG. NOTE: The Operators may complete this action before SFRCS activates.	MS-17
7:00 P.M.	0:45	No. 2 SG has boiled dry. NOTE: With No. 2 SG dry, cooldown should be performed quite slowly in order to minimize the shell to tube differential temperature considerations.	MS-18 MS-19 MS-19a
	0:50	A Fire Brigade Team member informs the Control Room that two personnel have become seriously injured while investigating fire damage on the 565' level. The Control Room sounds the Initiate Emergency Procedures Alarm, summons the First Aid Team, and notifies SAS to obtain additional offsite medical assistance.	MS-20 CS-4 MS-21
	0:55	The First Aid Team responds to treat the victims and a Chemistry & Radiation Tester (C&RT) monitors for contamination.	MS-22
7:15 P.M.	1:00	Meteorological conditions have shifted to: Wind Direction = 346° to 166° (NNW to SSE) Wind Speed = 4.2 mph Stability = ΔT of -2.1°F = B	MS-23 MS-23a MS-23b

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
7:20	1:05	NI-1 Source Range Channel fails low.	MS-24 CS-5
	1:10	Due to the transient the plant has just been through, the primary to secondary tube sheet leak in No. 2 SG increases.	MS-25
		NOTE: This creates a low level release to atmosphere out the stuck open MSSV. Plant cooldown rate should now be increased in an attempt to depressurize the plant to alleviate the release of radioactive material to the environment.	MS-25a MS-25b
7:30 P.M.	1:15	The Shift Supervisor declares an ALERT and initiates all required offsite notifications.	MS-26
		NOTE: The Shift Supervisor, using his judgment, may declare a higher level of emergency. However, due to the flexibility that will exist in the scenario data packages, no restrictions will be made on his actions and Controllers will modify their data packages accordingly.	
	1:20	The Station Superintendent notifies the Vice President, Nuclear of the event and is informed that the Vice President has been injured and is on his way to the hospital. The Station Superintendent is requested to take over as Operations Director.	MS-27 MS-28 MS-29 MS-30
8:25	2:10	The Technical Support Center, Emergency Control Center, Operations Support Center and Energy Education Center are activated. Radiation Monitoring Teams are dispatched to check for releases.	MS-31 MS-31a MS-31b

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
	2:15	The No. 2 SG tube sheet leak increases, exceeding the capacity of the Makeup Pumps.	MS-32
	2:20	Maintenance trys to gag the stuck open MSSV. They are unsuccessful.	MS-33
	2:25	The Control Room Operators secure a Reactor Coolant Pump in each loop.	MS-34
8:45	2:30	A response individual suffers a heart attack at the Davis-Besse Administration Building in the hallway outside the Technical Support Center. The Emergency Duty Officer directs First Aid Team personnel to respond and calls for offsite assistance (may be simulated).	MS-35 MS-36 MS-37 MS-38
	2:40	Main Steam Line No. 2 radiation monitors indicate a significant increase in radiation levels in the steam passing out the stuck open MSSV.	MS-39 MS-39a MS-39b MS-40 MS-41 MS-41a
9:15	3:00	Radiation Monitoring Teams pick up increased radiation levels near the site boundary.	MS-42 MS-43
	3:10	The Emergency Duty Officer declares a SITE AREA EMERGENCY (if not declared earlier by the Shift Supervisor) and initiates all required offsite notifications. Personnel accountability is performed (if not done earlier).	MS-44 MS-45
9:45	3:30	Special briefings are held for local officials and the news media.	MS-46 MS-47

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
	3:40	A member of the news media attempts to obtain access to the restricted area of the Davis-Besse Administration Building, penetrating the building security, if possible.	MS-48 MS-49 MS-50 MS-50a
10:00	3:45	There is an increase in the No. 2 SG tube sheet leak rate.	MS-51 MS-52
	3:55	The Post Accident Sampling System (PASS) is used to draw a primary coolant sample for analysis.	MS-53 MS-54 MS-55
	4:20	Radiation Monitoring Teams continue to evaluate radiation levels in the field.	MS-56
	4:40	PASS results indicate approximately 1.0% gap failure.	MS-57 MS-57a
11:00	4:45	The Emergency Duty Officer declares a GENERAL EMERGENCY and initiates all required offsite notifications. The early warning system sirens are sounded (simulated) to notify the public.	MS-58 MS-58a MS-59
		NOTE: The Emergency Duty Officer should provide recommendations to local officials for public protective actions that includes or exceeds "sheltering within a two mile radius and to five miles downwind".	MS-60
	4:50	The Operators succeed in cooling down and reducing the plant pressure. This reduces the release rate and aids in preventing further damage to the plant.	
		NOTE: The Radcon Operations Manager may direct that an additional RCS sample be taken.	MS-61

Approx. Time of Day	Planned Exercise Time Hours:Minutes	Simulated/Expected Events	Cue No.'s
11:30	5:15	The Radiation Monitoring Teams in the field report that radiation levels in the affected areas offsite are reading background.	MS-62
		NOTE: The actual Operating Shift crew will begin a shift change around this time. No scenario events should interfere with the normal conduct of this evolution.	MS-63
12:00	5:45	Plant conditions continue to improve.	MS-64
	5:55	Plant conditions appear to be manageable with continued cooldown, and control of radiological releases.	MS-65 MS-66
	6:05	The emergency condition is downgraded and restoration and reentry activities are planned for or are initiated.	MS-67
	6:10	The offsite agencies are updated on plant conditions. Various personnel are permitted to leave as conditions allow.	MS-68
12:30	6:15	Onsite reentry measures are completed (simulated) and recovery efforts (simulated) begin, as required.	
		NOTE: All basic recovery efforts should be either discussed or simulated. The exercise is then terminated.	MS-69