U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/90011

Docket No. 50-255

License No. DPR-20

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Palisades Nuclear Plant

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: May 21-25, 1990

Inspectors: D. Barss, Team Leader — 6/11/90 Date

J. Foster — 6/11/90 Date

Accompany Personnel:

B. Holian

E. Hickey

Approved By: William Snell, Chief
Radiological Controls and
Emergency Preparedness
Section — 6/11/90 Date

Inspection Summary

Inspection on May 21-25, 1990 (Report No. 50-255/90011(DRSS))
Areas Inspected: Routine, announced inspection of the Palisades Nuclear Plant annual emergency preparedness exercise, involving a review of the exercise scenario (IP 82302), observation by four NRC representatives of key functions, activities, and locations during the exercise (IP 82301) and follow-up on licensee actions on previously identified items (IP 92701).
Results: No violations, deficiencies or deviations were identified. The licensee demonstrated a good response to a hypothetical scenario involving equipment failures and a large radiological release. Two Open Items were identified. One Open Item was related to poor command/control and overall direction of the Operational Support Center and the other regarded untimely activation of the Emergency Operations Facility.

DETAILS

1. NRC Observers and Areas Observed

D. Barss, Control Room (CR), Technical Support Center (TSC), Operational Support Center (OSC), Maintenance Support Center (MSC)
J. Foster, CR, TSC
E. Hickey, OSC, MSC, Field Monitoring Teams
B. Holian, CR, TSC, Emergency Operations Facility (EOF)

2. Persons Contacted

Consumers Power Company

Norm Brott, Emergency Coordinator
David Vandewalle, Safety Licensing Director
Ray Brzezinski, IOC Superintendent
R. D. Orosz, Palisades Engineer and Maintenance Mgr.
Phil Loomis, Emergency Planning Administrator
Steven C. Cote, Property Protection Superintendent
R. Massa, Shift Supervisor
J. L. Fontaine, H.P. Support
A. Ganrica, OPS Coordinator
M. A. Hobe, Senior Emergency Planner
David L. Fugere, Senior Emergency Planner
Karen L. Penrod, NOD Analyst
Ralph W. Doan, Sr., Plant Safety and Licensing
Mark A. Savage, Plant Public Affairs Director
Michael Dawson, Nuclear Training Instructor, SEP
L. J. Kenaga, H.P. Superintendent
Jackson Lee Hanson, OPS Superintendent
Kurt M. Haas, Radiological Services Manager

All of the above listed personnel attended the NRC Exit Interview held on May 23, 1990.

The inspectors also contacted other licensee personnel during the course of the inspection.

3. Licensee Action on Previously Identified Open Items (IP 92701)

(Closed) Open Item No. 50-255/89016-01: The licensee had not provided adequate training for security personnel responding to the Emergency Operations Facility (EOF). Also, the EOF Security Officers Kit contained unapproved, uncontrolled, non-dated instructions. To resolve this Open Item the licensee trained security supervisors on security responsibilities and actions to activate and operate the EOF. The EOF security officers kit has been provided with a controlled copy of Procedure Number EOF-10, Property Protection. During the exercise, security personnel were observed to properly respond to, activate and control access to the EOF. This item is closed.

4. General

An announced, daytime exercise of the Palisades Nuclear Plant Site Emergency Plan was conducted at the Palisades Nuclear Plant on May 22, 1990. This exercise tested the licensee's emergency response organization's capabilities to respond to a simulated accident scenario resulting in a major release of radioactive effluent. This was a "partial participation" exercise with offsite participation by the State of Michigan, and Allegan , Berrien and Van Buren Counties.

Attachment 1 to this report describes the scope and objectives of the 1990 exercise. Attachment 2 describes the 1990 exercise scenario.

5. General Observations

a. Procedures

This exercise was conducted in accordance with 10 CFR Part 50, Appendix E requirements, using the Palisades Nuclear Plant Site Emergency Plan and Emergency Implementing Procedures, and the General Office Emergency Planning General Office Response Team (GORT) Emergency Operations Facility (EOF) Emergency Implementing Procedures.

b. Coordination

The licensee's response was coordinated, orderly and generally timely. If the scenario events had been real, the actions taken by the licensee would have been sufficient to mitigate the accident and permit state and local authorities to take appropriate actions to protect the public's health and safety.

c. Observers

The licensee's controllers/evaluators monitored and critiqued this exercise along with four NRC observers. Representatives of the State of Michigan's emergency response organization also observed the licensee's onsite emergency response activities.

d. Exercise Critique

The licensee's controllers/evaluators held critiques in each facility (with participants) immediately following the exercise. Lead controllers met jointly the day following the exercise to discuss observed strengths and weaknesses for each facility and the overall exercise. The NRC discussed observed strengths and weaknesses, developed independently by the NRC evaluation team, during the Exit Interview.

6. Specific Observations (IP 82301)

a. Control Room (CR)

Control room personnel performed well, properly responding to scenario events and determining emergency classifications. Participants displayed excellent exercise roleplaying and noise levels were kept low throughout the exercise.

Response to the initial steam generator tube leak was immediate. Procedures were consulted and procedural actions verified. Knowledge of applicable procedures was evident at all times. The Alert classification was properly made at 0840 hours, based on the observed (scenario) leakrate. An excellent decision to isolate blowdown was delayed by the Controller to preserve the scenario timeline.

The Shift Supervisor requested Health Physics personnel to monitor the steam lines to assist in steam generator leak location. It was indicated that a standard steam line monitoring plan had not been developed, and this should be considered.

Appropriate concern over shutdown margin was displayed; calculations of required shutdown boron concentration were performed and boron concentrations adjusted.

Notifications to offsite authorities were quickly and properly performed per procedure and utilizing procedurally supplied forms.

On declaration of the Alert, the plant alarm was sounded and a public address message advised plant personnel of the emergency classification and the reason for the classification. This was very well done.

Per procedure, assembly/accountability was initiated on the declaration of the Alert. As a point of clarification, NRC guidance specifies that this action is not required at the Alert classification, but is required at the Site Area Emergency Classification, and should be discretionary at the Alert level.

When the Main Steam Isolation Valves (MSIV) closed, causing a turbine trip/reactor trip, the Shift Supervisor immediately diverted the crews' attention to the emergency operating procedures (EOPs). Operators simulated the steps in EOP-1, verifying that each step had been taken. "Report-backs" of procedural steps could have been more complete, but the artificiality of the exercise Control Room makes this difficult.

Based on the above findings, this portion of the licensee's program was acceptable.

b. Technical Support Center (TSC)

The Technical Support Center (TSC) was rapidly activated following the Alert declaration. Minor pre-staging was noted in that the group area signs had been put in place.

Overall, TSC performance was excellent. Plant status was aggressively monitored, efforts were made to find ways to mitigate the ongoing (scenario) accident, and offsite dose projection and Protective Action Recommendations were very well done.

Excellent command and control was demonstrated by the Site Emergency Director (SED). Frequent and appropriately detailed status briefings were performed. A log was kept of the times the various briefings were performed, including Public Address system briefings/updates for plant personnel. The SED periodically called all group leaders to the main table for updates and discussions. Noise levels were acceptable throughout the exercise.

Status boards were well maintained with current information. Trending of selected parameters was performed (containment dome radiation monitor, charging flow, pressurizer level).

Assembly/accountability was completed, with one individual unaccounted for. It was determined that the one individual was not missing, but that his badge had been "pulled" or removed from service. Security personnel should understand that accountability can be declared as complete even if a small number of individuals remain to be accounted for. It was discussed whether non-essential personnel (then in assembly areas) should be sent home. Considering current plant (scenario) conditions, and that no benefit was gained from keeping personnel in assembly areas, the decision to simulate dismissal of non-essential personnel was correct.

TSC staff reviewed the Emergency Action Levels (EALs) to determine if further classifications were warranted. At 1046 hours, following the plant trip, there was an active discussion on declaring a General Emergency (GE). It was rapidly determined that the steam line break was not isolatable and a General Emergency was properly declared at 1048 hours.

Notifications of offsite authorities were very well done. Updates as to plant status, release rates, dose projections and Protective Action Recommendations were performed on the required frequency. Voice and telecopy communications were utilized for such notifications/updates, and information exchange appeared to be excellent.

Offsite dose projections were made at frequent intervals after the release began. Dose projection efforts were excellent. Use was made of six and twelve hour meteorological forecasts, and release durations were adjusted, as were release isotopic mixes, as better data became available. Offsite field team measurements were

utilized exclusively when it was evident that releases were not fully monitored by release path monitors. Field team data was utilized for isotopic mix adjustment (iodine to noble gas ratio) and to back calculate a plant release rate. Dose projections were then made to greater distances, utilizing this data.

Dose projection staff consulted with other groups and adjusted the default release duration based on anticipated release termination. They rapidly recognized that Protective Action Recommendations would be based on thyroid doses (the scenario plume had a large radioiodine component).

The TSC lacks status boards to track and prioritize the activities of in-plant teams. Such status boards enhance team control and awareness of task completion, especially for events which require multiple in-plant teams.

Potassium iodide (KI) authorization was made for offsite teams, but was not observed for onsite or in-plant teams.

Communications with other emergency response facilities was good. Turnover of responsibilities to the Emergency Operations Facility went smoothly.

The TSC did not have a "frisker type" contamination survey meter available to monitor personnel entering the facility from other plant areas for contamination. Habitability surveys were conducted frequently to verify the facilities' status.

Based upon the above findings, this portion of the licensee's program was acceptable. However, the following items are recommended for improvement:

- Provide/contamination survey meter(s) at each entrance to the TSC.
- Develop a status board to track and prioritize the activities of inplant teams.

c. Operational Support Center (OSC) and Maintenance Support Center (MSC)

The Operational Support Center (OSC) and the Maintenance Support Center (MSC) were activated in an orderly and timely manner utilizing applicable procedural guidance. Adequate staffing was readily available for assignment as necessary to various response teams.

In both the OSC and MSC, status boards were maintained with accurate, up to date information. Logs were kept of significant activities, information and decisions. Radiation Protection (RP) personnel, upon returning to the OSC, documented the results of inplant surveys on approved message forms. Survey results were promptly reviewed by the Radiation Protection (RP) Supervisor.

An ample supply of radiation monitoring equipment was brought to the OSC to support exercise activities. All equipment was in good working order, calibrated and, where necessary, had appropriate operational response checks completed. RP Personnel also checked equipment for operability before leaving the OSC. Equipment removed from the OSC was logged out, to ensure retrievability.

In both facilities, OSC and MSC, status briefings were provided to keep personnel well informed of plant conditions. Some briefings were conducted by the respective facility leader and others were conducted from the TSC over the general plant paging system, providing information to all site personnel.

The Radiation Protection Supervisor did an excellent job of dispatching and directing the offsite field monitoring teams. The teams were effectively placed to catch the leading edge of the plume and provide prompt, accurate information concerning the postulated offsite release.

Habitability surveys were promptly and regularly conducted in each facility. However the results of these surveys were not reported back to the facility leader. Particularly, the MSC supervisor was unsure of the habitability survey results for most of the exercise.

Teams dispatched from the MSC/OSC to inplant assignments made good use of installed plant telephone systems to maintain contact with the OSC. Portable radios were available for use by RP inplant teams. These radios failed to provide an adequate communication link. The licensee was previously aware of this problem and is actively seeking a solution.

Command, control and overall direction of OSC and MSC activities was marginal. Activities were not coordinated at the supervisor or director level.

A request for a particular activity would be made by the TSC to the appropriate MSC or OSC supervisor. The supervisor would then select personnel and assign them the task requested and direct them to contact the Radiation Protection Supervisor (RPS) for Health Physics Support. The RPS normally had no prior knowledge of the assigned task. The team members would then need to describe their assigned task and wait while the RPS arranged health physics support. It would be more appropriate and effective for the supervisor assigning tasks to also contact the RPS to coordinate Health Physics support. The OSC Director was not directly involved with planning activities for inplant teams and was not kept informed of all ongoing activities.

The OSC/MSC does not have a centralized, unified mechanism to effectively track the composition, mission or priority of all teams dispatched for inplant activities. Each supervisor in the OSC/MSC did keep track of their respective personnel, but no overall method of uniquely identifying teams and tasks was utilized.

The failure to coordinate OSC/MSC activities at a director or supervisor level, the failure to maintain overall direction and control of OSC/MSC response, and the lack of a unified method to uniquely identify and track inplant response teams is considered an Open Item and will be tracked as Open Item No. 50-255/90011-01.

It was also observed that the Radiation Protection Supervisor (RPS) was responsible for both inplant health physics support and directing and tracking offsite field monitoring team. Throughout this exercise both of these functions were successfully performed by one individual. However, had more extensive inplant team activities (combined with abnormal inplant radiological conditions) and an ongoing offsite radiological release been encountered, this position could easily be overwhelmed with responsibilities. Consideration should be given to reallocating some of these responsibilities.

With the exception of the one identified Open Item, this portion of the licensee's program was acceptable.

d. Emergency Operations Facility (EOF)

The day prior to the exercise, the inspectors toured each emergency response facility for general familiarization. The Emergency Operations Facility (EOF), which is not a dedicated facility, was found fully set up and ready for operation. Based on a discussion with the licensee, it was determined that this has been a long standing practice to prepare the EOF in advance of drills or exercises. The logistics of obtaining required computer hardware from distant locations has made this necessary to accommodate scenario timelines.

During the exercise, the Site Emergency Director initiated activation of the EOF at approximately 0938 hours. By about 1000 hours site personnel began to arrive at the EOF. Around 1107 hours the Emergency Officer and Emergency Operation Facility (EOF) director arrived by helicopter. At 1125 hours the remainder of the General Office Response Team (GORT), who had been prestaged near the EOF, were allowed to enter the EOF. The EOF Director took charge of the EOF at approximately 1132 hours and the EOF was formally declared activated at 1138 hours.

The initial request to activate the EOF occurred sooner than the licensee's scenario developers and controller team had anticipated. The GORT team was artificially delayed due to these previous assumptions.

Regardless of the controller induced delays, the EOF was not formally operational until two hours after initial activation was requested. This untimely activation, and the fact that the EOF was set up in advance did not satisfactorily demonstrate the licensee's ability to activate and staff the EOF in a timely manner. This is considered Open Item No. 50-255/90011-02.

Initially, the activities in the EOF were decentralized and seemed somewhat unorganized. When the Emergency Officer and EOF Director arrived, organization and teamwork improved. Once the EOF was completely staffed and activated, the emergency response organization functioned well.

The Emergency Officer aggressively pursued the resolution of puzzling technical questions by appropriately using staff expertise available in the EOF. Chemistry support personnel were very quick and accurate at calculating the postulated clad failure utilizing the primary coolant system data provided by the post accident samples.

Regular staff briefings were conducted to keep personnel informed of major emergency response actions. Communication with counterparts in other emergency response facilities functioned well. Communications with State, local and federal official were effective and timely.

Status boards in the EOF were not always kept updated in a consistent manner.

With the exception of the one identified Open Item, this portion of the licensee's program was acceptable.

e. Field Monitoring Teams (FMT)

Field Monitoring Teams (FMT) were promptly dispatched from the OSC and reported to the assigned vehicles. Inventory and equipment checks were performed in preparation for survey and sample taking activities. It was noted that FMT kits need a pair of tweezers.

The FMTs were provided with a good initial briefings of plant status and meteorological data. Throughout the exercise, frequent updates were provided, particularly as conditions changed which directly effected the FMT's. Radio communication between the FMTs and the controlling base, OSC (and later the EOF), were clear, concise and effective. Results of dose rate surveys and air samples were reported in a timely manner.

Survey techniques and contamination control practices were performed well. The FMTs were very effective at locating and identifying the plume centerline. Environmental samples of grass, dead vegetation, roots, soil and water were obtained utilizing approved methods.

Based on the above findings, this portion of the licensee's program was acceptable.

f. Joint Public Information Center (JPIC)

The Joint Public Information Center (JPIC) was activated and utilized by State, county and utility representatives.

Representatives of local news media were present in the JPIC throughout the exercise. NRC representatives did not directly observe JPIC activities.

7. Exercise Objectives and Scenario Review (IP 82302)

The licensee submitted the exercise scope and objectives and a draft scenario package for review by the NRC within the established timeframes. Following reviews, minor comments were provided to the licensee regarding the scenario package. These comments were considered and revisions made to the scenario package where applicable.

The licensee's scenario was considered challenging. The initial event, a steam generator tube rupture, was easily recognizable, but the later non-isolable main steam line break and the resulting iodine release was adequately difficult to significantly challenge the emergency response organization.

An inconsistency was noted during the exercise between data provided for ground shine dose rates and count rates for surface contamination levels. This inconsistency was recognized by Controllers and did not hinder player activities.

Based on the above findings, this portion of the licensee's program was acceptable.

8. Exercise Control

Overall exercise control was considered good. As in previous years, the licensee utilized a room adjacent to the Control Room (CR) for the exercise CR. No effort was made to make this environment similar to the real Control Room. Nevertheless, CR scenario data was effectively conveyed to the players.

Many of the data sheets and the scenario timeline had scenario time only recorded on them. This made it difficult for some controllers to quickly identify appropriate data pages. Also, the use of voluminous and multiple tables, charts and maps for radiological data was considerably complicated. Though it was difficult to use, controllers did a good job of providing correct data to players at appropriate times.

Based on the above findings, this portion of the licensee's program was acceptable.

9. Open Items

Open items are matters which have been discussed with the licensee which will be reviewed further by the inspector and which involve some actions on the part of the NRC or licensee or both. The Open Items disclosed during this inspection are discussed in detail in Sections 6.c and 6.d. of this report.

10. Exit Interview (IP 30703)

The inspection team held an Exit Interview the day after the exercise on May 23, 1990, with the licensee representatives denoted in Section 2. The licensee presented a summary of their findings identified in the controller critique held earlier in the day. The NRC team leader then discussed the findings of the NRC inspection team. No violations of NRC requirements were identified. The licensee was informed of the two Open Items previously mentioned in this report, involving (1) poor command/control and overall direction of OSC, and (2) untimely activation of the EOF.

The licensee was asked if any of the information discussed during the exit interview was proprietary. The licensee responded that none of the information was proprietary.

Attachments:
1. Exercise Scope and Objectives
2. Exercise Scenario Sequence of Events

1.0 SCOPE AND OBJECTIVES

1.1 SCOPE

PALEX 90 is designed to meet exercise requirements specified in 10 CFR 50, Appendix E, Section IV.F. It will postulate events which would require activation of major portions of the site emergency plan. Offsite participants include the State of Michigan, Allegan County, Berrien County and Van Buren County.

1.2 OBJECTIVES

The exercise will demonstrate the following items as dictated by the scenario:

1. Assessment and Classification

   a. Recognition of emergency conditions

   b. Timely classification of emergency conditions in accordance with emergency action levels

2. Communication

   a. Initial notification within specified time constraints (state and local - 15 minutes, NRC - 1 hour)

   b. Subsequent notification in accordance with procedure

   c. Notification and coordination with other organizations, as required (other utilities, contractors, fire or medical services)

   d. Provision of accurate and timely information to support news release activity

3. Radiological Assessment and Control

   a. Calculation of dose projection based on sample results or monitor readings

   b. Performance of in-plant and offsite field surveys and collection of environmental samples

   c. Trending of radiological data

   d. Formulation of appropriate protective action recommendations

   e. Contamination and exposure control

f. Collection and analysis of a post-accident primary coolant sample*

4. Emergency Response Facilities

a. Activation, staffing and operation at appropriate classifications and within specified time constraints

b. Adequacy of emergency equipment and supplies

c. Adequacy of emergency communication systems

d. Access control

5. Emergency Management

a. Command and control with transfer of responsibilities from Control Room to Technical Support Center to Emergency Operations Facility

b. Assembly and accountability within approximately 30 minutes

c. Coordination with State of Michigan emergency response organization

d. Mitigation of operational and radiological conditions

e. Mobilization of emergency teams

6. Reentry and Recovery

a. Assessment of damage and formulation of recovery plan outline

b. Identification of constraints, requirements and organization to implement the plan

7. Exercise Control

a. Provision for adequate free play

b. Accurate assessment of player performance

*If the panel is unavailable due to modifications, the post-accident sample will be either demonstrated administratively or rescheduled at an acceptable date.

PALEX - 90
Sequence of Events

Scenario Time	Event
-0030	Initial conditions - normal full power.
	Equipment out of service - none.
	Alarms - none.
	PCS leak rate (most recent results): 0.08 gpm identified, 0.034 gpm unidentified, 0.114 gpm total.
	Estimated primary to secondary leak rate: 0.001 gpm.
0000	Control Room indications of steam generator tube leakage received.
0010	Steam generator tube leakage quantified at 50-60 gpm.
0015	Plant shutdown at maximum attainable rate should be commenced and an "Alert" must be declared.
0048	Leaking generator tentatively identified as "B" S/G; shutdown continues at maximum attainable rate.
0210	"B" S/G main steam isolation valve fails closed, resulting in a turbine and reactor trip. On the trip, a weld cracks at the base of a "B" S/G relief valve column, resulting in a steam line break outside containment. The following transient results in 0.1% failed fuel.
0215	"General Emergency" must be declared.
0217	"B" S/G isolated, deliberate PCS pressure reduction commenced. Steaming path established via "A" S/G MSIV bypass valve. Cooldown rate is uncontrolled and release is in progress due to steam line break.
0224	SIAS received.
0239	SIAS reset and primary coolant pump P-50B restarted.
0245	"B" S/G is empty, release continues due to differential pressure. Cooldown rate is now controllable.
0250	Fuel damage estimated at 0.1%.
0400	Steaming path shifted to "A" S/G atmospheric dump valves.

Scenario Time	Event
0538	Shutdown cooling system in service.
0600	Release rate at minimum due to cooldown and depressurization; recovery phase demonstrated.
0600+	Secure from the drill.

PALEX - 90
Narrative Summary

0800
(-0030) Initial Conditions

A. The plant is at full power, at the end of core life (10.5 gwd/mtu).

B. No equipment is in a degraded mode.

C. No alarm conditions exist.

D. Meteorological conditions are as follows:

1. Wind Speed: 8.5 mph

2. Wind Direction: 214°

3. Stability: F

4. Ambient Temperature: 65°F

E. Primary and Secondary Chemistry:

1. Primary System Chemistry

a. pH: 6.8

b. Boron: 105 ppm

c. Dissolved O_2: <.02 ppm

d. H_2: 24 cc/kg

e. Total beta gamma activity: 1.43 microcuries/ml

f. Iodine dose equivalent: 3.1 E-2 microcuries/ml

g. Total PCS gas activity: 4.42 microcuries/ml

h. PCS Xe-133 specific isotope activity: 413 microcuries/kg

2. Secondary System Chemistry

a. Primary to secondary leak rate: 0.001 gpm

b. Offgas Xe-133: 5.50 E-5 microcuries/ml

c. Condenser air inleakage: 4 cfm

d. A and B S/G gross gamma activities: <5.6 E-6 microcuries/ml

F. Primary Coolant System Leak Rate (Most Recent Results):

1. Identified: 0.08 gpm

2. Unidentified: 0.034 gpm

3. Total: 0.114 gpm

0830-0845
(0000-0015)

A. The exercise begins when a through-wall crack develops in a tube in the "B" steam generator, resulting in a 57 gpm primary-to-secondary leak. Symptoms of a steam generator tube leak are indicated in the Control Room.

B. Expected Actions:

1. Respond to alarms in accordance with alarm response procedures.

2. Conclude that steam generator tube leakage is indicated and refer to ONP 23.2, "Steam Generator Tube Leak," and Site Emergency Implementation Procedure EI-1.

3. SS directs plant shutdown at the maximum attainable rate (for drill purposes, 30%/hr has been selected).

4. SS directs steam generator and offgas sampling and radiation surveys of main steam piping to determine the affected S/G.

5. SS assumes Site Emergency Director position and:

a. Classifies an "Alert" per EI-1 based on "primary to secondary leakage rate >50 gpm but less than charging pump capacity."

b. Directs public address announcement and sounding of the emergency siren.

c. Delegates actions/notifications identified in EI-1 and marked on EI-2.1, Attachment 1, including emergency staff augmentation, personnel accountability, activation of TSC/OSC, onsite monitoring and offsite dose estimates.

d. Requires the completion of the emergency notification forms of EI-3, Attachment 1 and NOD Form 3160.

e. Commences 15-minute status notifications per EI-3.

0845-1040
(0015-0210)

A. Plant Shutdown continues at 30%/hr.

B. The steam generator tube leak is tentatively identified as being located in the "B" S/G.

C. No other equipment malfunctions are noted.

D. Expected Actions:

1. Complete starting of TSC/OSC and turnover of responsibilities/plant status.

2. Continue shutdown at the present rate, as changing flow is adequate and no further S/G tube degradation is noted.

3. Confirm "B" S/G as the affected S/G and isolate functions in accordance with ONP 23.2.

4. Monitor condenser offgas for release calculations and perform confirmatory samples.

5. Perform PCS isotopic analysis for iodine.

1040-1045
(0210-0215)

A. As plant shutdown continues, the "B" S/G main steam isolation valve CV-0501 fails closed, which results in a turbine and reactor trip.

B. On the trip, a weld cracks at the base of a "B" S/G relief valve column (RV-0707), resulting in a 500,000 lbm/hr steam line break outside containment.

C. The resulting uncontrolled cooldown and pressure transient damages approximately 40 fuel rods in various core locations for a total of 0.1% failed fuel.

D. Expected Actions:

1. Complete EOP-1, standard post-trip actions.

2. Due to multiple malfunctions, EOP-9.0, "Functional Recovery Procedure" will be invoked and safety function status checks completed.

3. The Site Emergency Director will reclassify the event as a "General Emergency" per EOP-9.0, based on "Loss of 2 of 3 fission product barriers with potential loss of third fission product barrier" (the

fuel damage attendant to the trip will not be immediately apparent) and will:

a. Delegate actions/notifications identified in EI-1 and marked on EI-2.1, Attachment 1, including environmental assessment, estimation of core damage, and backup notification to Van Buren and Allegan counties.

b. Activate the EOF and JPIC and dispatch utility liaisons.

c. Evacuate unnecessary personnel.

1045-1115
(0215-0245)

A. Operations continue EOP-9.0 response. Safety function status checks are performed, the "B" steam generator is completely isolated (same isolation points required for both the excess steam demand event and the concurrent tube rupture), and PCS pressure is deliberately reduced to actuate safety injection. All primary coolant pumps are stopped.

B. The existence of fuel damage, S/G tube rupture, and steam line break results in an unisolable release containing iodine which will jeopardize protective action guidelines to the 10-mile EPZ and which will not be capable of being stopped until the PCS is cooled below 210°F and depressurized.

C. PCS cooldown is uncontrolled at this point due to the insoluble steam line break, until the "B" S/B empties.

D. Expected Actions:

1. Assess fuel damage.

2. Provide protective action recommendations to state and local officials as appropriate.

3. Verify adequate feedwater reserves to support cooldown.

4. Verify SIAS functions when received.

5. Verify natural circulation cooling.

6. Verify safety injection throttling criteria met; throttle and reset SIAS as conditions permit.

7. Restart at lease one primary coolant pump when conditions permit to assist in cooldown and pressure control.

8. Reduce PCS pressure and temperature as low as possible as quickly as possible to minimize the release.

1115-1344
(0245-0514)

A. Cooldown continues to shutdown cooling entry conditions; cooldown rate can now be controlled, as the "B" steam generator has blown dry.

B. The release continues at a decreasing rate as "B" steam generator differential pressure decreases. Until the PCS is cooled below 210°F and depressurized; however, all material transferred via the "B" S/G tube rupture will be released via the "B" S/G steam line break.

C. Expected Actions:

1. Continue to cooldown and depressurize as required to meet shutdown cooling entry conditions and minimize release.

2. Determine if PCS activity is acceptable for circulation outside of containment and implement appropriate radiological controls in anticipation of shutdown cooling operations.

3. Revise protective action recommendations as required.

1344-1430
(0514-0600)

A. The PCS has been cooled to less than 300°F and is at the minimum pressure for primary coolant pump operations.

B. The release continues via the steam line break at a low rate.

C. Expected Actions:

1. Implement plans for reentry/recovery.

2. Consider options to eliminate release path via steam line break as radiation levels and steam pressure decrease, eg, erection of temporary barriers/enclosures.

3. Verify shutdown cooling entry conditions are met.

4. Provide TSC/PRC resolution of technical issues, eg, waiving requirements for continued PCP operation while on shutdown cooling to support early PCS depressurization and termination of release.

D. The recovery phase is demonstrated when the reduction of the release rate by shutdown cooling system operation is proven.

1430+
(0600+) Terminate Exercise