U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/88002(DRSS)

Docket No. 50-155 License No. DPR-6

Licensee: Consumers Power Company
212 West Madison Avenue
Jackson, MI 49201

Facility Name: Palisades Nuclear Power Plant

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: February 16-18, 1988

Inspectors: James P. Patterson — March 4 '88 Date

James E. Foster — 3/8/88 Date

Approved By: William Snell, Chief FOR — 3/8/88 Date
Emergency Preparedness Section

Inspection Summary

Inspection on February 16-18, 1988 (Report No. 50-255/88002(DRSS))
Areas Inspected: Routine, inspection of the Palisades Nuclear Power Plant's emergency exercise involving observations by three NRC representatives of key functions and locations during the exercise. The inspection was conducted by two NRC inspectors and one consultant.
Results: No violations, deficiencies, or deviations were identified as a result of this inspection.

DETAILS

1. Persons Contacted

NRC Observers and Areas Observed

J. Patterson, Technical Support Center (TSC) and Emergency Operations Facility (EOF)
J. Foster, Control Room, Operational Support Center (OSC) and Post Accidental Sampling Monitor (PASM)
G. Stoetzel, TSC and EOF, Dose Assessment and Health Physics Activities

Consumers Power Company (CPCo) Personnel

*F. Buckman, Vice President, Nuclear Operations
D. Hoffman, Plant General Manager, Palisades
R. Rice, Operations Manager
R. Orosz, Engineering and Maintenance Manager
D. Joos, Administrative and Planning Manager
W. Beckman, Radiological Services Manager
T. Anderson, Shift Supervisor
B. Bauer, Shift Supervisor
R. McCaleb, Quality Assurance Director
P. Loomis, Emergency Planning Administrator, Corporate
T. Katarsky, Senior Nuclear Emergency Planner Corporate
D. Fugere, Emergency Planner Corporate
K. Penrod, Emergency Planner Corporate
M. Hobe, Emergency Planning Coordinator (Big Rock Point Plant)
J. Brunet, Senior Emergency Planning Coordinator (Palisades)
M. Dawson, Senior Health Physics Technician, Emergency Planning
R. Doan, Sr., EOF Administrator
J. Hager, Chemistry Lab Supervisor
D. Malone, Nuclear Licensing Analyst
J. Cole, Facilities Operations Supervisor
L. Kenaga, Health Physicist (Palisades)
A. Clark, TSC Health Physics Controller
G. Ellis, Radiation Protection Supervisor
M. Savage, Public Affairs Director (Palisades)
T. Hollowell, Reactor Engineer
J. Dearth, Lead Controller, Maintenance Support Center (MSC) - OSC
R. Beeker, Auditor, Nuclear Assurance Department
D. Anderson, Senior Quality Assurance Consultant, Nuclear Assurance Department

All names listed above except the one designed by an asterisk attended the exercise exit meeting on February 18, 1988.

2. General

An exercise of the Palisades Plant Site Emergency Plan (SEP) and the Emergency Implementing Procedures (EIPs) was conducted on February 17, 1988. The exercise tested the response of the licensee to a hypothetical

accident scenario, resulting in a major release of radioactive material to the environment. An attachment to this report describes the scope and objectives and provides a sequence of events of the exercise scenario. This was an unannounced off-hours exercise with partial participation by the State of Michigan and the counties of Van Buren, Allegan, and Berrien.

3. General Observations

a. Procedures

This exercise was conducted in accordance with 10 CFR, Part 50, Appendix E requirements using the Palisades Nuclear Generating Plant Emergency Plan and associated implementing procedures.

b. Coordination

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

c. Observers

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

d. Critique

The licensee held a critique at the South Haven Conference Center, South Haven, Michigan on February 18, 1988. The NRC critique was also held there on the same day. Personnel who attended this joint meeting are listed in Section 1.

4. Licensee Actions on Previously Identified Items

a. (Closed) Open Item No. 50-255/86015-01. This item resulted from the licensee's inability to adequately demonstrate the capability for emergency personnel to respond within the 30 minute or 60 minute guidelines of NUREG-0654 when contacted at home on off-hours. The licensee committed to perform an additional call-in drill before July 1, 1987, with a second drill to be conducted within 90 days of the first. These two drills were conducted successfully within the requested time frames. In addition, a shift augmentation response was demonstrated as part of this off-hours, unannounced emergency exercise. This shift augmentation response was satisfactory although conducted under adverse weather conditions (snow-packed roads with patches of fog). This item is closed.

b. (Closed) Open Item No. 50-255/86019-01. This 1986 emergency exercise item resulted from limited interaction and integration between the Plant Security and Operations Support Group and the Site Emergency

Director (SED) in the TSC during this simulated emergency. Since then, through practice drills and demonstration in this exercise, the security staff and the Control Room/TSC have integrated well with a coordinated effort needed in an emergency. This item is closed.

5. Control Room

a. Control Room personnel demonstrated excellent responses to both the initial security event and the subsequent stem generator tube rupture with radiological release.

During the security event, security procedures were correctly followed, emergency classification of the event as an Alert was conservative and accurate, and a proper decision not to shut down the plant (there was no threat made to plant operations) was made by the Shift Supervisor (Site Emergency Director). Notifications were made in a timely fashion, per the applicable procedure. During the security event, licensee personnel expressed concern and verified that Security Guards did not carry loaded shotguns around the plant for drill purposes.

During the steam generator tube rupture the following procedures were appropriately utilized; standard post trip action checklist (prior to tube rupture), emergency operating procedures (Excess Steam Demand Event EOP 6.0), event diagnostic diagram, and Emergency Plan implementing procedures.

When the Duty and Call Superintendent arrived to assume the duties of Site Emergency Director (SED) from the Shift Supervisor, he received a thorough turnover briefing and let several minutes pass to assure that he understood the overall situation before assuming his duties. This was considered prudent.

To enhance the realism of the exercise (the exercise Control Room lacks instrumentation) the licensee utilized a tape recorder to provide the sound of "escaping steam".

It was observed that the Shift Supervisor/Site Emergency Director did not review the accountability documentation when it was provided to him by a Security Guard. He was advised that the accountability procedure had been completed within 24 minutes, with only two people missing. The two missing people were identified in approximately 10 minutes. This was viewed as a minor oversight.

b. Technical Support Center (TSC)

TSC shift augmentation began following the initial Alert. The inspector observed the operation of the automatic dialer system used to contact emergency response personnel to report to the TSC or OSC, using a recorded message. The system, used for the first time in an annual exercise, functioned as designed and exhibited a marked improvement over earlier "call-in" systems using individuals to

make the calls. This demonstration, plus prior NRC requested drills since July 1987, confirmed the capability of the new system to get sufficient numbers of responders for both the 30 minute goal and the 60 minute goal as stipulated in Procedure EI-2.2 and the Site Emergency Plan.

The SED declared the TSC activated and operational at 0308, based on assurances that communications and security coverage were ready. These were his main concerns at that time. Other support groups were activated as sufficient personnel were present.

Briefings by the SED to the TSC staff and caucuses held with TSC support group leaders were frequent and meaningful.

There was a somewhat excessive delay in seeking out a revised emergency classification using the EAL tables. This was to identify which EAL was correct for the Main Steam Line Code safety valve being in the stuck open position following a reactor trip about 0312. At 0342 the SED updated the TSC staff to announce that this condition was identified as an "Alert." Another declaration was not made to the off-site agencies, since the plant was already in the Alert stage from the Security event earlier. An update of events to the State, local agencies, and the NRC should have been made at that time.

Good deliberations and examples of objectivity were demonstrated by the support staff interacting with the SED before the General Emergency was declared. Advice was sought from the Health Physics Group Leader on the proper Protective Action Recommendation (PAR) to recommend to the off-site agencies. The SED contacted the State at 0402 with a complete PAR to go with the General Emergency Declaration. Also, he made an announcement to evacuate all nonessential personnel and pregnant women via the normal plant access route. He first conferred with his Health Physics Group Leader before making the announcement, to get assurance that the plume was not going in the direction of the evacuation route. These actions were well demonstrated.

The first off-site monitoring team was dispatched at 0414. Their radiation readings were sent back to the TSC via the OSC by 0425. The Health Physics Group Leader instructed the OSC to activate the first field team at 0330. To be prepared for a fast breaking release sequence as in this scenario, the field teams should be automatically activated with all required equipment operable in a standby mode at the Alert level. The decision-makers had to wait approximately 30 minutes to get confirmatory readings of the release from the field teams.

Habitability checks were being performed in the TSC at adequate intervals. Dose assessment values were calculated by the Health Physics Group based on a dose projection through a Main Steam Line Dump Valve as described in Procedure EPIP 6.2, as determined from steam line monitor RIA-2323 and RIA-2324. This flow rate is much greater than that for the Code safety valve. Thus, the dose

assessment values were much higher as calculated than they would have been if based on the flow rate through the stuck open Code safety valves. The source of this error (resulting in much higher calculated radiation levels) was not identified until late in the exercise. The basic cause appeared to be one of nomenclature and misidentification of which valves were involved. Dose estimates, thus obtained, were back calculated for the off-site field teams' readings. These in turn resulted in unusually high radiation levels being reported at 1.6 miles and at 3.3 miles.

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

- The Site Emergency Director, when confronted with a second emergency event in the same category as an earlier one, should provide a notification update to State, county agencies, and the NRC Duty Officer describing the applicable EAL, while avoiding a second formal emergency classification.

- The Site Emergency Director and his technical support staff should take positive steps to assure that the Health Physics Support Group has clear, concise information on the source of the radiation release. This will permit them to calculate an accurate value, based on best available information.

c. Operations Support Center and Maintenance Support Center

The Operations Support Center (OSC) and Maintenance Support Center (MSC) were orderly and well organized. Both facilities were staffed at approximately 0205 hours. Noise levels were acceptable throughout the exercise. Status boards were utilized to track on-site and off-site radiological monitoring teams, on-site task teams (equipment repair or maintenance), major events and lead personnel. Status board OSC-1 appeared to be mislocated and unutilized, but an "ad hoc" status board with the same information was established.

Good communications between the OSC, MSC, TSC and EOF were evident. Priorities were assigned for the various equipment repair and maintenance teams, based on the perceived need for the action to mitigate the accident sequence.

A contamination control step-off pad was established and personnel were questioned as to whether they had "frisked" themselves. At various points, concern for contamination control and radiation dose reduction were properly demonstrated.

d. Post Accident Sampling Monitor (PASM)

During the steam generator tube rupture event, a sample from the Post Accident Sampling Monitor (PASM) system was requested. A three-man technician team from the Operations Support Center (OSC) was dispatched to obtain and analyze the PASM sample.

Initial dispatch of the team from the OSC was somewhat delayed due to discussions related to the radiological habitability of the area of the PASM panel, and the likely radiation dose to the PASM team. An informal As Low As Reasonably Achievable (ALARA) review was discussed. Some time would have been saved if the team had been given turn-back or stop work dosages and immediately dispatched.

The team was equipped with full anti-contamination clothing and self-contained breathing apparatus (SCBA). From observation and discussion, it was evident that the team had little prior experience in operating the PASM panel while wearing this equipment. The SCBA units lacked communication devices, but no difficulties in communication were observed. This was partially due to the fact that there was no communication with the PASM team via radio (where communications problems normally arise when wearing SCBA).

The team carefully followed the PASM sampling procedure, with one individual reading the procedure and verifying steps, while the other performed the various manipulations. Good health physics support was provided by the assigned radiation technician.

The time from sample request to sample results availability (in the TSC) was approximately 3.5 hours. This is beyond the 3 hour goal for such actions, but was considered as acceptable.

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

- Training for PASM team members should include drills wearing full anti-contamination clothing ans SCBA.

- Communication devices should be provided for the SCBA provided for the PASM team.

e. Emergency Operations Facility (EOF)

The EOF activation was delayed due to the nature of the emergency scenario (EOF activates normally at Site Area Emergency) which was still in the Alert stage and under control of the TSC, until 0558. At that time the EOF took command and control. Prior to the official takeover, the Emergency Director (ED) had a general caucus with his support group leaders. There was a good discussion and exchange of information and opinions between the ED and his support group leaders at that time. At 0515, prior to activation, the status boards were current and the plot trends of reactor pressure level vs. primary coolant system pressure were posted on the trending status board.

The EOF Off-site Monitoring Teams Status Board indicated at 0500, that most field team readings were at 1.6 miles and 3.3 miles from the plant. As radiation levels increased, no apparent effort was identified to dispatch either of the teams out to greater distances from the plant to get a better understanding of the plume and

radiation levels. In general, radiation readings provided to the off-site teams were consistent with the scenario; however, on a few occasions the field team controllers provided erroneous data (which later proved to be due to an arithmetic error of a factor of 10).

At 0613 dose calculations projected values of > 1R total dose out to 17 miles due to erroneous field data plus an estimated three hour release time. The Health Physics Group Leader was concerned about the magnitude of exposure rates at and beyond 10 miles. While questioning these levels, the philosophy of the Health Physics Support Group Leader seemed to be that the emergency responders had to act with the best data available, and to recommend more preventative actions to protect the population beyond the 10 mile EPZ. The Chief Controller interceded at 0633 to prevent any PARS being assessed beyond 10 miles, which would conflict with the State of Michigan's emergency evacuation plans for Allegan County. A two hour release duration value was recommended to the participants at that time.

The exercise participants weren't allowed to use a release duration that would be consistent with the scenario. A three hour release duration did result in a PAR beyond 10 miles, as identified previously.

PASM results were received by telephone by the Reactor Physics Group. Although later it was determined that these results were transferred by documentation to the EOF, it was not readily apparent to the NRC inspector. Such vital information should have been transferred without delay by written message as soon as it was available, with copies to the Emergency Director and each of his EOF Support Group Leaders.

One scenario discrepancy that kept reappearing in discussions in both the TSC and the EOF, was the absence of Iodine in the composition of the released fission gases. The unrealistic composition of the fission gases was identified in the pre-exercise meeting as being generated to simplify evacuation/sheltering recommendations by the State of Michigan for Allegan County. The Chief Controller later clarified this by stating that it had been the consensus of the licensee's scenario developers to eliminate iodine entirely. Following the various licensee critiques after the exercise it was decided to include iodine in any fission gas releases for future exercises. Both the TSC and EOF technical staff had problems in accepting a no iodine release.

Recovery and re-entry were well demonstrated in this exercise. The initial request by the interim ED was for each support group leader to develop a list of proposed measures by priority which should be implemented as part of the recovery/re-entry activities. The SED from the TSC plus his three key support group leaders (operations, maintenance, and health physics) were invited to participate at the EOF in those discussions. When these three individuals arrived, a joint meeting was held which also included input from the Emergency

Service Officer of the EOF management staff. This discussion considered many aspects besides operations, such as logistics, added manpower, coordination with off-site agencies and radiation hazards still remaining in the plant. The exercise terminated at approximately 0915.

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

Those responsible for dispatching off-site monitoring teams, whether from the OSC or EOF, should utilize and evaluate dose assessment information and related radiation levels to better direct the teams out to further distances from the licensee's protected area.

6. Exit Interview

The inspection team held an exit interview the day after the exercise on February 18, 1988, with the license representatives denoted in Section 1. The NRC team leader discussed the scope and findings of the inspection and indicated that no probable exercise weaknesses were identified at that time.

The inspectors also discussed the probable content of the report to determine if the licensee considered that any of the information should be proprietary. The licensee responded that none of the information should be proprietary.

Attachment: Palisades Exercise
Scope and Objectives and
Sequence of Events

1.0 SCOPE AND OBJECTIVES

1.1 SCOPE

PALEX 88 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 and response by Van Buren, Allegan and Berrien Counties and the State of Michigan. The exercise will be unannounced in support of state and local exercise objectives. The Joint Public Information Center will be activated.

1.2 OBJECTIVES

The exercise will demonstrate each item listed under the following categories:

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 (state, local, NRC)

   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

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

   d. Trending of radiological data

   e. Formulation of appropriate protective action recommendations

   f. Contamination and exposure control

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

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

7. Exercise Control

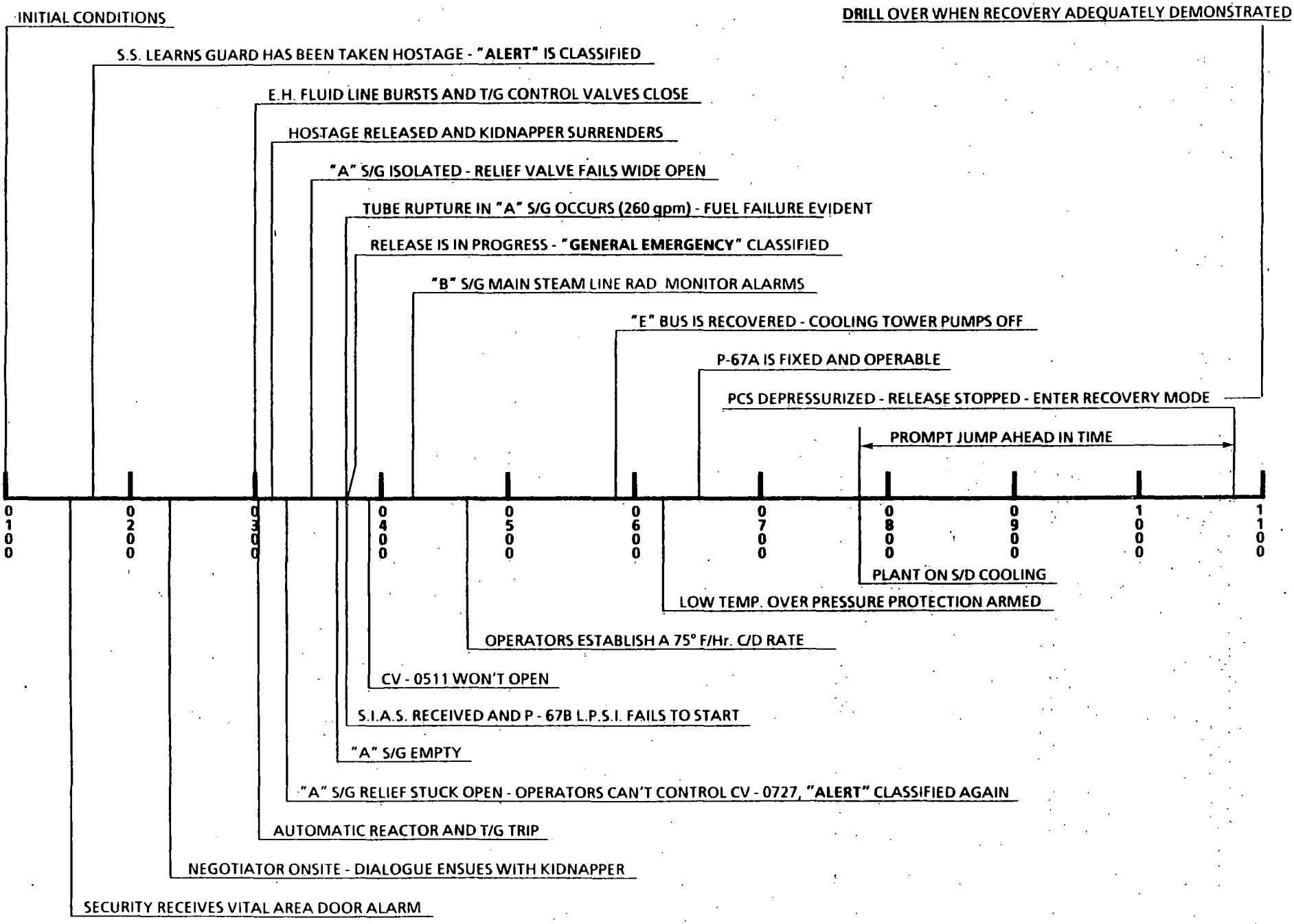
   a. Provision for maximum free play

   b. Accurate assessment of player performance

PALEX 88
Sequence of Events

Time Actual (Scenario)	Event
0100 (-0030)	Initial conditions - Normal full power Equipment out of service: Auxiliary Feed Pump P-8C, Low Pressure Safety Injection Pump (LPSI) P-67A, and the Failed Fuel Monitor Alarms: None PCS leak rate as of 0700 yesterday: 0.05 gpm unidentified, 0.1136 gpm identified, 0.1636 gpm total Further historical data will be provided by the controller if requested.
0130 (0000)	CAS/SAS receives alarm on the Bay Roof Door. CAS dispatches officer to investigate.
0135 (0005)	Security Officer arrives at alarming door and is taken hostage outside the vital area. He is then taken to the AO Pit (auxiliary operators briefing/break room) located at the north end of the turbine deck. His captor orders out any AOs there at the time and takes over the room.
0140 (0010)	Kidnapper calls the Control Room from the AO Pit, describes the situation and makes demands.
0145 (0015)	SS assumes SED duties and classifies an "Alert" based on "adversaries commandeering a nonvital area."
0210 (0040)	Negotiator arrives.
0215 (0045)	Negotiator clears security and arrives at the scene. Discussion ensues.
0300 (0130)	Electrohydraulic fluid line bursts, resulting in the turbine generator control valves closing.
0302 (0132)	An automatic reactor trip occurs when the high pressurizer pressure set point is exceeded. Following the trip, one of the "A" steam generator safety valves sticks open.
0310 (0140)	Kidnapper releases his hostage and surrenders. Kidnapper is removed from the site in the custody of local law enforcement officers.
0315 (0145)	Another "Alert" is classified based on an unisolable main steam line break and notifications made. When operators attempt to increase auxiliary feedwater flow, they will find they have no control of FIC-0727 from the Control Room.

Time Actual (Scenario)	Event
0325 (0155)	Operators isolate "A" steam generator (S/G), and shortly thereafter, the faulty safety valve fails wide open. Auxiliary operator is manually controlling auxiliary feed flow and is in communication with Control Room for directions on how to throttle it.
0340 (0210)	"A" S/G is empty. Operators stop two primary coolant pumps, and start dropping Primary Coolant System (PCS) pressure.
	NOTE: When operators first attempt to establish cooldown using CV-0511, they find it will not open.
0345 (0215)	An approximate 260 gpm steam generator tube rupture occurs in the "A" S/G as indicated by the "A" main steam line radiation monitor HIGH alarm energizing; this is followed by SIS actuation. P-67B Low Pressure Safety Injection Pump fails to start.
~0350 (~0220)	SED classifies a "General Emergency" based on a loss of "2 out of 3 fission product barriers." Commences making notifications.
0355 (0225)	Operators have reestablished cooldown and are dropping PCS pressure to reduce the leak rate; they also block and reset safety injection.
	NOTE: When SIAS initially occurred, they stopped the remaining two primary coolant pumps. Now that SI has been reset, they restart "B" and "C" PCPs. They also stop both boric acid pumps and try to establish a 75° per hour cooldown rate.
~0415 (~0245)	"B" S/G main steam line radiation monitor alert alarm energizes. Operators isolate letdown.
~0633 (~0503)	P-67A Low Pressure Safety Injection Pump returned to service and tested
0750 (0620)	Plant is on shutdown cooling - cooldown continues.
0755 (0625)	Time jumps 2 hours and 55 minutes to condition where the PCS has been cooled and depressurized to a point where the release has become negligible.
1050	Management enters the recovery mode.
~0955 (~0825)	Exercise ends. Recovery adequately demonstrated.


INITIAL CONDITIONS
DRILL OVER WHEN RECOVERY ADEQUATELY DEMONSTRATED
S.S. LEARNS GUARD HAS BEEN TAKEN HOSTAGE - "ALERT" IS CLASSIFIED
E.H. FLUID LINE BURSTS AND T/G CONTROL VALVES CLOSE
HOSTAGE RELEASED AND KIDNAPPER SURRENDERS
"A" S/G ISOLATED - RELIEF VALVE FAILS WIDE OPEN
TUBE RUPTURE IN "A" S/G OCCURS (260 gpm) - FUEL FAILURE EVIDENT
RELEASE IS IN PROGRESS - "GENERAL EMERGENCY" CLASSIFIED
"B" S/G MAIN STEAM LINE RAD MONITOR ALARMS
"E" BUS IS RECOVERED - COOLING TOWER PUMPS OFF
P-67A IS FIXED AND OPERABLE
PCS DEPRESSURIZED - RELEASE STOPPED - ENTER RECOVERY MODE
PROMPT JUMP AHEAD IN TIME
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
PLANT ON S/D COOLING
LOW TEMP. OVER PRESSURE PROTECTION ARMED
OPERATORS ESTABLISH A 75° F/Hr. C/D RATE
CV - 0511 WON'T OPEN
S.I.A.S. RECEIVED AND P - 67B L.P.S.I. FAILS TO START
"A" S/G EMPTY
"A" S/G RELIEF STUCK OPEN - OPERATORS CAN'T CONTROL CV - 0727, "ALERT" CLASSIFIED AGAIN
AUTOMATIC REACTOR AND T/G TRIP
NEGOTIATOR ONSITE - DIALOGUE ENSUES WITH KIDNAPPER
SECURITY RECEIVES VITAL AREA DOOR ALARM