

NRC Immediate, Interim and Future Actions to Assess the Impact of the San Simeon Earthquake on the Diablo Canyon Power Plant

PHASE 1 - IMMEDIATE ACTIONS FOLLOWING EARTHQUAKE

- Immediately following the earthquake both NRC resident inspectors, who were onsite at the time of the earthquake, reported to the control room and immediately walked down control board panels to ascertain the status of safety systems and verified the licensee had implemented their emergency plan.
- NRC inspectors noted that the seismic monitor recorded a seismic event of 0.04g, well below the Hosgri design basis of 0.75g. This met the licensee's definition of a Moderate Earthquake (0.01 to 0.1 g). The inspectors used licensee Procedure CP M-4, "Earthquake" to follow up on the required licensee actions following a moderate earthquake.
- NRC inspectors established a separate telephone link between the station's control room and both NRC's Headquarters office in Rockville, Maryland and the NRC Region IV office in Arlington, Texas.
- Consistent with NRC requirements, the licensee declared an "unusual event" at 11:25 a.m. PST (NRC Event Report #40408). This is the lowest of the four level emergency classifications prescribed by NRC regulations.

- The licensee minimally staffed their Emergency Operating Facility (EOF) which is co-located with the San Luis Obispo County Office of Emergency Services, who were monitoring the event for damage and emergency services response. The licensee established a video conference link between the EOF and the shift manager's office to provide periodic situational updates. At least one resident inspector was present during each of the updates between the EOF and control room.
- NRC inspectors monitored reports of Pacific Gas and Electric's walkdowns of the plant. At 3:00 p.m., an inspector performed an independent inspection of plant equipment. During this inspection, the inspector searched for broken, shifted, or leaking pipes and their support braces; displaced equipment; cracks in concrete walls and in the plant's foundation and other signs of damage. The other resident inspector remained in the control room to monitor licensee actions and maintain communication with the NRC's Headquarters and regional offices.
- NRC inspector walked down the turbine building. The emergency diesel generators, component cooling water heat exchangers, and high voltage switchgear are housed in this building. No evidence of leaks or damage to any system, structure or component was noted.
- An NRC inspector walked down the switchgear area of the auxiliary building. No damage was noted in the AC or DC switchgear rooms, the cable spreading room or the battery rooms.

- An NRC inspector entered the radiologically controlled area of the auxiliary building and performed an inspection of the emergency core cooling system, the component cooling water system, and auxiliary feedwater system. No visual evidence of leaks or damage to any system, structure or component was noted.
- An NRC inspector entered the fuel building and verified level in the spent fuel pools. No evidence of leaks or damage to any system, structure or component was noted.
- An NRC inspector performed an outside tour of the plant. The inspector verified that security systems and security barriers remained operable and intact. Major outside tanks (condensate storage tank, refueling water storage tank, primary water storage tank, and fire water storage tank) were verified to have no cracks or obvious damage. The inspector also toured the intake structure and verified that no damage occurred to the traveling screens or auxiliary saltwater system.
- An NRC inspector walked down the offsite power sources and monitored licensee communications with the emergency facilities.
- An NRC inspector provided continuous site coverage until Pacific Gas and Electric Company exited the “unusual event”. Due to the frequency and magnitude of the aftershocks the licensee remained in an “unusual event” until approximately 12:15 p.m. PST on December 23.

- In the days following the earthquake, the inspectors continued to review actions with respect to response to aftershocks and adequacy of licensee procedures and emergency plan implementation.

PHASE 2 - INTERIM ACTIONS

- The NRC inspectors continued to perform plant walk downs following aftershocks.
- On January 5, 2004, inspectors performed a more detailed inspection following the earthquake near the Diablo Canyon Power Plant. The inspection effort focused on detecting evidence of movement resulting from seismic acceleration, and inspection of accessible portions of structures, systems, and components to determine whether the seismic event caused any damage. Structures, systems, subsystems, and components selected for examination were prioritized based on their risk significance. No system or structural damage nor evidence of differential deflections was detected.
- The inspectors also performed a visual examination of selected structures, systems and components inside the Unit 2 containment building. No system or structural damage nor evidence of differential deflections was detected. The NRC staff concluded that, based on there being no damage and the near identical designs of both units' containment buildings, inspection of the Unit 1 containment building could be deferred until the Unit 1 refueling outage scheduled to begin in March 2004.

- The inspectors also reviewed the Special Report submitted by the licensee to the NRC following the December 22 earthquake. The licensee has made a commitment to the NRC, which requires evaluation of each seismic event where on site monitoring instruments are actuated to determine the magnitude of the ground motion and resultant effect upon facility features important to safety. This report detailed the licensee's evaluation of the San Simeon earthquake.
- The inspectors also reviewed the Special Report submitted following two magnitude 3.4 earthquakes that occurred on October 18, 2003 (NRC Event Report #40258). These earthquakes were located approximately 3.5 miles east of the Diablo Canyon Power Plant. Both earthquakes were felt in the control room. The second earthquake triggered onsite seismic monitoring instrumentation.
- The complete results of the inspection performed by the inspectors will be included in the integrated resident inspection report that covers the time period January through March 2004 (NRC Inspection Report 05000275/2004002 and 05000323/2004002).

PHASE 3 - FUTURE ACTIONS

- During the refueling outage (March - May 2004) NRC inspectors will perform a visual inspection inside the Unit 1 containment building. In addition, an NRC manager will tour

the Unit 1 containment to look for any adverse effects from the December 22, 2003, San Simeon earthquake or the aftershocks.

- The NRC staff will review any supplements to the Special Report submitted following the December 22 San Simeon earthquake.



**UNITED STATES
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January 16, 2004

Gregory M. Rueger, Senior Vice
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**SUBJECT: DIABLO CANYON POWER PLANT - PRELIMINARY RESULT OF NRC EVENT
FOLLOWUP FOR THE DECEMBER 22, 2003, SAN SIMEON EARTHQUAKE**

Dear Mr. Rueger:

During the period of December 22, 2003, through January 9, 2004, the NRC has been conducting event followup inspections at the Diablo Canyon Nuclear Plant in direct response to the December 22, 2003, San Simeon earthquake. The purpose of this letter is to communicate to you the preliminary results of these inspection activities and to describe the NRC's planned and future actions with respect to further followup, actions, and documentation associated with the earthquake and the assessment of its impact on the Diablo Canyon plant.

The inspections to date were conducted under Inspection Procedure 71153, "Event Follow-up," and the enclosure to this letter provides a summary of the inspection scope and preliminary inspection results in the areas reviewed. Please note that the final inspection results and findings are not being issued at this time, are subject to further review, and will be documented in NRC Inspection Reports 05000275;323/2003008 and 05000275;323/2004002 to be issued approximately at the end of January and April 2004, respectively.

In summary, the NRC actions in response to the earthquake focused on the following areas:

- The impact of the seismic event on the integrity of structures, systems, components, and containment barriers that are important to the safe operation of the nuclear plant;
- The adequacy of the licensee's response to the event; and
- Whether the event was within the design basis for the nuclear plant.

The NRC's overall response to the San Simeon earthquake consists of three phases which involve the site resident inspectors and Regional and Office of Nuclear Reactor Regulation (NRR) representatives. The NRR representatives were seismic experts that provided technical experience to the inspection activities. The first phase, which has been completed, involved the immediate response to the December 22, 2003, earthquake by NRC inspectors. Immediately following the earthquake, both resident inspectors, who were onsite at

Enclosure 3

the time of the earthquake, reported to the control room and walked down control board panels to ascertain the status of safety systems and verify that your staff had implemented their emergency plan. The inspectors also performed independent visual examinations of selected structures, systems, and components. During these walkdowns, the inspectors did not identify any broken, shifted, or leaking pipes; damaged support braces; displaced equipment; or cracks or spalling in concrete walls and floor or the plant's foundation that would indicate any signs of damage.

Phase 2 of the NRC's followup involved an onsite inspection during the week of January 5-9, 2004. The inspection focused on detecting evidence of movement resulting from seismic acceleration, and visual examination of accessible portions of selected structures, systems, subsystems, and components to determine whether the seismic event resulted in degradation. The structures, systems, subsystems, and components selected for examination were prioritized based on their risk significance. During this Phase 2 portion of the inspection, the NRC staff concluded that, in order to assure that there was no damage to equipment inside the containment buildings, it would be necessary to perform a visual examination of selected structures, systems, subsystems, and components inside one of the containment buildings. Accordingly, an inspection was made of the Unit 2 containment's structures, systems, subsystems, and components. No system or structural damage or evidence of differential deflections were detected. The NRC staff concluded that, based on there being no damage and the near identical designs of both units' containment buildings, an inspection of the Unit 1 containment building could be deferred until the Unit 1 refueling outage scheduled to begin in March 2004.

Phase 3 of the NRC's actions are ongoing. Specifically, additional inspections are planned, particularly including the visual inspections in Unit 1 containment during the March 2004 refueling outage and further review of your Special Report, submitted to the NRC on January 5, 2004, as we understand you intend to supplement that report.

In addition, the NRC plans to conduct a Category 1 technical meeting with you regarding your January 5, 2004, Special Report in San Luis Obispo, California. This meeting will be open to public observation and will provide attending members of the public a period for comments and questions prior to the conclusion of the meeting. Immediately following the technical meeting on the Special Report, a second Category 1 public meeting will be conducted to provide your staff a more detailed interim exit for the Phase 1 and 2 inspection activities and a review of ongoing and planned inspection activities.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its Enclosure will be available electronically for public inspection in the NRC Public Document

Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

William B. Jones, Chief
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Dockets: 50-275
50-323
Licenses: DPR-80
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Diablo Canyon Response to San Simeon
Earthquake on December 22, 2003

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Enclosure

Preliminary NRC Inspection Results to Date for Diablo Canyon Response to San Simeon Earthquake on December 22, 2003

A. Background Information:

On December 22, 2003, at 11:16 a.m. PST, with both units operating at 100 percent power, a 6.5 magnitude earthquake occurred 50 km NNW of Diablo Canyon Power Plant at a depth of about 7 kilometers near San Simeon, California. The earthquake was measured as 0.04g acceleration at the top of the containment base. At 11:22 a.m. PST, the licensee declared an "Unusual Event" based on exceeding 0.01g acceleration.

The Operating Basis Earthquake and the Design Basis Earthquake maximum ground accelerations for Diablo Canyon are 0.2g and 0.4g, respectively. The reactor trip system has a reactor trip setpoint nominal value of 0.35g acceleration. The reactor trip was set at 0.3g at the time of the San Simeon earthquake. Therefore, the measured acceleration was less than 15 percent of the reactor trip setpoint and well within the bounds of the seismic analyses. The station is also evaluated for its capacity to withstand ground acceleration resulting from a 7.5 magnitude earthquake originating in the offshore Hosgri fault.

Units 1 and 2 remained at full power throughout the event. Both NRC resident inspectors were onsite at the time of the earthquake, responded to the control room to observe immediate operator actions, and maintained an NRC presence onsite for the next 24 hours. Immediately following the first shock, the resident inspectors established a direct open telephone link between the station's control room and both the NRC headquarters office in Rockville, Maryland, and the NRC Region IV office in Arlington, Texas. This line was kept open by one of the two inspectors and information concerning the station's status was continuously provided to NRC staff.

Fifty-six of 131 early warning system sirens lost power as a result of the earthquake. Alternate means of notifying people within the affected areas were available. The evacuation routes remained accessible. As of 3:40 p.m., on December 22, 2003, 35 sirens were without power, and at 6 p.m. 26 sirens were still without power. At 1:30 a.m., on December 23, 2003, 4 sirens were without power. These remaining 4 were restored in the subsequent 24 hours.

B. Inspection of Structures, Systems, and Components

Purpose:

To identify any structural damage to plant equipment and structures that might negatively impact safe operation.

Preliminary Inspection Results to Date:

As part of the NRC's immediate response, the onsite resident inspectors performed visual inspections in the control room and other safety-related areas of the plant, such as the auxiliary building, saltwater intake structure, and fuel handling buildings. No evidence of damage that

would affect safety system operability was identified. The inspectors also observed selected licensee visual examinations of plant structures, systems, subsystems, and components and concluded that licensee was performing adequate examinations.

During the period of January 5-9, 2004, further inspections were performed by the resident inspectors and an NRC senior reactor inspector. During this inspection activity, all levels of the turbine, auxiliary, fuel handling, saltwater intake, and containment buildings were visually inspected, with particular attention given to systems and components having the most risk significance. During the inspections, no system or structural damage or evidence of differential deflections were detected, and no site ground effects were noted during exterior visual inspections. In addition, no damage was noted to the administration building, which is designed to Uniform Building Code.

C. Inspection of Licensee Event Response

Purpose:

To assess the adequacy of the licensee's response to the earthquake.

Preliminary Inspection Results to Date:

The licensee's immediate response to the earthquake was effective in ensuring continued safe operation. The licensee's subsequent inspections were effective in evaluating whether any structural damage occurred.

The licensee convened an Event Response Team to capture lessons learned and to fully understand the response of the plant systems. The NRC inspectors reviewed the team's findings and concluded that the scope and depth of the team's reviews were comprehensive and effective. The review of control room annunciator alarms identified enhancements needed to assist control room operators and to preclude unnecessary actions in a future event.

The licensee's implementation of NRC's prompt notification requirements was timely and correct.

All seismic instrumentation functioned correctly. The NRC inspectors conducted a review of the required surveillances on seismic monitoring instruments. All instruments were correctly calibrated. The inspectors noted that the licensee is in the process of upgrading the current Earthquake Force Monitor to a digital distributed system that will provide better information (e.g., wider frequency response and more monitoring locations).

D. Inspection of the Licensee's Earthquake Response Procedure and Documentation Review

Purpose:

To assess the adequacy of the licensee's procedures and documentation relative to the earthquake.

Preliminary Inspection Results to Date:

Casualty Procedure M-4 was used in responding to the earthquake. Although overall response to the earthquake was adequate, several lessons were learned by the licensee from a subsequent review of the implementation of the procedure. The licensee has begun a general revision to improve its quality based on this experience. The NRC plans to review this procedure following its revision.

The inspectors also performed a review of the licensee's Special Report 03-04, dated January 5, 2004. This Special Report is required by the facility operating license (i.e., the license requires the licensee to evaluate each seismic event where onsite monitoring instruments are actuated to determine the magnitude of the ground motion and resultant effect upon facility features important to safety). The inspectors noted that this report was prepared based solely on the seismic monitoring instrument located on top of the containment basemat without consideration of other seismic monitoring instruments at the station. As a result of this observation, the licensee issued a corrective action document to submit a supplemental report to the NRC that will describe the analysis of data from all actuated seismic monitoring instruments (acceleration, displacement, and frequency spectrum) and will compare these to design values at the corresponding location in the plant. The NRC will review this supplemental report upon receipt from the licensee.

The inspectors reviewed the licensee's reportability procedure for loss of the early warning system sirens. During the review, the inspectors noted that the procedure for notification of the NRC for a loss of the early warning system sirens only addressed sirens within a 10-mile radius and not the entire Diablo Canyon Emergency Planning Zone, as defined in the Emergency Plan. In this case, the licensee did inform the NRC of the loss at the time the Unusual Event notification was made. The licensee issued a corrective action document to further evaluate this observation.