

County of Multnomah )  
State of Oregon ) ss.

AFFIDAVIT OF DONALD J. BROEHL  
ASSISTANT VICE PRESIDENT  
PORTLAND GENERAL ELECTRIC COMPANY

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My name is Donald J. Broehl, and my title is Assistant Vice President of Portland General Electric Company.

The purposes of this affidavit are to report to the Licensing Board concerning the status of Licensee's responses to the NRC Staff's questions in the Trojan Control Building Proceeding, to address the Board's concern as to the scope of the review of safety-related equipment performed for purposes of interim operation, to provide the background and current status of the matters reported to the Staff in Licensee's LER 79-15 and two Supplements thereto, and to explain why the latter subject does not affect the conclusions reached concerning interim operation of the Trojan Plant.

STATUS OF RESPONSES TO STAFF QUESTIONS  
IN THE CONTROL BUILDING PROCEEDING

In the Control Building proceeding, Licensee has received the following requests for information from the Staff concerning the proposed modifications to the Control Building:

September 14 - 10 questions

September 20 - 6 questions

September 28 - 7 questions

October 2 - 25 questions

Licensee met with the Staff on October 18-19 and on December 6 in order to obtain clarifications of certain Staff questions and to discuss Licensee's approach to providing the requested information. At the first meeting, Licensee provided to the

Staff drafted written responses to 19 of the questions. These draft responses and Licensee's preliminary description of its proposed responses to the remaining questions were discussed at that meeting. These discussions enabled the Licensee to finalize and submit its answers to 11 of the 48 questions on November 21, 1979. Additional discussions were held at the second meeting regarding the outstanding Staff Structural Branch questions.

Based on the discussions at the two meetings with the Staff, we are not aware of any substantive difference between the Licensee and the Staff concerning the proposed modifications. We are preparing the substantial documentation that the Staff has required concerning the design and implementation of the proposed modifications. We plan to file our responses to the 37 remaining Staff questions by December 22.

Preparation of responses to the Staff's questions has involved extensive analyses and confirmatory documentation, including the development of design and construction details which normally would not have been performed until the proposed modifications had been finally approved and implementation was about to be undertaken. These responses have required many man-months of effort by personnel of Licensee and Bechtel who are most knowledgeable in the design and operation of the Trojan Plant. The extended time frame involved in the preparation of responses is also attributable to the fact that the same personnel were required to allot a portion of their time during

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this period to other licensing matters relating to the Trojan Plant, including the "wall problem" discussed below.

We are certain, however, that the Board is aware of our earnest desire to complete Phase II of this proceeding at the earliest date. We assure the Board that we will take every possible step to complete submittal of our responses by the date we have specified above.

We would like to emphasize that none of the questions asked by the Staff raise any doubt as to the safety of continuing interim operation of the Plant. The questions deal solely with the design and implementation of the proposed modifications.

#### REVIEW OF SAFETY-RELATED EQUIPMENT FOR INTERIM OPERATION

In its Order (Page 2), the Board expresses concern as to the scope of the review of safety-related equipment within the Control-Auxiliary-Fuel Building Complex ("Complex") that was performed for the purposes of interim operation and as to whether such review conformed to the Partial Initial Decision. This portion of the Affidavit will summarize the review that was performed and explain how it conformed fully to the requirements for interim operation.

In examining the scope of the reviews of safety-related equipment performed for the Phase I proceeding, it is important to consider what led to the need for the review. The following discussion retraces the history of what was done for interim operation and describes why it was done.

During the original design of the Trojan Plant, all safety-related equipment, components, and piping in all buildings at all elevations were analyzed to establish that they would function properly in the event of an OBE or SSE. Seismic accelerations for those items during such events were determined through the use of floor response spectra developed from time history analyses.

As a part of Phase I of this proceeding, a review of the deficiencies in the design of the Control Building led to the use of the STARDYNE finite element analysis which more accurately predicted the response of the Complex to a seismic event than did the original method of analysis.

A question raised by the STARDYNE analysis was whether the floor response spectra developed during the original design of the Complex and used for equipment and piping design inputs should be changed. In response to questions raised by Dr. McCollom at the Phase I hearings, Licensee's witness explained that the change in the predicted building response did not affect the floor response spectra for all elevations in the Complex. Rather, because structural amplification due to the building response is a factor only above ground level, the floor response spectra for all el. 45' and below were not affected by the STARDYNE analysis (Tr. 2356-57; also see Tr. 2773-74). Thus, new time history analyses were performed and new floor response spectra were developed for all elevations above el. 45' in the Complex.

A comparison of these new floor response spectra to those developed in the original design showed that equipment, components, and piping having a natural frequency within a certain range would be potentially subject to higher seismic accelerations than considered in the original design of the Complex. Therefore, a review was made of all safety-related equipment, components, and piping systems above ground level (el. 45') in the Complex required to safely shut down the Plant, to provide emergency core cooling, or to mitigate the consequences of an accident so as to assure that offsite releases exceeding 10 CFR Part 100 guidelines would not occur. \*/ This review was undertaken to assure that the changes in seismic accelerations indicated by the changes in floor response spectra would not adversely affect the operation of such equipment or systems.

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\*/ The scope of such review conformed fully with the record of the proceeding (see, e.g., Licensee Exh. 9G; the systems listed in Licensee's Exh. 23; Tr. 2765) and the Board's findings in the Partial Initial Decision as to the functions of the systems that were reviewed (§ 61 and 65). The resulting modifications also conformed fully to Condition 2.C.(10)c. added to the Trojan Operating License to implement paragraph 3 of the Board's Order in the Partial Initial Decision. 8 NRC 748. Although there are a few additional systems or parts of systems, such as the sampling system, within the Complex that are designated as "safety related", they are not involved with the fulfillment of the essential functions specified above; e.g., they are not required for safe shutdown of the Plant.

Licensee's review indicated that no such equipment or components required modification as a result of the change in floor response spectra; however, changes were required to piping systems. As indicated in the discussions of the "wall problem" below, the additional reviews performed recently provide confirmation that all reviews necessary to comply with License Condition 2.C (10)c were properly performed at that time and that all modifications required at that time were properly implemented.

#### BACKGROUND AND STATUS OF "WALL PROBLEM"

The Plant was shut down on October 12, 1979, to correct primary to secondary leakage in two of Trojan's four steam generators. The leakage rate had increased from a barely detectable level when the Plant was started up in January 1979 to approximately 80 to 100 gallons per day just prior to the October 12 shutdown. Even though the leakage rate was well below the limits of the Technical Specifications, Licensee decided to shut down the Plant and plug the leaking tubes in mid-October when replacement power was available for the anticipated two-week shutdown period. A major factor in the decision to shut down at that time was the possibility that the leakage could increase to a level at which a Plant outage would be required during PGE's peak power demand period (November to February).

Several days after the Plant was shut down, in the course of evaluating a pipe support attached to a thin concrete block

wall, \*/ Licensee discovered that the wall would experience a local overstress condition in the block reinforcing steel due to pipe support reactions which could be imparted to the wall. \*\*/ Investigations into the cause of the overstress have attributed it primarily to a failure on the part of the engineer reviewing the application of piping loads onto the wall to properly consider the wall's ability to support this piping load.

This problem and related developments were reported to the Staff in Licensee's LER 79-15 and two Supplements thereto, copies of which have been provided to the Board and all parties by the Staff or the Licensee. This overall subject is referred to in the Board's Order as the "wall problem". The current status of this problem is described below.

Licensee has reviewed all masonry block walls in the Plant subject to significant equipment and piping loads in order to identify all conditions requiring corrective action. To enable an expedited NRC review, Licensee utilized simpler, more conservative criteria and calculational methodology than used in the

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\*/ The evaluation was performed pursuant to the requirements of IE Bulletin 79-02, supplied to the Licensing Board by Staff letter dated March 21, 1979.

\*\*/ This wall, which was designed as a partition wall to separate the two trains of equipment present in the area, consists of an 8" concrete block wall and a 6" concrete block wall which have been mortared together to form one 14" wall. Because it was not designed as a shear wall and most of its span is below ground level (el. 45'), it was not modeled in the STARDYNE analysis of the Complex.



original design of the Plant in order to identify the most sensitive supports, recognizing that this approach would add to the number of piping supports to be evaluated and possibly modified. The resulting corrective actions, which have been described in LER 79-15 and the two Supplements, are essentially complete.

To assure itself that similar conditions did not exist on other types of structural elements at the Plant, Licensee evaluated piping and equipment supports attached to composite walls, concrete walls, concrete floor slabs, and structural steel members, although it judged that few modifications would be required since these other types of structural elements are inherently stronger than thin masonry walls. The review to date \*/ has confirmed this judgment. Only one minor modification to a structural steel member to which a piping support is attached will be required, and one modification of a support attached to a concrete floor slab may be required. No modifications have been necessary to piping supports attached to composite walls or concrete walls.

On December 5-6, 1979, Licensee met with members of the Staff to discuss the reviews which have been performed. At that time, the Staff identified five areas in which it requires additional documentation prior to the Staff being satisfied that

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\*/ The review of composite walls is approximately 80 percent complete. Since the composite walls which would tend to be most heavily loaded have been reviewed, it is unlikely that any modifications will be required to supports attached to composite walls.

operation of the Plant can resume safely. \*/ The Staff's requests essentially require elaboration and documentation of information that was orally presented by Licensee. Licensee plans to provide such additional documentation as soon as possible and is confident that it will provide it no later than December 13. We expect that the Staff will be able to express its satisfaction shortly thereafter.

All necessary corrective actions identified as a result of the above-described reviews are expected to be completed by about December 15, 1979.

As I indicated in my letter to A. Schwencer dated November 19, 1979 (a copy of which was served on the Board and all parties on November 20), the information developed by Licensee as of that date confirmed that the "wall problem" did not involve any shear walls relied upon to provide seismic resistance capability in the Complex and has no direct relationship to the design deficiencies which are the subject of the Control Building proceeding, and that any indirect bearing is minimal. Licensee's conclusions in this regard have not changed subsequent to my November 19, 1979 letter.

As described in my November 19 letter, only one masonry wall potentially subjected to significant piping forces was

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\*/ The Staff also requested that a confirmatory testing program be conducted. The staff made explicit that such confirmatory program is not a prerequisite to resumption of Plant operation but can be conducted thereafter.

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included in the seismic analysis for interim operation. This wall was not considered a shear wall in the original design of the Plant and was included in the STARDYNE model only to provide a more realistic assessment of force distribution. Our conclusion with respect to seismic capacity of the Complex would not have been altered if the wall had not been considered in the STARDYNE analysis. Nevertheless, the wall was evaluated in detail. Of the five Seismic Category I supports attached to that wall, three are adequate in the present condition, and two have been through-bolted to mobilize both wythes of block to resist piping reaction forces, as a result of application of the new, more conservative criteria. \*/ With the through-bolting, when the reaction forces are specifically considered, the wall still has adequate capacity to withstand all loads imparted by either a 0.25g SSE or a 0.15g OBE in accordance with FSAR criteria. As explained on page 8 above, Licensee's review has shown that no modifications to supports attached to concrete or composite walls have been required as a result of the "wall problem".

In addition, as indicated in my letter of November 19, Licensee has reviewed all of the support and restraint modifications performed prior to interim operation to determine whether any of them have been impacted by the modifications resulting from the "wall problem". Licensee has completed this

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\*/ This is a correction to my November 19 letter, which erroneously referred to six such supports and stated that three of them were being through-bolted.

review and has determined that it was necessary to modify only one of these supports.\*/ This was necessary only to satisfy the new, more conservative criteria. Therefore, this modification does not indicate any inadequacy in the performance of the modifications for interim operation.

Moreover, to provide confirmation that the modifications required for interim operation were properly implemented, we have also reviewed each of the new support modifications above ground level in the Complex that were identified pursuant to LER 79-15. In each case, the modification was related only to LER 79-15 considerations. Thus, this review has provided confirmation that License Condition 2.C.(10)c was satisfied prior to the resumption of Plant operation in January 1979.

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\*/ At the time of my November 19 letter, it was believed that this support would be through-bolted. Field engineering determined that modification was more convenient. At that time, it was also expected that a support would need to be modified to eliminate an interference with another modification, but this later proved to be unnecessary.

The foregoing Affidavit is true.

*Donald J. Broehl*

Donald J. Broehl  
Assistant Vice President  
Portland General Electric

Subscribed and sworn to before me this 8th day of December 1979.



*Carole A. Hodgdon*  
Notary Public for Oregon

My Commission Expires:

*August 9, 1983*

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