Portland General Electric Company

Donald J. Broehl Assistant Vice President

February 6, 1981

Mr. R. H. Engelken, Director
Nuclear Regulatory Commission, Region V
1990 North California Boulevard
Walnut Creek, CA 94596

Re: Portland General Electric Company et al.
(Trojan Nuclear Plant) Docket No. 50-344
(Control Building Proceeding)

Dear Sir:

This letter is a report of instances in which an assumption made by Licensee in the course of the Control Building proceeding has been proven to be incorrect and two instances in which commitments made by the Licensee in the course of that proceeding were not met.

In response to a question from the NRC Staff (a copy of which is provided as Attachment 1 hereto) Licensee represented that based on its past experience, drilling of holes into walls would result in maximum damage to the reinforcing steel in those walls of a 1/8-inch nick. Based on that assumption, Bechtel calculated the maximum total strength loss which would occur if all of the reinforcing steel in the walls suffered such nicks. Bechtel calculated this loss to be 2 percent, and indicated that the reserve capacity of the subject walls, both during interim operation and after the modification, is well above this value.

Recent drilling of the necessary holes indicates that the assumption that the damage would be limited to 1/8-inch nicks was incorrect. Although the reinforcing steel has been either avoided altogether or only slightly damaged during most of the core drilling, 12 reinforcing bars suffered nicks larger than 1/8-inch and 9 bars were severed. Bechtel has attributed such damage to changes in the sharpness of the drilling bit as drilling is conducted and to some carelessness on the part of certain drill operators. The damage to the reinforcing steel which has occurred to date has not reduced the structural

121 S.W. Salmon Street, Portland, Oregon 97204

capacities of the subject walls any more than 1 percent at any elevation. (Drilling is virtually complete at El. 45'-61' of the R-line wall where the most significant damage has occurred).

In an effort to limit the damage to the reinforcing steel, Bechtel has assigned an additional Field Engineer to monitor the drilling operation and give direction to the drilling crews. Despite this measure, Licensee believes it is no longer reasonable to rely on the nicks to the reinforcing steel being less than 1/8-inch. Therefore, Bechtel is keeping a running log of the amount of steel damage which has occurred so that the maximum total strength loss due to damage by core drilling remains within the 2 percent previously estimated. Should sufficient damage occur such that severing of one additional rebar would increase the strength loss to greater than 2 percent, the core drilling operation will be halted completely for that wall until either (1) previously damaged rebar has been repaired, thus reducing the amount of previous capacity reduction, or (2) an additional safety evaluation pursuant to 10 CFR 50.59 has been prepared (and properly submitted to the NRC) assessing the potential impact of further rebar damage.

In the response provided as Attachment 1, Licensee also stated that if it was necessary to abandon a partly drilled hole because reinforcing steel had been encountered, the hole would be fully grouted before a replacement hole was drilled*. In several instances where reinforcing steel was encountered, it was not necessary to completely abandon the hole, but rather to only abandon part of the hole. (See sketches provided in Attachment 2). An evaluation was performed by Bechtel to provide justification for not grouting the portion of the hole which was being abandoned. (This evaluation is being formalized, and it will be transmitted to the Region V Office of Inspection and Enforcement as well as the Office of Nuclear Reactor Regulation.) It is unclear whether License Amendment No. 55 (issued pursuant to the State of Oregon's appeal) would require that this evaluation be submitted to the Region V Office of Inspection and Enforcement, as well as the Office of Nuclear

* Licensee condition 2.C (12)(v) places a limitation on the amount of concrete which may be removed from the walls at any one time. The instances described in this letter have not resulted in a violation of this license condition, which controls the amount of capacity reduction for these walls due to concrete removal.

Reactor Regulation, prior to proceeding with the drilling of the slightly moved hole. In any event, such notification will be provided if a similar uncertainty concerning the reporting requirements occurs in the future.

In two cases a hole was completely abandoned and not grouted prior to drilling the replacement hole, in violation of Licensee's commitment. These holes have been grouted, and steps are being taken to prevent recurrence of the violation. Licensee has reiterated to Bechtel the nature of this commitment and the importance of complying with it.

In "Licensee's Testimony on Matters Other than Structural Adequacy of the Modified Complex", Licensee testified that drilling along column line N' in the electrical auxiliaries room so that rebar U-bends could be inserted would not affect the tendons in the precast panels of the floor slab because the tendons are located at regular intervals and their location would be established and avoided during the drilling. This testimony was based on Licensee's plan at that time to drill holes one inch in diameter. Bechtel field construction engineering personnel requested that additional holes five inches in diameter be drilled to facilitate concrete placement. This size hole necessarily required that two tendons be severed during the drilling process. An evaluation was performed by Bechtel prior to drilling which concluded that the severing of these two tendons would not have adverse safety consequences; however, a formal safety evaluation should have been prepared and transmitted by Licensee to the Region V Office of Inspection and Enforcement, as well as the Office of Nuclear Reactor Regulation, prior to the performance of this work. (Such an evaluation is being formalized, and it will be transmitted to these two offices of the NRC.)

Licensee has taken the following steps, both as a result of the occurrences described above and to prevent recurrence of similar incidents in the future: (1) The drilling crew responsible for the damage to 9 of the reinforcing bars has been terminated; (2) Bechtel has taken steps, described above (p. 2), to limit damage to reinforcing bars and to assess further damage to reinforcing bars should it occur; (3) Licensee has emphasized once again to Bechtel the importance of the transmittal of safety evaluations involving changes in the modification program in accordance with License Amendment No. 55; and (4) Licensee has directed Bechtel that no changes in the modification program take place before (a) such changes have been submitted to Licensee personnel who were directly involved in this NRC proceeding and (b) such Licensee personnel have reviewed the relation of any such changes to the commitments made by Licensee in the course of this proceeding and have

determined that all requirements for reporting such changes in accordance with License Amendment No. 55 have been satisfied.

Licensee believes that the measures described above are adequate to prevent the recurrence of similar situations.

Sincerely,

Donald J. Brockl

Attachments

c: Director, Office of Inspection and Enforcement
Nuclear Regulatory Commission
Washington, DC 20555

Director, Office of Nuclear Reactor Regulation
Attention Mr. R. L. Clark
Washington, DC 20555

Mr. Lynn Frank, Director
Oregon Department of Energy

ATTACHMENT 1

NRC Questions (10/2/79)

Q. 1 Page 1 of 7

Your motion for summary disposition indicates that a core drill is to be used to drill holes in the existing walls. Previous indications were that a core drill was not to be used, but rather a star drill.

a. Provide a detailed basis for your conclusion that the reinforcement will not be significantly damaged by contact of the core drill and that contact will be immediately detected by the drill operator considering the strength of the concrete and aggregate used for the construction of the in-situ walls.

b. Include a detailed discussion of how the safety-related conduits embedded in the R wall will be avoided.

c. Additionally, your June 29, 1979 response to question 30 indicates that abandoned holes will be fully grouted before replacement holes are drilled.

d. Verify that the grout will have attained its required strength before replacement holes are drilled. Also, provide the properties of the grout which will be used and justify the acceptability of the grout for the proposed application and your procedure for determining that the grout has attained its required properties before the replacement hole is drilled.

e. Also, state how many holes can be drilled before a wall is degraded significantly if the grout has not been allowed

to develop the required strength and justify all assumptions and conclusions.

Answer:

a. The holes in the existing walls for the bolts which will connect the new elements with the existing ones will be drilled with a core drill. There is an increased drag on the drill when reinforcing steel is encountered and the water that is being used to lubricate the drill becomes less turbid due to the reduced cutting rate. This was confirmed by observing typical core drilling on a similar wall at Trojan. It was observed that the maximum damage sustained by a reinforcing bar was a nick of 1/8". It was also shown that the operator was capable of detecting a reinforcing bar during the drilling and stopping the drill without any further damage than the mentioned 1/8" nick.

Reinforcing steel in the masonry wythes can be readily located with the magnetic rebar locator presently in use at the Plant, and thus can be avoided in the drilling operation. Reinforcing steel in the concrete core of composite walls cannot be easily located in this manner due to its distance from the wall surface. The smallest size bar in the cores of existing composite walls is a No. 6 bar for verticals and a No. 9 bar for horizontals. Therefore the smallest size bar that can be damaged by drilling in the walls is a No. 6 bar which has a nominal

area of 0.44 in.^{2}. A 1/8" nick would reduce this area by .05 in.^{2}. In terms of loss of strength this amounts to .05/.44 = .11, or 11%. If it is assumed that all of the vertical bars between column lines 41 and 46 (or 1 panel in 4, or 25%) are damaged, and considering that the vertical bars provide 75% of the wall capacity, the maximum total strength loss due to damage by core drilling to reinforcing bars is 0.11 x 0.25 x 0.75 = .02, or 2%. The reserve capacity of these walls both during interim operation and after the modification is well above 2%. The assumption that all vertical bars are damaged is very conservative, since once a bar is encountered, the location of other vertical bars can be established based on their known spacing, and damage to other bars can be avoided.

b. There are no electrical conduits embedded in the N line wall where drilling will be performed. There are two electrical conduits embedded in the R line wall where core drilling will be performed. Their approximate location will be marked on the surface of the walls where the core drilling will be performed. This procedure should reduce the possibility of the drill bit striking the conduit; however, experience has shown that should the drill bit strike the conduit, the enclosed cable would not be harmed. The conduit is made of steel and has a wall thickness of 0.145 inches (slightly larger than 1/8 of an inch).

Previous observations with regard to the effect of the drill bit striking reinforcing steel has shown that the smaller diameter reinforcing steel would only be nicked by a maximum of 1/8 inch before the drill operator, upon detecting he had struck the steel, could pull back the drill bit. Since the conduit diameter (1-1/2" nominal rigid steel) is much larger than the 5/8" diameter reinforcing bar discussed above, the depth of penetration into the conduit wall before the drill operator detects that he has contacted conduit should be much less due to the larger surface area presented.

Nevertheless, as added assurance that there is no significant safety concern, we have further reviewed the consequences of the encased wiring being completely cut. Our review has shown that two existing conduits, CB1910 and DB1937, are routed in the Control Building from the Electrical Auxiliaries Room (el. 65') to the Control Room (el. 93'). The major portion of these conduits is embedded in the Control Building wall as shown on the attached Figure 1-1.

Each conduit contains two cables that perform the following functions:

CB1910

Power for the instruments in the Nuclear Instrumentation (NIS) Channel C Cabinet C31C

Power for the Control Circuits in the NIS Channel C Cabinet C31C

DB1937

Power for the instruments in the NIS Channel D Cabinet C31D

Power for the Control Circuits in the NIS Channel D Cabinet C31D

Nuclear Instrumentation Cabinets C31C and C31D contain redundant safety-related circuitry for the ex-core neutron power range flux detectors (Channels A and B are not affected). The Channel D Cabinet C31D contains additional circuitry that consists of the power range neutron flux comparator circuit, source range neutron flux rate circuitry, and an audio display of the source range flux levels. These two NIS cabinets and their associated electrical circuitry generate the following reactor trip signals:

1. Power Range high neutron flux (high and low setpoint)
2. Power Range high positive neutron flux rate trip
3. Power Range high negative neutron flux rate trip

The loss of Channel C power range detector would not cause a reactor trip since the reactor trip logic (2 out of 4) would not be satisfied. Activation of Control Room alarms (power range loss of detector voltage, NIS high neutron flux power range, and power range comparator deviation) would result from damage to conduit CB1910. Loss of NIS

cabinet C31C would not affect any other safety-related circuits or equipment.

The effect of damage to conduit DB1937 would be the same as for CB1910 except that Channel D NIS would be involved and the startup rate count meters on the main control board would be lost.

If both conduits CB1910 and DB1937 were damaged, a reactor trip may occur since two of the four NIS channels are affected.

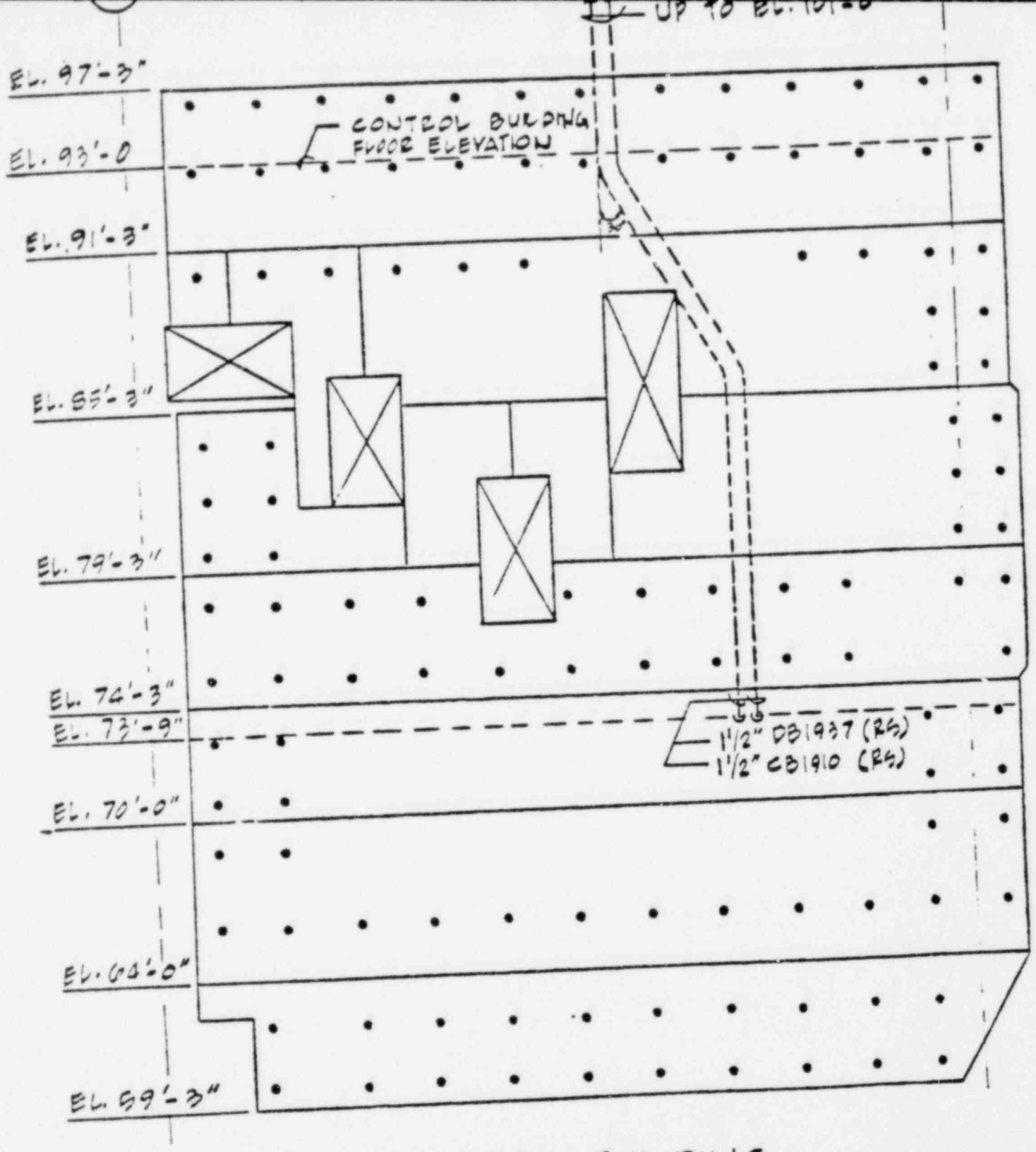
c. If it is necessary to abandon a partly drilled hole because reinforcing steel has been encountered, the hole will be fully grouted before a replacement hole is drilled. Since the reduction in shear area owing to any such abandoned hole would be insignificant (see "e." below) , the replacement hole may be drilled even if the grout in the abandoned hole has not yet developed its design strength.

d. The grout to be used to fill the abandoned holes is Five Star Grout manufactured by U.S. Grout Corp. Tests performed in accordance with ASTM C109 established that this grout attains at least 5000 psi compressive strength in 7 days and at least 8000 psi in 28 days. Since this strength is greater than the strength of the block material (2000 psi) or the strength of the concrete core (5000 psi) and because it is non-shrink grout, its use to grout the abandoned holes in these materials is acceptable.

NRC Questions (10/2/79)

Q. 1 Page 7 of 7

e. The reduction in area due to the drilling of bolt holes at any period of time will not be more than that described in Licensee's response dated June 29, 1979 to NRC Question No. 30. The above condition will be assured by stopping the drilling whenever the area reduction percentages reach the limits set in the above referenced response.



CONTROL BUILDING

(VIEW FROM TURBINE BUILDING TOWARDS CONTROL BUILDING)

FIGURE 1-1

ATTACHMENT 2

Bechtel Power Corporation

Interoffice Memorandum

To: M. Daubenheyer

Subject: Portland General Electric Co.
Trojan Nuclear Plant
Bechtel Job No. 13097

Spec. C-501

Copies to: J. F. O'Leary
J. C. Kotler
W. Lang

File No. 274

Date: December 31, 1980

From: P. Chang-Lo

Of: SFPD

At: 221/5/A-03 Ext. 0211

As a further clarification of Spec. C-501, please find below the ground-rules for drilling bolt holes in the Control Building R & N wall, above elevation 65'-0":

1. Definition of terms as used in these ground-rules:

   Hole: A void resulting from material removed with a core drill from the wall. A hole filled with grout (or bolt and grout) that has attained 5000 psi, shall not be considered a hole as defined above.

   Hole Projection: See sketch below.

   Horizontal or vertical band: A horizontal or vertical band of the wall not to exceed 6 inches in width, centered on bolt lines, shown in elevation on dwg. C-1213.

2. Ground-rules:

   a. The hole projection shall not be larger than 7.5 inches.

   b. The sum of the horizontal projections of the holes in a horizontal band shall not exceed 67 inches.

2/A-18

c. The sum of the vertical projections of the holes in a vertical band shall not exceed 45 inches.

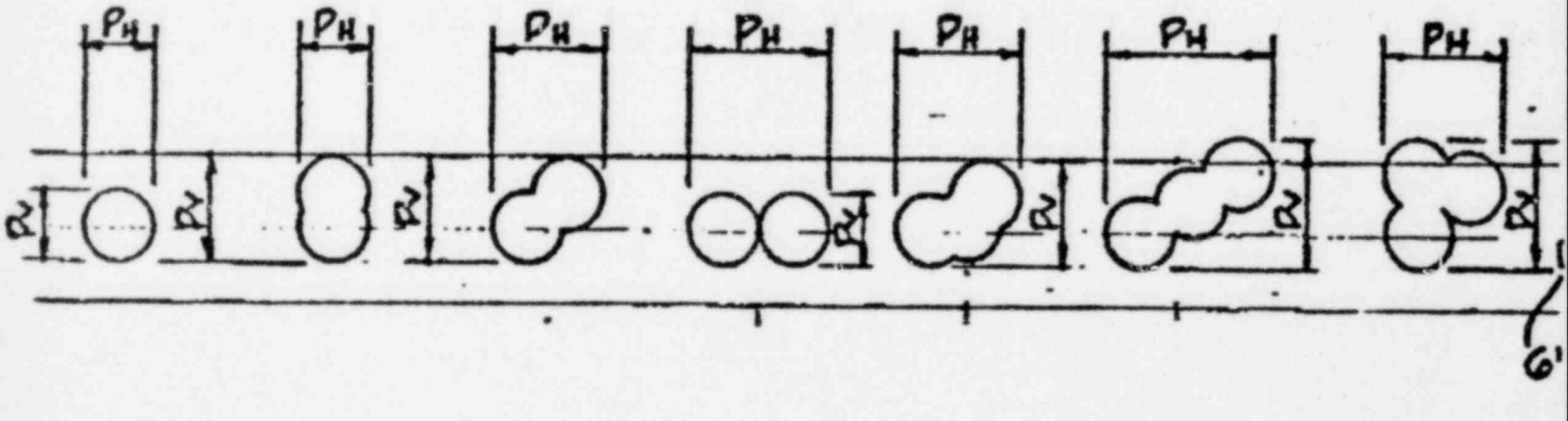
Cases not falling exactly in one of the above categories shall be verified with the Project Engineer.

P. Chang-Lo

P. Chang-Lo
Project Engineer

FHD/ls

TYPICAL EXAMPLES



P_H = Hole horizontal projection

P_V = Hole vertical projection

If the band is vertical, reverse subscripts.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	Docket 50-344
PORTLAND GENERAL ELECTRIC COMPANY, et al	)	(Control Building Proceeding)
	)	
(Trojan Nuclear Plant)	)	

CERTIFICATE OF SERVICE

I hereby certify that Licensee's letter dated February 6, 1981 to the Atomic Safety and Licensing Appeal Board, with attachments, has been served upon the persons listed below by depositing copies thereof in the United States mail with proper postage affixed for first class mail.

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Washington, D. C. 20555

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Ronald W. Johnson
Assistant General Counsel
Portland General Electric Company

Dated: February 6, 1981

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