

Arizona Public Service Company

PO BOX 2188 • PHOENIX, ARIZONA 85001

November 3, 1982

ANPP-22188 - WFQ/TFQ

Mr. H. R. Denton, Director  
Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2 and 3  
Docket Nos. STN-50-528/529/530  
File: 82-056-026, G.1.01.10

References: See Attached List

Dear Mr. Denton:

On July 29, 1982 I discussed our position concerning the backfitting of power operated relief valves (PORVs) into the PVNGS design with F. Miraglia and E. Licitra of your staff. At the end of that conversation, I promised to formally submit an explanation of our activities and our technical conclusion concerning the need for this piece of equipment.

In recent months a great amount of attention and concern has been directed toward the lack of PORVs on the primary system of newer vintage Combustion Engineering (CE) NSSS designs (System 80 and the 3410s; e.g. San Onofre and Waterford). In our opinion the major reasons for this concern are that: (1) the vast majority of operating PWRs have PORVs on the primary system; (2) without PORVs it has been assumed that these new CE NSSS designs do not include rapid depressurization capability; and (3) without PORVs it has been assumed that these designs cannot remove decay heat in the event that all feedwater is lost. The following is a brief discussion of the events and meetings contributing to our evaluation of this issue.

As part of our continuing safety evaluation of the PVNGS plant design, the question of whether a PORV would enhance the operation or safety of PVNGS has been considered by APS for several years. Such consideration was initiated in recognition that PORVs might offer the following benefits: reducing challenges to the primary system safety valves, minimizing high pressure transients, providing high system pressure protection, venting of non-condensable gases, providing back-up to pressurizer sprays, providing mitigation of start-up and shutdown transients and providing an alternate means of decay heat removal. The on-going evaluation of these issues by both CE and APS indicated to us that the benefits were not sufficient to outweigh the negative aspects.

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The rapid depressurization and decay heat ("feed and bleed") removal issues have been raised and addressed frequently during the last several years and each time the conclusion has been that PORVs are not required. The accident at Three Mile Island, Unit 2, (TMI-2) illustrated an important shortfall in the use of PORVs, that is, the fail-open mode of PORVs is a potential breach of the reactor coolant pressure boundary, which subsequently could lead to a small break loss of coolant accident. TMI-2 is only one of several examples of PORV failures where PORVs have stuck open. These failures are of great concern to APS.

The NRC staff, in the SERs (References A and B) for PVNGS, concluded that PORVs were not required for the safe operation of PVNGS. Reference (A), Section C.4, discussed unresolved safety issue A-45, "Shutdown Decay Heat Removal Requirements", in which the staff concluded that PVNGS can be operated prior to the ultimate resolution of the issue, relying on the primary method of decay heat removal, which is the use of the steam generators and the secondary system. This method depends on the operation of the auxiliary feedwater system, which was reviewed by the NRC staff and discussed in reference (A), Section 20.4.9 and 22.2, item II.E.1.1. Reference (B) did not conclude that PORVs or a rapid depressurization system needed to be included in the System 80 design prior to the granting of a Final Design Approval (FDA).

As reflected in references (C) and (D), the Advisory Committee on Reactor Safeguards (ACRS) was concerned that the System 80 design does not have the capability to rapidly depressurize the primary system in a direct manner and does not have a method to remove decay heat without the use of the steam generators. The ACRS expressed their concern that the safety of the plant was highly dependent on the integrity of the steam generators and the reliability of the auxiliary feedwater system. The ACRS requested that APS, CE and the NRC staff further evaluate the present design in light of their concerns. CE has presented their reevaluation before the ACRS subcommittee on Decay Heat Removal Systems on March 16, 1982, and before the ACRS full committee on April 1, 1982. (These meetings will be discussed in more detail later in this letter.)

Early this year, an incident at the Ginna Nuclear Facility placed further attention on the use of PORVs for rapid depressurization of the primary system, and ironically the failure of the PORV to close properly. This incident was a steam generator tube rupture which resulted in a radiological release through the main steam safety valves. Reference (E) reported that the release was controlled by using the PORV to rapidly depressurize the primary system, thus reducing the primary-to-secondary leakage. This event precipitated another review of the PVNGS design by APS.

In response to an NRC staff request, CE provided their evaluation of rapid depressurization and decay heat removal capability, reference (F).



This letter was reviewed by the NRC staff and a request for additional information was made in reference (G). The CE evaluation and the NRC request for additional information were discussed before ACRS on April 1, 1982. The ACRS agreed with the NRC staff approach to resolving this issue in an expeditious manner. The ACRS again requested that the NRC staff and CE reconsider the issue, but concluded that the resolution should not be a condition for licensing of plants at full power and that the need for future hardware or procedural changes should be contingent upon the results of the evaluation.

Based on a preliminary reassessment it appeared to us that it may be beneficial to provide the control room operator an additional means of direct primary system pressure control, and we decided in May of this year to proceed with the preliminary design of a direct rapid depressurization system, which included remote manually-operated PORVs. In conjunction with the decision to design the plant modification, we decided to determine if it was possible to install the modification prior to fuel load to minimize several key factors; radiological dose to construction workers, impact on future outage schedules, impact on present construction and start-up schedule and increased costs. To further enhance our ability to achieve these objectives, we also proceeded with a portion of the related procurement activities. All of these activities were based on our perception, based on preliminary analysis, that the following enhancements to the operation of PVNGS would be achieved:

- Operator flexibility to control primary system pressure
- Operator flexibility to mitigate to a SGTR accident
- Address possible future NRC requirements for Decay Heat Removal Systems
- Provide for a future alternate Low Temperature Over Pressure Protection System should the operators desire a more flexible system

This commitment was reflected in the telephone conversation I had with F. Miraglia and E. Licitra on July 29, 1982. During that conversation, I stated that we were pursuing the installation of PORVs on the basis that we were enhancing operator flexibility. We indicated that we did not consider this modification a safety enhancement, but we were evaluating the design to assure the PORVs did not degrade plant safety.

Development of our design criteria resulted in a preliminary design. This design included two remotely operated PORVs in parallel, which could only be manually operated from the control room (no automatic setpoint). The inlet piping to one of the primary safety valves would be modified to include a "TEE" for the inlet piping for the PORVs. Normally closed, remotely-operated block valves upstream of the PORVs would also be part of the system, and the PORVs would discharge into the existing reactor



drain tank. The piping and valves would be ASME Section III, Class 1, and IE power would be provided to the valve actuators and instrumentation. Design criteria for equipment which is part of the RCPB would also be met. This arrangement provided a depressurization capability of 20 psi/sec for one PORV and 40 psi/sec for two PORVs once the operator opened the valves. These depressurization rates could be reduced by throttling the block (globe) valves, to a rate of 4 psi/sec.

However, further investigation and evaluation indicated that this rapid depressurization capability posed operational concerns not previously identified in our preliminary analysis. These operational concerns were associated with the use of PORVs to rapidly reduce primary system pressure and resulted in voiding of the reactor vessel upper head, degradation of pressurizer level control and liquid discharge to the containment. These concerns then led to a more detailed evaluation of situations where this system would be used and how the present design would cope with them. For PVNGS the depressurization capability of the primary system is provided by the pressurizer sprays, when the reactor coolant pumps are running, and by the safety-grade auxiliary spray system when the RCPs are not running. The use of the auxiliary sprays, instead of PORVs to depressurize when the RCPs are not operational will result in a depressurization rate of 6 psi/sec, with better control of pressurizer level and partial reactor vessel upper head voiding. This evaluation concluded, contrary to our initial preliminary evaluation, that PORVs did not enhance operator flexibility.

#### Current APS Technical Position

The evaluation of adding remote-manual operated PORVs to PVNGS design resulted in the following benefits and drawbacks of this modification. The benefits are as summarized below:

- ° Direct manual method of depressurization, which will backup the existing safety-grade auxiliary spray system.
- ° Provides capability for decay heat removal, "feed and bleed", if neither steam generator and the safety-grade auxiliary feedwater system are not operable.
- ° May provide a more flexible low temperature over pressure protection method (if an automatic setpoint is utilized for actuation).

The drawbacks are summarized below:

- ° The PORVs add a potential path of RCS leakage.
- ° Inadvertent opening may violate the reactor coolant pressure boundary (RCPB).

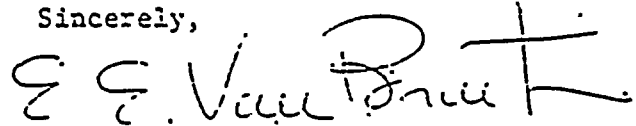
- ° Probability of PORVs sticking open increases probability of plant transients (similar to small break loss of coolant accidents) LOCAs.
- ° If used when RCPs are not operable, the reactor vessel upper head voids, and the pressurizer becomes solid (degrading pressurizer level control very quickly).
- ° Any extended use will result in a discharge to the containment.
- ° Adverse impact on construction, without balancing enhancement start-up and preoperational test schedules, and their related costs.

When considering these benefits and drawbacks, we conclude that this modification does not significantly improve the operational flexibility. Therefore, PORVs will not, at this time, be backfitted into the PVNGS design.

APS is continuing to participate in the CE Owner's Group effort to provide the additional information requested in reference (F), so that the NRC staff can complete their reevaluation of the CESSAR design with respect to this issue. As we have in the past, as additional information concerning this subject becomes available, we will reevaluate the PVNGS design which may or may not require installation of PORVs.

We will be available to discuss this letter or any additional concerns on this matter with the NRC at your request.

Sincerely,



E. E. Van Brunt, Jr.  
APS Vice President  
Nuclear Projects  
ANPP Project Director

EEVB/TFQ/wp

cc: D. G. Eisenhower  
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W. G. Bingham  
D. Keith  
G. F. Kopchinski  
J. Schuh  
C. Ferguson  
M. F. Barnoski  
G. Davis (CE)



ATTACHMENT

REFERENCES

- (A) NUREG-0857, "Safety Evaluation Report related to the operation of the Palo Verde Nuclear Generating Station, Units 1, 2 and 3" dated November, 1981.
- (B) NUREG-0852, "Safety Evaluation Report related to the final design approval of the Combustion Engineering Standard Nuclear Steam Supply System (CESSAR) System 80", dated November, 1981.
- (C) NRC letter from J. Carson Mark, Chairman of Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, U.S. Nuclear Regulatory Commission, dated December 15, 1981. "ACRS Report on Final Design Approval for Combustion Engineering, Inc. Standard Nuclear Steam Supply System."
- (D) NRC letter from J. Carson Mark, Chairman of Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, U.S. Nuclear Regulatory Commission, dated December 15, 1981. "ACRS report on the Palo Verde Nuclear Generating Station, Units 1, 2 and 3."
- (E) NUREG-BR-005, Volume 4, No. 2 USNRC Power Reactor Events Jan-Feb, 1982
- (F) Letter from A. E. Scherer, CE, Director of Nuclear Licensing, USNRC, LD-62-029, dated March 4, 1982.
- (G) NRC letter from R. L. Tedesco, Assistant Director for Licensing, Division of Licensing, USNRC, to P. E. Scherer, Director of Nuclear Licensing, Combustion Engineering, Inc. "Depressurization and Decay Heat Removal Capability of the CESSAR Design", dated March 26, 1982.
- (H) NRC letter from P. Shewman, Chairman Advisory Committee on Reactor Safeguards, to William J. Dircks, Executive Director for Operations, USNRC, dated April 5, 1982, "Reliability of the Shutdown Heat Removal System on the System 80 Design."



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DOCKET NO(S). 50-528  
The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
United States House of Representatives  
Washington, D. C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL. PALO VERDE NUCLEAR GENERATING  
STATION, UNIT 1

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application.
- ☐ Draft/Final Environmental Statement, dated \_\_\_\_\_.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated \_\_\_\_\_.
- ☐ Safety Evaluation Report, or Supplement No. \_\_\_\_\_, dated \_\_\_\_\_.
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- ☒ Order Extending Construction Completion Date, dated December 29, 1983.
- ☐ Other (Specify) \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead  
bcc: OCA

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DOCKET NO(S). 50-528  
The Honorable Alan Simpson, Chairman  
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November 18, 1982

DOCKET NO(S). 50-528

The Honorable Toby Moffett, Chairman  
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Committee on Government Operations  
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DATE	11/18/82						



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- ☒ Order Extending Construction Completion Date, dated November 4, 1982.
- ☐ Other (Specify) \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: OCA

OFFICE	DL:LB#3						
SURNAME	JL:ec						
DATE	11/18/82						



October 7, 1982

DOCKET NO(S). STN 50-528/529/530  
The Honorable Toby Moffett, Chairman  
Subcommittee on Environment, Energy  
and Natural Resources  
Committee on Government Operations  
United States House of Representatives  
Washington, D.C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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- ☐ Other (Specify) \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Joel Deckard

bcc: CCA

OFFICE	DA:IB#3						
SURNAME	J. Lee						
DATE	10/7/82						



October 7, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Lujan

bcc: OCA

OFFICE	DE:1B/3						
SURNAME	J. Lee						
DATE	10/7/82						

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October 7, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D. C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

/

OFFICE	DI:IE#3						
SURNAME	10/7/82						
DATE	10/7/82						





October 7, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Alan Simpson, Chairman  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: OCA

OFFICE	DP:IB/#3						
SURNAME	IB						
DATE	10/7/82						



May 26, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Lujan

bcc: OCA

OFFICE	DL-IB#3						
SURNAME	J Lee						
DATE	5/26/82						



May 26, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

OFFICE	DL: LB#3						
SURNAME	DL: LB#3						
DATE	5/26/82						



May 26, 1982

DOCKET NO(S). STN 50-528/529/530  
The Honorable Toby Moffett, Chairman  
Subcommittee on Environment, Energy  
and Natural Resources  
Committee on Government Operations  
United States House of Representatives  
Washington, D.C. 20515  
SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Joel Deckard

bcc: OCA

OFFICE	DL: IB#3						
SURNAME	J Lee						
DATE	5/26/82						





1. The first part of the document is a list of names and addresses. The names are listed in the first column, and the addresses are listed in the second column. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

May 26, 1982

DOCKET NO(S). STN 50-528/529/530

The Honorable Alan Simpson, Chairman  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: OCA

OFFICE	DL:LB#3						
SURNAME	SL:SE						
DATE	5/26/82						



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May 7, 1982

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

May 7, 1982

Docket No. STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Facility Operating License No. DPR- \_\_\_\_\_, NPF- \_\_\_\_\_, dated \_\_\_\_\_.
- ☒ Amendment No. 4 to CPPR- 1417 or DRR- 143, dated 4/28/82.  
CPPR-142 & CPPR-143
- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

OFFICE ▶

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5/7/82

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

May 7, 1982

Docket No. STN 50-528/529/530

The Honorable Alan Simpson  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

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OFFICE	DL:LB#3				
SURNAME	JT				
DATE	5/7/82				



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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

May 7, 1982

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior & Insular Affairs  
United States House of Representatives  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Lujan

bcc: OCA

OFFICE

DL:IB#3

SURNAME

JLce

DATE

5/7/82

THE  
FEDERAL BUREAU OF INVESTIGATION  
UNITED STATES DEPARTMENT OF JUSTICE

MEMORANDUM FOR THE DIRECTOR  
FROM THE SAC, NEW YORK  
SUBJECT: [Illegible]

RE: [Illegible]  
[Illegible]

On [Illegible] [Illegible] [Illegible]  
[Illegible]

[Illegible]  
[Illegible]

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

April 7, 1982

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Lujan

bcc: OCA

OFFICE	DL:LB#3				
SURNAME	J Lee				
DATE	4/7/82				

state

1. The first part of the report is a general  
description of the project and its objectives.  
2. The second part is a detailed description of the  
methodology used in the study.  
3. The third part is a description of the results  
of the study.  
4. The fourth part is a discussion of the results  
and their implications.  
5. The fifth part is a conclusion and a list of  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

April 7, 1982

Docket No. STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

OFFICE

DL:LB#3

SURNAME

J Lee

DATE

4/7/82



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

April 7, 1982

Docket No. STN 50-528/529/530

The Honorable Alan Simpson, Chairman  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: OCA

OFFICE

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SURNAME

J Lee

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3/26/82



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UNITED STATES  
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April 7, 1982

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- ☐ Application and Safety Analysis Report, Vol. \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to Application/SAR, dated \_\_\_\_\_.
- ☐ Construction Permit No. CPPR- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Facility Operating License No. DPR- \_\_\_\_\_, NPF- \_\_\_\_\_, dated \_\_\_\_\_.
- ☒ Amendment No. 3 to CPPR- 142 & CPPR-143 141/or DRR- \_\_\_\_\_, dated 3/26/82.
- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Joel Deckard

bcc: OCA

OFFICE	DL: 1B/3					
SURNAME	J Lee					
DATE	4/7/82					

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

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12. The Commission has also been informed that the Government of the Republic of the Philippines has been unable to obtain the necessary information from the Government of the Republic of China to enable it to take the necessary steps to ensure that the Republic of the Philippines is not in breach of its obligations under the Convention.

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1.  $\frac{1}{2}$  of the total number of students

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains.

2.  $\frac{1}{2}$  3.  $\frac{1}{2}$  4.  $\frac{1}{2}$  5.  $\frac{1}{2}$  6.  $\frac{1}{2}$  7.  $\frac{1}{2}$  8.  $\frac{1}{2}$  9.  $\frac{1}{2}$  10.  $\frac{1}{2}$

$$\frac{1}{\lambda} \left( \frac{\partial}{\partial t} + v \cdot \nabla_x \right) f + \nabla_x \cdot (\sigma \nabla_x f) = -\nabla_x \cdot (f \nabla_x \phi) \quad (1)$$

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 24, 1982

Docket No. STN 50-528/529/530

The Honorable Toby Moffett, Chairman  
Subcommittee on Environment, Energy and  
Natural Resources  
Committee on Government Operations  
United States House of Representatives

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

The following documents concerning our review of the subject facility  
are transmitted for your information:

- ☐ Notice of Receipt of Application.
- ☐ Draft/Final Environmental Statement, dated \_\_\_\_\_.
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- ☐ Facility Operating License No. DPR- \_\_\_\_\_, NPF- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to CPPR- \_\_\_\_\_ or DRR- \_\_\_\_\_, dated \_\_\_\_\_.
- ☒ Other: Notice of Availability of Final Environmental Statement
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Joel Deckard

bcc: OCA

OFFICE ▶

DL:LB#3

SURNAME ▶

JLee

DATE ▶

3/24/82

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1. The first part of the report  
deals with the general situation  
of the country and the  
state of the economy.

2. The second part of the report  
deals with the results of the  
survey and the conclusions  
drawn from it.

3. The third part of the report  
deals with the recommendations  
made by the committee and  
the measures proposed to be  
taken to improve the situation.

4. The fourth part of the report

deals with the conclusions  
drawn from the survey.

5. The fifth part of the report  
deals with the recommendations  
made by the committee and  
the measures proposed to be  
taken to improve the situation.

6. The sixth part of the report

deals with the conclusions  
drawn from the survey.

7. The seventh part of the report  
deals with the recommendations  
made by the committee and  
the measures proposed to be  
taken to improve the situation.

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 24, 1982

Docket No. STN 50-528/529/530

The Honorable Alan Simpson, Chairman  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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- ☒ Other: Notice of Availability of Final Environmental Statement
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: OCA

OFFICE	DL:LB#3					
SURNAME	J Lee					
DATE	3/24/82					

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 24, 1982

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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- ☒ Other: Notice of Availability of Final Environmental Statement
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Iujan

bcc: OCA

OFFICE

DL:LB#3

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 24, 1982

Docket No. STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 & 3

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- ☒ Other: ~~Notice of Availability of Final Environmental Statement~~
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

OFFICE	DL:IB#3					
SURNAME	J Lee					
DATE	3/24/82					

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 1, 1982

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Iujan  
bcc: OCA

OFFICE

DL:LB#3

SURNAME

J Lee

DATE

3/1/82

State

1944

1. The first part of the report deals with the general situation in the country. It is a very interesting and informative study of the political and economic conditions of the country at the time. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's history.

2. The second part of the report deals with the political situation. It is a very detailed and thorough study of the political system of the country. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's history.

3. The third part of the report deals with the economic situation. It is a very detailed and thorough study of the economic system of the country. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's history.

4. The fourth part of the report deals with the social situation. It is a very detailed and thorough study of the social system of the country. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's history.

5. The fifth part of the report deals with the cultural situation. It is a very detailed and thorough study of the cultural system of the country. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's history.

1944

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 1, 1982

Docket No. STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation and Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead

bcc: OCA

OFFICE	DL:LB#3					
SURNAME	Lee					
DATE	3/1/82					

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the 1990s, the number of people in the world who are under 15 years of age is expected to increase from 1.1 billion to 1.5 billion. The number of people aged 65 and over is expected to increase from 200 million to 400 million. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion.

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Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group (C) and the experimental group (E). The control group was divided into two subgroups: the control group (C) and the control group (C). The experimental group was divided into two subgroups: the experimental group (E) and the experimental group (E). The control group (C) was divided into two subgroups: the control group (C) and the control group (C). The experimental group (E) was divided into two subgroups: the experimental group (E) and the experimental group (E).

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...and the *Journal of the American Medical Association* (JAMA) has been the most influential journal in the field of medicine for over a century.

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11. *Journal of the American Medical Association*, 277:1221-1222, 1997

*Journal of Management Education* 36(8) 907-927

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 1, 1982

Docket No. STN 50-528/529/530

The Honorable Alan Simpson, Chairman  
Subcommittee on Nuclear Regulation  
Committee on Environment and Public Works  
United States Senate  
Washington, D.C. 20510

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

The following documents concerning our review of the subject facility  
are transmitted for your information:

- ☐ Notice of Receipt of Application.
- ☐ Draft/Final Environmental Statement, dated \_\_\_\_\_.
- ☒ Safety Evaluation, or Supplement No. 1, dated February 1982.
- ☐ Notice of Hearing on Application for Construction Permit.
- ☐ Notice of Consideration of Issuance of Facility Operating License.
- ☐ Application and Safety Analysis Report, Vol. \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to Application/SAR, dated \_\_\_\_\_.
- ☐ Construction Permit No. CPPR-\_\_\_\_\_, dated \_\_\_\_\_.
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- ☐ Amendment No. \_\_\_\_\_ to CPPR-\_\_\_\_\_ or DRR-\_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Senator Gary Hart

bcc: CCA

OFFICE

DL:IB#3

SURNAME

J Lee

DATE

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

March 1, 1982

Docket No. STN 50-528/529/530

The Honorable Toby Moffett, Chairman  
Subcommittee on Environment, Energy and  
Natural Resources

Committee on Government Operations  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Joel Deckard

bcc: OCA

OFFICE	DL:LB#3					
SURNAME	Hee					
DATE	3/1/82					



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

December 9, 1981

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
Subcommittee on Energy and the Environment  
Committee on Interior and Insular Affairs  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Iujan

bcc: OCA

OFFICE	DL:IB#3					
SURNAME	Jlee					
DATE	12/9/81					

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*State*  
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OFFICE ▶

DL: LB#3

SURNAME ▶

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12/9/81

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1. The first group of people who are interested in the results of the study are the researchers themselves. They want to know if the study was successful in achieving its goals and if the results are consistent with their expectations. They also want to know if the study was conducted in a rigorous and unbiased manner.

[illegible]

1. *Chlorophyll a* (Chl *a*) is the primary photosynthetic pigment in most plants and algae. It is a green pigment that absorbs light energy in the blue and red regions of the visible spectrum.

[illegible]

17

$\frac{1}{2} \times \frac{1}{2}$

Figure 1. The effect of the concentration of the  $\text{H}_2\text{O}_2$  solution on the amount of the released  $\text{H}_2\text{O}$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel. The amount of the released  $\text{H}_2\text{O}$  was measured by the weight difference of the hydrogel before and after the release. The concentration of the  $\text{H}_2\text{O}_2$  solution was 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 M. The amount of the released  $\text{H}_2\text{O}$  was measured by the weight difference of the hydrogel before and after the release. The concentration of the  $\text{H}_2\text{O}_2$  solution was 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 M. The amount of the released  $\text{H}_2\text{O}$  was measured by the weight difference of the hydrogel before and after the release. The concentration of the  $\text{H}_2\text{O}_2$  solution was 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 M.

*Journal of Management Education* 30(6)

1. *Chlorophyll a* (Chl *a*)

$$x \quad y \quad z \quad w \quad v \quad u \quad t \quad s \quad r \quad q \quad p \quad o \quad n \quad m \quad l \quad k \quad j \quad i \quad h \quad g \quad f \quad e \quad d \quad c \quad b \quad a$$
[illegible]

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971) using a Shimadzu 1010 UV-Visible Spectrophotometer. The concentration of chlorophylls was expressed in  $\mu\text{g mL}^{-1}$ .

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$\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

December 9, 1981

Docket No. STN 50-528/529/530

The Honorable Richard Ottinger, Chairman  
Subcommittee on Energy Conservation & Power  
Committee on Energy and Commerce  
United States House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Carlos Moorhead  
bcc: OCA

*state*

OFFICE

DL:IB#3

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Office of Nuclear Reactor Regulation

Enclosures:  
As stated

*State* cc: Representative Joel Deckard

bcc: OCA

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| OFFICE  | DL:IB#3 |  |  |  |  |  |
| SURNAME | DL:IB#3 |  |  |  |  |  |
| DATE    | 12/9/81 |  |  |  |  |  |

$$E_{\text{eff}} = \frac{1}{2} \left( \frac{1}{\epsilon_0} + \frac{1}{\epsilon_0} \right) = \frac{1}{\epsilon_0}$$

1. *Phragmites* (Common Reed)

[illegible]

1. The first group of people who are interested in the results of the study are the researchers themselves. They want to know if the study was successful in achieving its goals and if the data collected is reliable and valid. They also want to know if the study has contributed to the field of research and if it has any practical implications.

$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) e^{-x^2} dx = \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) e^{-x^2} dx$

Figure 1. The effect of the concentration of the  $\text{H}_2\text{O}_2$  solution on the amount of the released  $\text{H}_2\text{O}_2$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel. The amount of the released  $\text{H}_2\text{O}_2$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel was measured at 37 °C for 24 h. The amount of the released  $\text{H}_2\text{O}_2$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel was measured at 37 °C for 24 h. The amount of the released  $\text{H}_2\text{O}_2$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel was measured at 37 °C for 24 h.

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$$1. \quad \text{If } \mathcal{A} \text{ is a } \mathcal{C} \text{ algebra, then } \mathcal{A} \text{ is a } \mathcal{C} \text{ algebra.}$$

$\frac{1}{2} \left( \frac{1}{2} \right) = \frac{1}{4}$

1.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$$- \frac{1}{\partial} \left( \frac{\partial}{\partial x} \right) = - \frac{1}{\partial} \left( \frac{\partial}{\partial x} \right)$$

$\frac{d}{dt} \left( \frac{1}{r^2} \right) = -\frac{2}{r^3} \frac{dr}{dt}$

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

October 30, 1981

Docket No. STN 50-528/529/530

The Honorable Morris Udall, Chairman  
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- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: Representative Manuel Lujan

bcc: OCA

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|---------|----------|--|--|--|--|
| OFFICE  | DL:IB#3  |  |  |  |  |
| SURNAME | J Lee    |  |  |  |  |
| DATE    | 10/30/81 |  |  |  |  |

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Committee on Energy and Commerce  
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United States Senate  
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- ☐ Facility Operating License No. DPR- \_\_\_\_\_, NPF- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to CPPR- \_\_\_\_\_ or DRR- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: The Honorable Gary Hart

bcc: OCA

|         |          |  |  |  |  |  |
|---------|----------|--|--|--|--|--|
| OFFICE  | DL:JB#3  |  |  |  |  |  |
| SURNAME | J Lee    |  |  |  |  |  |
| DATE    | 10/30/81 |  |  |  |  |  |





THE  
UNITED STATES  
DEPARTMENT OF  
THE ARMY  
OFFICE OF THE  
CHIEF OF STAFF  
WASHINGTON, D. C.  
20315-5000

MEMORANDUM FOR THE  
CHIEF OF STAFF  
SUBJECT: [Illegible]

10/1/77  
10/1/77  
10/1/77

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON D.C. 20555

October 30, 1981

Docket No. STN 50-528/529/530

The Honorable Toby Moffett, Chairman  
Subcommittee on Environment, Energy and  
Natural Resources

Committee on Government Operations  
U.S. House of Representatives  
Washington, D.C. 20515

Subject: ARIZONA PUBLIC SERVICE COMPANY, ET AL  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

The following documents concerning our review of the subject facility  
are transmitted for your information:

- ☐ Notice of Receipt of Application.
- ☒ Notice of Availability of  
Draft/First Environmental Statement, dated 10/30/81.
- ☐ Safety Evaluation, or Supplement No. \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Notice of Hearing on Application for Construction Permit.
- ☐ Notice of Consideration of Issuance of Facility Operating License.
- ☐ Application and Safety Analysis Report, Vol. \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to Application/SAR, dated \_\_\_\_\_.
- ☐ Construction Permit No. CPPR- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Facility Operating License No. DPR- \_\_\_\_\_, NPF- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Amendment No. \_\_\_\_\_ to CPPR- \_\_\_\_\_ or DRR- \_\_\_\_\_, dated \_\_\_\_\_.
- ☐ Other: \_\_\_\_\_
- ☐ \_\_\_\_\_

Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: The Honorable Joel Deckard  
bcc: OCA

OFFICE

DL:IB#3

SURNAME

JLee

DATE

10/30/81



1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity of the financial system and for providing a clear audit trail. The text also mentions that this practice helps in identifying any discrepancies or errors early on, which can then be corrected before they become a problem.

2. The second part of the document focuses on the role of the accounting department in the overall business operations. It highlights that the accounting team is responsible for not only recording transactions but also for analyzing the data to provide insights into the company's financial health. This includes monitoring cash flow, managing debt, and ensuring that the company is compliant with all relevant regulations.

3. The third part of the document discusses the importance of communication between different departments within the organization. It states that effective communication is essential for ensuring that everyone is on the same page and that all necessary information is shared in a timely manner. This helps to prevent misunderstandings and ensures that the company is able to respond quickly to any challenges it may face.

4. The fourth part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity of the financial system and for providing a clear audit trail. The text also mentions that this practice helps in identifying any discrepancies or errors early on, which can then be corrected before they become a problem.

5. The fifth part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity of the financial system and for providing a clear audit trail. The text also mentions that this practice helps in identifying any discrepancies or errors early on, which can then be corrected before they become a problem.

6. The sixth part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity of the financial system and for providing a clear audit trail. The text also mentions that this practice helps in identifying any discrepancies or errors early on, which can then be corrected before they become a problem.

7. The seventh part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for ensuring the integrity of the financial system and for providing a clear audit trail. The text also mentions that this practice helps in identifying any discrepancies or errors early on, which can then be corrected before they become a problem.