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CONWAY,W.F. Arizona Public Service Co. (formerly Arizona Nuclear Power
RECIP.NAME RECIPIENT AFFILIATION
LIEBERMAN,J. Ofc of Enforcement (Post 870413)

SUBJECT: Responds to NRC 920813 ltr re violations noted in Insp Repts 50-530/92-15,50-528/92-23 & 50-530/92-19 on 920404-10, 0508-14 & 0615-19 & proposed imposition of civil penalty. Corrective actions:Molycoat lubricant removed from GE RTB.

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WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-02274-WFC/TRB/JRB
September 14, 1992

Mr. James Liebermann
Director, Office of Enforcement
U. S. Nuclear Regulatory Commission
Washington, DC 20555

References: 1) Letter dated August 13, 1992, from J. B. Martin, NRC, to W. F. Conway, APS

2) Letter dated August 20, 1992, from S. A. Richards, NRC, to W. F. Conway, APS

Dear Sir:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Reply to Notice of Violations and Proposed Imposition of Civil Penalty
50-530/92-15-02, 50-530/92-15-01, 50-528/92-23-01, and 50-530/92-19-01
File: 92-070-026

Arizona Public Service Company (APS) has reviewed Reference 1 and the enclosed Notice of Violations and Proposed Imposition of Civil Penalty. Pursuant to the provisions of 10 CFR 2.201, APS' response is enclosed. Appendix A to this letter is a restatement of the Notice of Violations. APS' response is provided in Enclosure 1. As requested in Reference 2, additional information concerning APS' initial efforts to resolve problems with General Electric reactor trip breakers is provided in Enclosure 2. APS is remitting Check No. 50003394 in payment of the proposed civil penalty.

The enclosures to this letter respond to the Notice of Violations, and provide the corrective actions associated with the specific violations. In addition to addressing these specific violations, APS has conducted a broader review of identified deficiencies from January 1991, to June 30, 1992, and has identified the need for additional actions. These broader issues and APS' actions to address them, were discussed in the enforcement conference on July 9, 1992.

In letters dated February 14, 1992, and March 2, 1992, APS described actions being taken in response to the events that were the subject of EA 91-182. Those actions included measures to strengthen the conduct of activities in the areas of Operations, Maintenance and Site Technical Support. PVNGS managers and supervisors are devoting an increased portion of their time to direct observation of station activities.

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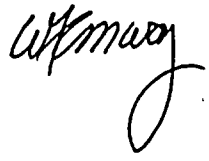
During their observation of station activities, they are emphasizing the use of procedures, and improved communications within and among Operations, Maintenance, and other site organizations. APS also strengthened its programs for root cause of failure analyses and monitoring of the effectiveness of corrective actions. These and other corrective actions associated with EA 91-182 were initiated during late 1991 and the first half of 1992. The events that are the subject of EA 92-119 include activities that occurred before the initiation of the corrective actions associated with EA 91-182, or before the effects of those corrective actions could be fully realized. Consequently, APS believes that the actions initiated in response to EA 91-182 will also contribute to prevention of events such as those identified in EA 92-119.

APS management will closely monitor the implementation and effectiveness of the actions described above and within the enclosures, and will keep the NRC informed.

If you have any questions regarding this response, please contact Thomas R. Bradish at (602) 393-5421.

Sincerely,



WFC/TRB/JRB/JJN

Attachment: APS Check No. 50003394, dated September 8, 1992, in the amount of $100,000.00

Enclosures:

1. Appendix A - Restatement of the Notice of Violations and Proposed Imposition of Civil Penalty
2. Enclosure 1 - Reply to the Notice of Violations and Proposed Imposition of Civil Penalty
3. Enclosure 2 - Additional Information Concerning Initial Efforts to Resolve Problems with General Electric Reactor Trip Breakers

cc: J. B. Martin
J. A. Sloan

APPENDIX A

RESTATEMENT OF NOTICE OF VIOLATIONS AND PROPOSED IMPOSITION OF CIVIL PENALTY 530/92-15-02, 530/92-15-01, 528/92-23-01, AND 530/92-19-01

NRC INSPECTIONS CONDUCTED APRIL 4-10, MAY 8-14, AND JUNE 15-19, 1992

INSPECTION REPORT NOS. 50-528, 529, 530/92-15, 50-530/92-19, AND 50-528, 529, 530/92-23

RESTATEMENT OF NOTICE OF VIOLATIONS AND PROPOSED IMPOSITION OF CIVIL PENALTY 530/92-15-02, 530/92-15-01, 528/92-23-01, and 530/92-19-01

During NRC inspections conducted April 4-10, May 8-14, and June 15-19, 1992, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, the Nuclear Regulatory Commission proposes to impose a civil penalty pursuant to Section 234 of the Atomic Energy Act of 1954, as amended (ACT), 42 U.S.C 2282, and 10 CFR 2.205. The particular violations and associated civil penalty are set forth below:

A. Technical Specification 6.8.1 for Palo Verde Unit 3 requires that "written procedures shall be established, implemented, and maintained covering . . . a. The applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978, . . . " Appendix A of Regulatory Guide 1.33, Revision 2, recommends that "maintenance that can affect the performance of safety-related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances."

   Contrary to the above, as of April 10, 1992, the licensee's maintenance procedures, 32MT-9SB01, Revision 5, "Maintenance of Westinghouse Reactor Trip Switchgear," and 32MT-9SB02, Revision 1, "Maintenance of General Electric Reactor Trip Switchgear," for maintenance of reactor trip breakers were not appropriate to the circumstances as evidenced by the following examples:

   1. Since 1983, procedures 32MT-9SB01 and 32MT-9SB02 have specified the use of an improper lubricant, Molykote 321R, for all reactor trip breakers. General Electric (GE) informed the licensee in 1989 that this was an improper lubricant that could affect the operation of the GE reactor trip breakers. This information was directly applicable to Westinghouse reactor trip breakers also. The licensee did not correct the earlier error.

   2. Procedure 32MT-9SB01 did not incorporate an October 1991 Westinghouse reactor trip breaker inspection bulletin describing an inspection to check whether the Westinghouse reactor trip breakers were adjusted with sufficient opening force to operate properly.

   3. Procedure 32MT-9SB02 did not incorporate the GE recommended maintenance procedures, which had been on site since January 1990, for GE reactor trip breakers. These maintenance procedures included additional undervoltage and shunt device adjustment instructions.

B. Technical Specification 6.8.1 for Palo Verde Unit 3 requires that "written procedures shall be established, implemented, and maintained covering . . . a. The applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978 . . ." Appendix A of Regulatory Guide 1.33, Revision 2, recommends procedures for equipment control.

Licensee procedure 70DP-OEE01, Revision 1, "Equipment Root Cause of Failure," Section 3.3.1, requires the on-duty Shift Technical Advisor (STA) to initiate formal quarantining of important safety-related equipment for a failure investigation, to preserve the as-found conditions of the incident.

Contrary to the above, On March 31, 1992, the on-duty STA took no action to initiate formal quarantining of the Unit 3 reactor trip breaker, important safety-related equipment, when on March 31, 1992, the STA was informed by the Shift Supervisor that this breaker had failed to open during its surveillance test. Instead, routine troubleshooting was initiated, which included numerous cycles of opening and closing the breaker, and thereby failed to preserve the as-found conditions of the incident.

C. Technical Specification 3.6.3 for Palo Verde Unit 1 states that "the containment isolation valves specified in Table 3.6-1 shall be operable. . . " while in Modes 1, 2, 3, and 4. Valve SIE-V133 is specified as a containment isolation valve in Table 3.6-1.

Technical Specification Action Statement 3.6.3.1 states that "with one or more of the isolation valve(s) specified in Table 3.6-1 inoperable, maintain at least one isolation valve operable in each affected penetration that is open and either: a. restore the inoperable valve(s) to operable status within 4 hours, or b. isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or c. isolate the affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or d. be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours."

Contrary to the above, from April 17, 1990, to February 17, 1992, while Unit 1 was in Modes 1, 2, 3, or 4, Unit 1 containment isolation valve SIE-V133, a containment isolation valve specified in Table 3.6-1, was inoperable because the valve internals were installed backwards and the valve could not perform its containment isolation function. The licensee did not fulfill Technical Specification Action Statement requirements 3.6.3.1.a - d.

D. Technical Specification 6.8.1 for Palo Verde Unit 3 states that "written procedures shall be established, implemented, and maintained covering . . . a. The applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978, . . ." Appendix A of Regulatory Guide 1.33, Revision 2, recommends that "maintenance that can affect the performance of safety-related equipment should

be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances."

Procedure 30DP-9MP01, Revision 4, "Conduct of Maintenance," Section 3.5.16, states that "necessary precautions shall be taken whenever work is done, such that the work activity and any tools/equipment used will not accidentally damage or remove equipment from service, thus compromising essential plant safety functions."

Contrary to the above, on May 4, 1992, during the performance of Work Order 00521473, licensee personnel failed to take necessary precautions to prevent accidental removal of equipment from service, thus compromising essential plant safety functions, when an electrician lost control of a lifted lead inside load center L18, which contacted a 480 volt bus, causing a loss of control room annunciator circuits. This resulted in the declaration of an Alert and compromised the ability of the plant operators to monitor the status and conditions of plant parameters and to operate safety-related equipment to assure that parameters remained within acceptance limits.

This is a Severity Level III problem (Supplement I). Cumulative Civil Penalty - $100,000 (assessed equally among the violations).

ENCLOSURE 1

REPLY TO NOTICE OF VIOLATIONS AND
PROPOSED IMPOSITION OF CIVIL PENALTY
530/92-15-02, 530/92-15-01, 528/92-23-01, and 530/92-19-01

NRC INSPECTIONS CONDUCTED APRIL 4-10,
MAY 8-14, AND JUNE 15-19, 1992

INSPECTION REPORT NOS. 50-528, 529, AND 530/92-15,
530/92-19, AND 50-528, 529, 530/92-23

REPLY TO NOTICE OF VIOLATION A (50-530/92-15-02)

Admission or Denial of the Alleged Violation

APS agrees that the maintenance procedures for the reactor trip breakers were not appropriate to the circumstances.

Reason for the Violation

Example 1

The reason for the violation was the failure of APS personnel to recognize the need to revise the lubrication specification in the maintenance procedure for General Electric (GE) reactor trip switchgears when advised by GE in 1989 that an inappropriate lubricant was found on a PVNGS breaker sent to GE for refurbishment.

In April 1983, as a result of Arizona Public Service Company's (APS) review of IEB 83-01, "Failure of Reactor Trip Breakers (Westinghouse DB-50) to Open on Automatic Trip Signal," APS identified that the recommended lubricants (Molykote M88 and Spray-Kote) for Westinghouse reactor trip breakers were no longer available from Dow Corning. IEB 83-01 described the recommended lubricants as dry or near-dry molybdenum disulfide lubricants. Also, at that time, the Westinghouse technical manual in use at PVNGS recommended the use of Molykote M30 or a mixture of molybdenum disulfide and alcohol or equivalent. APS selected a dry molybdenum disulfide lubricant that was currently available (Molykote 321R) for lubrication of all metal sliding surfaces, excluding current carrying components, on PVNGS reactor trip breakers. A change request was processed to incorporate this lubricant recommendation into the Westinghouse and the GE technical manuals in use at PVNGS. This recommendation was subsequently incorporated into the maintenance procedure for PVNGS reactor trip switchgears.

Molykote 321R was inappropriately incorporated into the GE technical manual for reactor trip breakers as an additional approved lubricant and subsequently into the maintenance procedure for the GE reactor trip switchgears. In 1989, GE, during their refurbishment of a PVNGS reactor trip breaker, informed APS that an unapproved lubricant was apparently being used on the reactor trip breaker. APS personnel did not recognize the need to revise the lubrication specification in the maintenance procedure for GE reactor trip switchgears.

The use of a lubricant that is different than that recommended in a 1991 Westinghouse technical bulletin (Molykote BR-2 Plus) was identified as a less than optimal lubrication practice in the APS root cause of failure investigation of the failure of the Unit 3 Westinghouse reactor trip breaker to open on March 31, 1992. (This Westinghouse technical bulletin, NSD-TB-91-06-RO, is discussed further in the response to Example 2 below). The investigation also determined that the application of the incorrect lubricant to the Westinghouse reactor trip breaker only had a minor effect on the performance of the breaker. Molykote 321R is an acceptable substitute for the lubricants specified in the Westinghouse technical manual which was in use prior to the issuance of Westinghouse technical bulletin NSD-TB-91-06-RO. Acceptable substitution of these lubricants was confirmed with the lubricant manufacturer in April 1992. Subsequently, the maintenance procedure for Westinghouse reactor trip switchgears (32MT-9SB01) has been revised to incorporate the maintenance practices, including lubricant requirements, identified in Westinghouse technical bulletin NSD-TB-91-06-RO.

Example 2

The lack of a thorough review resulted in Westinghouse technical bulletin NSD-TB-91-06-RO not being incorporated into the maintenance procedure for Westinghouse reactor trip switchgears.

APS received Westinghouse technical bulletin, NSD-TB-91-06-RO, "DS-206 and DSL-206 Breakers - Mechanical Friction of Main Contact Assemblies," in October 1991, describing failures of DS-206 circuit breakers to open at another utility. PVNGS Westinghouse reactor trip breakers are Type DS-206. This bulletin was reviewed in accordance with the PVNGS vendor document program and incorporated into the Westinghouse technical manual for the reactor trip breakers as a reference. The bulletin states, in part, ". . . if the contact adjustment procedures given in the referenced instruction bulletin [Westinghouse Instruction Bulletin IB 33-790] are not followed, then the potential exists for the breaker to only partially open due to excessive friction in the main contact assemblies." The bulletin further states, in part, "Inspections and tests in this bulletin . . . should be performed if difficulties have been experienced with electrical opening of the breaker." Westinghouse Instruction Bulletin IB 33-790, "Instructions for Low-Voltage Power Circuit Breaker Types DS and DSL," was utilized in the development of the PVNGS reactor trip switchgear maintenance procedure. Prior to March 31, 1992, no problems had been experienced at PVNGS with either the electrical opening or closing of a Westinghouse reactor trip switchgear. Based on these considerations, the review of technical bulletin NSD-TB-91-06-RO concluded that no additional actions were required to be taken at PVNGS.

A combination of an inadequate maintenance program, the occurrence of an unknown opposing force and marginal opening force of the DS-206 breaker was determined to be the apparent cause of the failure of the Unit 3 Westinghouse reactor trip breaker to open on March 31, 1992. However, the APS root cause of failure investigation determined that Westinghouse technical bulletin NSD-TB-91-06-RO did not identify all actions necessary to reduce friction and the failure to implement inspections and tests described in this bulletin was only a contributing factor to the breaker failure.

Example 3

The failure to recognize the applicability of publication GEK-64459 and aggressively pursue incorporation of the publication into the applicable maintenance procedure resulted in the maintenance procedure for General Electric reactor trip switchgears being incomplete.

GE publication GEK-64459, "Low-Voltage Power Circuit Breakers, Types AKR-30/50 and AKRT-50," was provided to APS by GE exclusively for use with GE AKR-50 circuit breakers. APS recognized that this publication might apply to the GE AKR-30 reactor trip breakers; however, PVNGS attempts to obtain GE's endorsement of the publication for use with PVNGS reactor trip breakers were unsuccessful, since APS had procured the breakers from Combustion Engineering and did not have a contract with GE. Consequently, this manual was not approved for use in maintenance activities on the GE reactor trip breakers. GE publication GEK-7310, "Power Circuit Breakers, Types AKR-3/3A-50 and AKRH-3/3A-50," was the publication that had been provided to APS for use with the GE reactor trip breakers. This publication was approved by APS for use in maintenance activities on the GE reactor trip breakers, was included in the GE vendor technical manual, and was incorporated into the maintenance procedure for the GE reactor trip switchgears.

Insufficient clearance between the undervoltage trip paddle assembly adjustment screw and the trip shaft clamp was identified as the root cause in the APS root cause of failure investigation of two March 1992 failures of a Unit 3 GE reactor trip breaker to close. This clearance value is not specified in either GE publication GEK-64459 or GEK-7310. However, APS recognizes that GE publication GEK-64459 contains additional guidance for conducting maintenance on GE reactor trip breakers, including undervoltage and shunt trip device adjustments.

Corrective Steps That Have Been Taken And Results Achieved

Example 1

APS conducted a root cause of failure investigation of two March 1992 failures of a Unit 3 GE reactor trip breaker to close. Although inadequate lubrication was not identified as a potential failure mechanism for the breakers, the investigation did recognize that the lubricant used in maintenance activities on GE reactor trip breakers was not approved by GE.

Work requests have been initiated to remove any Molykote 321R lubricant from the GE reactor trip breakers at their next scheduled maintenance. These breakers will function satisfactorily until then. Also, the maintenance procedure for GE reactor trip switchgears (32MT-9SB02) has been revised to delete Molykote 321R as an approved lubricant for reactor trip breaker maintenance.

During APS' investigation, GE provided APS an updated maintenance publication for the GE reactor trip breakers which specifies the use of Mobilgrease 28 for reactor trip breaker lubrication. (This GE Publication, GEK-64459, is discussed further in the response to Example 3 below.) This maintenance publication is currently undergoing review at PVNGS. Upon approval of the publication, it will be incorporated into the vendor technical manual and the maintenance procedure for GE reactor trip switchgears in accordance with the PVNGS vendor document program.

Example 2

The Westinghouse reactor trip switchgear maintenance procedure (32MT-9SB01) has been enhanced, including incorporation of the instructions provided in Westinghouse technical bulletin NSD-TB-91-06-RO.

Example 3

APS obtained GE's endorsement of GEK-64459 for use on PVNGS reactor trip breakers during the APS root cause of failure investigation. This publication has been reviewed by APS. APS comments are currently being resolved by GE.

Corrective Steps That Will Be Taken to Avoid Further Violations

Example 1

The corrective actions discussed above are considered adequate to address reactor trip breaker lubrication issues and no additional corrective actions are planned.

Example 2

The corrective actions discussed above are considered adequate to address the use of technical bulletin NSD-TB-91-06-RO in maintenance activities on Westinghouse reactor trip switchgears and no additional corrective actions are planned.

Example 3

Upon resolution of APS comments by GE, publication GEK-64459 will be incorporated into the GE vendor technical manual. The maintenance procedure for GE reactor trip switchgears will then be revised in accordance with the PVNGS vendor document program to include the additional guidance provided in the publication. This is expected to be completed by November 30, 1992. Until then, APS will continue to use the currently approved GE publication, GEK-7310.

Date When Full Compliance Will Be Achieved

Example 1

Full compliance was achieved on August 21, 1992, upon deletion of MolyKote 321R from the procedure as an approved lubricant for GE reactor trip breaker maintenance.

Example 2

Full compliance was achieved on June 26, 1992, upon incorporation of Westinghouse technical bulletin NSD-TB-91-06-RO into the Westinghouse reactor trip switchgear maintenance procedure (32MT-9SB01).

Example 3

Full compliance will be achieved by November 30, 1992, upon incorporation of GE publication GEK-64459 into the maintenance procedure for GE reactor trip switchgears.

Additional Corrective Actions

Procedures for the review of vendor technical information have been revised to require prioritization for the processing of vendor information based on the safety significance of the applicable equipment. Also, the frequency for periodically contacting vendors to verify that technical manuals are current has been increased based on the safety significance of the applicable equipment. These corrective actions were discussed during a management meeting between NRC and APS personnel in Phoenix, Arizona, on May 26, 1992.

REPLY TO NOTICE OF VIOLATION B (50-530/92-15-01)

Admission or Denial of the Alleged Violation

APS agrees that the involved Shift Technical Advisor (STA) did not initiate formal quarantining of the Unit 3 'C' Westinghouse reactor trip breaker when he was informed by the Assistant Shift Supervisor that the breaker had failed to open during a surveillance test.

Reason for the Violation

Lack of procedural guidance for equipment quarantining resulted in the Unit 3 'C' reactor trip breaker not immediately being quarantined when the breaker failed to open during a surveillance test.

Administrative procedure 40AC-90P18, "Technical Specification Component Condition Record," requires the STA to evaluate the need for an equipment root cause of failure analysis (ERCFA), if the equipment is declared inoperable due to a component failure and to initiate a Condition Report/Disposition Request (CRDR) if an ERCFA is necessary. Departmental procedure 70DP-OEE01, "Equipment Root Cause of Failure," requires the Duty STA to initiate a formal request to the responsible department to preserve evidence necessary for the investigation. On March 31, 1992, during performance of surveillance test procedure 36ST-9SB04, "PPS Functional Test - RPS/ESFAS Logic," Unit 3 reactor trip switchgear 'C' failed to open. Further inspection determined that the breaker had failed in an intermediate position, not fully open nor fully closed. The Shift Supervisor declared the breaker inoperable and entered the appropriate Technical Specification Action statement.

Shortly after the breaker failed to open, the STA was contacted by the Assistant Shift Supervisor to inform him of the failure of the breaker to open and the intended course of action. Based on the lack of procedural guidance, the STA made no recommendations for quarantining the breaker nor was he sensitive to the significance of the failure. Consequently, no direction for evidence preservation was provided by the STA. Troubleshooting of the breaker then commenced. The STA, upon his arrival in the control room later in his shift, initiated a Technical Specification Component Condition Record for the 'C' reactor trip breaker. During shift turnover, the Lead STA recommended that a CRDR be initiated to perform an ERCFA based on his recognition of the significance of the failure. A CRDR was initiated and, subsequently, an ERCFA was conducted. During the course of this investigation, the 'C' reactor trip breaker was quarantined.

Corrective Steps That Have Been Taken and The Results Achieved

The need to develop guidance on quarantining equipment for an ERCFA was identified as a concern in the APS root cause of failure investigation of the failure of the Unit 3 reactor trip breaker 'C' to open. As a result of this concern, quarantine guidelines have been incorporated into 70DP-OEE01 to control the quarantining of equipment for the purposes of performing an ERCFA.

The Site Technical Support Director has issued a letter to the plant managers and maintenance managers identifying situations which require early engineering involvement in troubleshooting activities. Also, to improve the awareness and sensitivity of personnel at PVNGS, a critical systems, components, and activities list has been developed by a task force based on NRC Generic Letters, NRC Bulletins, NRC Information Notices, Industry Events, PVNGS Probabilistic Risk Assessment, and PVNGS experience. These corrective actions were discussed during a management meeting between NRC and APS personnel in Phoenix, Arizona, on May 26, 1992, and during the enforcement conference at the NRC Region V office on July 9, 1992.

Corrective Steps That Will Be Taken To Avoid Further Violations

A sensitive issues awareness list is currently being developed based on the identification of the critical systems, components, and activities list discussed above. This list will be communicated to personnel, including STA's, to improve their awareness and sensitivity.

Date When Full Compliance Will Be Achieved

Full compliance was achieved on April 2, 1992, upon quarantining the Unit 3 'C' reactor trip breaker.

REPLY TO NOTICE OF VIOLATION C (50-528/92-23-01)

Admission or Denial of the Alleged Violation

APS admits that check valve SIE-V133 was installed incorrectly.

Reason for the Violation

The reason for the incorrectly installed check valve is believed to be a personnel performance error. Only one of the individuals involved in the work is still employed at PVNGS, and this individual could not recall the specifics of the work performed in August 1989. APS has reviewed the work documents and no errors or deficiencies were noted relevant to the alignment of the disc. APS has concluded that the error most probably occurred either during the valve disassembly when the match marks were scribed on the check valve body, during reassembly when the match marks were realigned, or if the studs were removed and reinserted in different positions during valve maintenance.

A potential contributing cause to the event was the scribing and/or realignment of the valve internals. The valve, as supplied by the vendor, did not have permanent alignment marks to ensure proper reassembly. The mechanics were required to make their own scribe marks based upon the position of a specific stud. The appropriate stud may have been relocated during maintenance or a previous scribe mark in a different location may have been used during reassembly.

APS has determined that the operability requirement for the check valve is that the valve is capable of passing sufficient safety injection flow. The safety function of the inboard check valve SIE-V133 is directly analogous to the outboard containment motor operated isolation valve for the same penetration. During any plant condition which generates a Containment Isolation Actuation Signal (CIAS), a concurrent SIAS (Safety Injection Actuation Signal) is also generated. With a SIAS/CIAS, the safety function of the outboard motor operated isolation valve is to open to allow safety injection flow. Similarly, the safety function of the inboard isolation valve is to open.

Check valve SIE-V133 also provides redundant, defense-in-depth against intersystem LOCAs, but its safety function as defined in the UFSAR (Table 6.2.4-1) is to pass safety injection flow. Check valves SIE-V542 and SIE-V237 are the two downstream check valves in series to protect against intersystem LOCAs. These check valves are tested in accordance with ASME section XI for reverse flow. SIE-V542 is the ASME Class 1 to Class 2 break from the RCS. As stated above, SIE-V133 provides redundant protection from intersystem LOCAs but, its safety function is to open to allow safety injection flow.

Corrective Steps That Have Been Taken And The Results Achieved

The check valve was reassembled with the check valve disk aligned correctly with the seat.

Briefings were conducted with Units 1, 2, and 3 Mechanical Maintenance personnel to discuss this event.

Subsequent to the event described above, a similar event occurred during the last Unit 1 refueling outage. As a result, APS assessed the need for further testing of check valves in all units. This assessment identified over 200 bonnet hung swing check valves. Most of these valves were determined not to be suspect due to prior reverse flow testing or a design which would not allow bonnet rotation during reassembly. Based on this assessment, ten check valves in each unit were ultrasonically tested and verified to be installed correctly.

APS maintenance and engineering personnel have disassembled and reassembled a new check valve under controlled conditions to accurately document the correct techniques and sequencing to ensure sufficient information was available. This activity was used to prepare a model work order which will be used during the upcoming Unit 3 outage.

Corrective Steps That Will Be Taken To Avoid Further Violations

A maintenance procedure will be developed for this specific type of check valve. This procedure will address disassembly/reassembly and a means of permanently scribing the

valve. The procedure will require the scribe marks to be made in a manner consistent with the system flow path to aid in proper alignment. This procedure is expected to be developed and approved by November 1, 1992.

Date When Full Compliance Will Be Achieved

Full compliance was achieved on April 24, 1992, when the check valve was properly reassembled.

REPLY TO NOTICE OF VIOLATION D (50-530/92-19-01)

Admission or Denial of the Alleged Violation

APS admits the violation.

Reason For The Violation

The reason for the violation was the failure of the electricians to maintain positive control of the lead as procedurally required. Based on the scope of the work, the layout of the plant equipment, and the perceived risk to the plant, the electricians believed that they had positive control of the lead using the capture screwdriver. However, the use of a capture screwdriver is not considered acceptable control of the lead. Following this event, the Electrical Maintenance Supervisor discussed the decision to depend on the capture screwdriver to control the lead, and the electricians concurred that this was not positive control of the lead.

Prior to lifting the lead, the proper capture screwdriver was selected using a similar screw. The screw positively restrained the lead in all directions except along the shaft. The Electricians expected to retain the lead along the shaft using the friction of the threads on the screw. This was decided in part due to the scope of the work which involved only momentarily lifting the lead to break the connection and then reterminating the lead. Other means of positively controlling the lead (e.g., by hand or pliers) were not

selected since this would have been contrary to good maintenance practice of using only one hand when working on or near energized equipment. The use of a second electrician to restrain the lead was believed to have been impractical since access was limited and required both Electricians to be on a ladder. Additionally, APS did not have a sufficiently insulated tool capable of restraining the lead at the distance required.

The Electricians elected not to use electrically insulated blankets due to the perceived risk of electrocution associated with installing the blankets due to the limited space between the bus and the lead terminal. Only a limited area of the bus could have been reasonably protected using the blanket due to the configuration of the 480 volt bus, the breakers, and the lead terminal. APS management has inspected the work conditions and has concurred with the decision not to use electrically insulated blankets in this application since the risk would outweigh the benefits.

The Electricians proceeded with work using the capture screwdriver and believed that the work could be performed safely with minimal risk to the plant. The Senior Electrician understood that the annunciator circuit operated on a floating ground and had blocking diodes. The Senior Electrician believed that if the lead inadvertently contacted the 480 volt bus, only blown fuses or open breakers would have resulted. It was not possible to know that another fault in the system and the relative proximity of the fault to ground would allow arcing to ground and the resultant adverse effect on the annunciator system.

Corrective Steps That Have Been Taken And The Results Achieved

APS has revised procedure 30DP-9MP01, Conduct of Maintenance, to provide specific guidance for the control of lifted leads.

A briefing was conducted with Unit 1, 2, and 3 Electrical maintenance personnel to discuss this event and to ensure supervisory expectations are clearly communicated.

The two Electricians involved in the event have been counseled in accordance with APS's positive discipline program regarding the requirement to maintain positive control of lifted leads.

Corrective Steps That Will Be Taken To Avoid Further Violations

APS is developing a safety policy for work on energized equipment and will evaluate whether additional tools are required. The expected completion date is December 31, 1992.

Date When Full Compliance Will Be Achieved

Full compliance was achieved on May 4, 1992, when the lead was reterminated.

ENCLOSURE 2

ADDITIONAL INFORMATION CONCERNING INITIAL EFFORTS TO RESOLVE PROBLEMS WITH GENERAL ELECTRIC REACTOR TRIP BREAKERS

ADDITIONAL INFORMATION CONCERNING INITIAL EFFORTS TO RESOLVE PROBLEMS WITH GENERAL ELECTRIC REACTOR TRIP BREAKERS

APS does not agree that the initial troubleshooting efforts in evaluating General Electric (GE) trip breaker failures to close lacked thoroughness or that additional evaluations of the procurement and design history were prompted by the NRC as stated in Inspection Report Nos. 50-528,529,530/92-22.

The thoroughness of the initial APS root cause effort was documented in NRC Special Inspection Report Nos. 528,529,530/92-15. The NRC inspection concluded "that the licensee's incident investigation was thorough, and clearly defined the mechanical failure of both circuit breakers."

By May 1, 1992, APS had completed the root cause evaluation for the failure to close that had been identified in March 1992. Because the evaluation had included GE field representation and written concurrence from GE Nuclear Management that the recommendations from the root cause evaluation were correct, APS believed that the short-term solution to the failure to close problem was identified. For the long-term, APS planned to evaluate the adequacy of the breaker design from the standpoint of maintainability.

At the conclusion of initial root cause investigation efforts in April 1992, the root cause team identified that inadequate undervoltage device armature to trip paddle gap was the major contributing cause of the failure to close condition on breaker S/N N2689500011 and recommended that, of the six breakers installed in the Palo Verde units, the two installed in Unit 1 have their gaps adjusted prior to startup from the current refueling outage and the remaining four have their gaps adjusted either at the next scheduled preventive maintenance activity or if the failure to close condition manifested itself prior to the scheduled preventive maintenance. This recommendation was based on the following:

1. The root cause of failure team determined that the existing maintenance procedure, 32MT-9SB02, did not contain information or guidance that was incorrect. The additional information that was included in technical manual GEK-64459B concerning undervoltage adjustments would not have had an effect on the identified breaker failure to close performance. Based on the history of the undervoltage device failures at Palo Verde, this additional information would not have been needed for routine inspections. The maintenance procedure sequencing concerns regarding reverifying the undervoltage device positive trip after adjustments was implemented immediately be means of a procedure change notice.

2. The scheduled preventive maintenance is performed every six months and the breakers are exercised monthly. As a result, all breakers would have their undervoltage armature gap set at the recommended value within six months (all but

one within four months) while those not adjusted would continue to be monitored during the monthly testing.

3. The documented failure to close occurrences were infrequent. The root cause of failure investigation of breaker S/N N2689500011 determined that the discrepancies identified in the technical manual, procedure, and work practices would not affect the ability of the breaker to open once closed. Completing all newly recommended breaker adjustments within a six-month period was deemed appropriate by APS.

4. The adjustments recommended in the root cause of failure report would not completely prevent the failure to close condition from occurring. It was recognized that this undervoltage gap adjustment optimized the breaker performance but could not eliminate it. Therefore, taking breakers that were not experiencing this problem out of service to make an adjustment that might marginally improve performance over the short time period remaining prior to regularly scheduled maintenance was not appropriate.

5. In the near term, a higher priority existed for the use of Palo Verde resources to implement recommendations made for the Westinghouse reactor trip breakers.

Thus, the original implementation plan recognized that additional breakers could exhibit the failure to close condition and that breakers with all adjustments made might occasionally exhibit this condition. The implementation plan also assumed that if additional breakers exhibited any abnormal operating characteristics they would be immediately evaluated to determine if the condition was within the boundaries of the root cause determination or whether they constituted a performance limiting deficiency.

Between May 1, 1992, and July 6, 1992, three GE reactor trip breakers failed to close during testing. Each of these had an undervoltage armature to trip paddle gap well below the root cause recommended value of 0.030 inches. The condition was consistent with the conclusion derived in the initial root cause of failure report.

In June, APS was unable to set the undervoltage armature to trip paddle gap to the recommended tolerance on breaker S/N N2689500010 during scheduled maintenance. This breaker had been received from the warehouse. APS contacted the vendor and sent the breaker to the GE Atlanta Service Facility for troubleshooting. The Atlanta Service Facility requested design drawings for the undervoltage trip paddle from the GE document center in order to measure the paddle dimensions. When they took the measurements, it was identified that the trip paddle was 0.10 inches longer than specified on the drawing. Subsequently, GE determined that the trip paddle underwent a design change in 1982 to shorten the radius dimension to the tip of the paddle but the change was coded to deplete existing stock of the current paddle prior to implementation. The GE Atlanta Service Facility was unaware of this change prior to APS sending breaker S/N N2689500010 to them for troubleshooting and was still using the longer paddle when

refurbishing breakers. As stated in the NRC inspection report and in a GE letter, dated July 2, 1992, "The use of the longer or shorter trip paddle in an AKR-4BE-30 breaker that has been properly maintained and adjusted will not affect the breaker opening function."

Additional testing which took place in Atlanta during July and August, 1992 demonstrated that the paddle length does not appreciably affect breaker closing functions either.

While further addressing APS' concerns over breaker S/N N2689500010, GE Atlanta Service Facility determined that it could not meet the undervoltage gap specification of 0.030 inches that GE had previously agreed was the appropriate tolerance. GE notified APS in late June 1992 that the undervoltage armature to trip paddle gap tolerance should be a minimum of 0.005 inches. Because APS recognized that this would conflict with the recommendations from our root cause of failure evaluation, it was determined that additional root cause testing on the AKR-30 breakers was needed in order to resolve technical differences between APS and GE. During the first week of July, APS arranged to have a spare reactor trip breaker cubicle shipped to the GE Atlanta Service Facility and scheduled testing to be conducted in Atlanta on July 14 and 15, 1992.

Also in July, the undervoltage devices on a GE breaker in Unit 2 and one in Unit 3 failed to respond as expected during testing. On July 8, 1992, Unit 2 breaker S/N N2689500019 undervoltage armature was reported to fall to an intermediate position with the coil deenergized. The undervoltage device tripped the breaker when deenergized indicating that the armature traveled fully upward and subsequently fell back down. The original root cause of failure team, which had been reestablished to evaluate the additional testing that might be needed as described in the above paragraph, was immediately available to begin a root cause investigation into this problem. During root cause inspection and troubleshooting, the armature anomaly condition never occurred with the breaker in an as-found condition. This condition; if it occurred as reported, appears to be random and does not constitute a generic breaker issue. However, the root cause team identified and recommended additional enhancements to the maintenance program to further ensure improved breaker performance. The root cause investigation results are documented in a failure report, dated September 8, 1992.

In response to the undervoltage device performance issue described above, APS immediately verified that the undervoltage devices on the remaining installed breakers were not exhibiting similar behavior and that they would trip their respective breaker when deenergized. As part of this verification on July 8, 1992, while testing Unit 3 breaker S/N N2689500015, the breaker tripped as required when the undervoltage device was deenergized but the undervoltage device would not reset when reenergized. A separate root cause of failure investigation was performed by the same team described above. The cause of the Unit 3 undervoltage device failure to pickup was attributed to excessive gap clearance between the rivet and the armature. The primary factor contributing to the occurrence of excessive clearance was inadequate guidance in both the procedure and the technical manual for measuring the gap clearance. The cause was unrelated to the

failure to close condition that had been investigated during April. The root cause investigation results are documented in a failure report, dated September 11, 1992.

The breaker vendor, GE, was present during the July root cause of failure investigations. The GE representative was the same individual that was present during the April root cause investigation.

Beginning with the April investigation, APS performed a thorough review of work history and procurement history for the GE reactor trip breakers. The review of the design history was complicated by the fact that it required proprietary information owned by GE. The GE representative sent to assist in our root cause evaluations was knowledgeable of the GE design document program and brought many design drawings that assisted in the investigations. The GE representative interfaced with GE Engineering to obtain answers to APS design questions, but was unable to provide answers to all of the questions and indicated that, in many instances, the design history was not readily available. APS has continued to work with GE to obtain relevant design history needed to explain and eliminate the failure to close problem. To date, GE's research of the design history has been unable to identify any design changes to the AKR-30 breakers which would have any impact on the failure to close problem. APS' efforts to review breaker origin, .procurement processes, and design history began early in the investigative process and have continued as new, unexpected problems have developed.

Since March, APS has continued to thoroughly investigate each occurrence of breaker improper operation, regardless of the apparent effect on operability. A dedicated root cause investigation team, which includes an APS Director, continues to be utilized for each new problem. A considerable investment of resources is being made to conduct testing with the vendor in order to solve the problems associated with these breakers.

NOTE: On September 2, 1992, a Unit 2 GE reactor trip breaker did not close during breaker testing. Preliminary evaluation indicates no causes different than those discussed above. A final report will be issued in accordance with APS' incident investigation program.