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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 91-010-01:on 911115,ESF actuation occurred.Caused by manual deenergization of offsite power.Crane operation guidance established & action plan developed,approved & implemented to remove mobile crane.W/920130 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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EXTERNAL:	EG&G BRYCE,J.H	3	3	L ST LOBBY WARD	1	1
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Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00769-JML/TRB/KR
January 30, 1992

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530 (License No. NPF-74)
Licensee Event Report 91-010-01
File: 92-020-404

Attached please find Supplement 01 to Licensee Event Report (LER) 91-010 prepared and submitted pursuant to 10CFR50.73. This supplement is being submitted to provide the corrective actions that were developed as a result of the APS investigation of the event described in the LER and the schedule for implementation. In accordance with 10CFR50.73(d), a copy of this supplement is being forwarded to the Regional Administrator, NRC Region V.

If you have any questions, please contact T. R. Bradish, Compliance Manager, at (602) 393-2521.

Very truly yours,

James M Levine

JML/TRB/KR

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Unit 3	0 5 0 0 0 5 3 0	1 OF 1 4

TITLE (4)

ESF Actuations Caused by Manual Deenergization of Offsite Power

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
1 1	1 5	9 1	9 1	– 0 1 0	– 0 1	0 1	3 0	9 2	N/A	0 5 0 0 0

OPERATING MODE (9)	3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	X	50.73(a)(2)(iv)		73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
		20.405(a)(1)(iv)	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
		20.405(a)(1)(v)	50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Thomas R. Bradish, Compliance Manager	6 0 2 3 9 3 – 2 5 2 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On November 15, 1991, at approximately 0913 MST, Palo Verde Unit 3 was in Mode 3 (HOT STANDBY) when Control Room personnel, responding to a report that a mobile crane was in contact with an energized 13.8 kV overhead power line, secured power to the Train B 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S06). This resulted in the expected loss of power to the Train B Class 1E 4.16 kV bus, and a Loss of Power (LOP) Engineered Safety Feature Actuation System (ESFAS) actuation. The Train B Emergency Diesel Generator (EDG) started and loaded per design. At approximately 0914 MST, the Control Room was notified that the line the crane was in contact with was still energized and that the Train A 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S05) needed to be deenergized. Control Room personnel proceeded to reenergize the NAN-S06 bus prior to deenergizing the NAN-S05 bus. At approximately 0922 MST, Control Room personnel deenergized the NAN-S05 bus which resulted in the expected loss of power to the Train A Class 1E 4.16 kV bus and a Train A LOP ESFAS actuation. The Train A EDG started and loaded per design. All equipment functioned as designed. No other safety system responses occurred and none were required.

Based on investigation results, the cause of the crane coming in contact with an energized 13.8 kV power line was determined to be personnel error.

There have been no previous similar events reported pursuant to 10CFR50.73.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 0913 MST on November 15, 1991, Palo Verde Unit 3 was in Mode 3 (HOT STANDBY) at normal operating temperature and pressure following an automatic reactor (AC)(RCT) trip which occurred on November 14, 1991 (LER 530/91-008).

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: An event or condition that resulted in an automatic actuation of an Engineered Safety Feature (ESF) (JE).

At approximately 0913 MST on November 15, 1991, Unit 3 Control Room personnel (utility, licensed), responding to a report that a mobile crane was in contact with an energized 13.8 kV overhead power line, secured power to the Train B 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S06) (BU)(EA). This resulted in the expected loss of power to the Train B Class 1E 4.16 kV bus (PBB-S04) (BU)(EB) and a Loss of Power (LOP) Engineered Safety Feature Actuation System (ESFAS)(JE) actuation. The Train B Emergency Diesel Generator (EDG) (FG) started and loaded per design.

At approximately 0914 MST, Control Room personnel were notified that the line, which the crane was in contact with, was still energized and that the Train A 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S05) (BU)(EA) needed to be deenergized. Control Room personnel proceeded to reenergize the NAN-S06 bus prior to deenergizing the NAN-S05 bus, thereby maintaining the availability of offsite power. At approximately 0922 MST, Control Room personnel deenergized the NAN-S05 bus which resulted in the expected loss of power to the Train A Class 1E 4.16 kV bus (PBA-S03) (BU)(EB) and a Train A LOP ESFAS actuation. The Train A EDG started and loaded per design. All equipment functioned as designed. No other safety system responses occurred and none were required.

Prior to the event, on the morning of November 15, 1991, work was in progress to perform evaluations and maintenance on the Phase A Main Transformer (XFMR)(EL) following a lightning induced electrical fault and automatic reactor trip which occurred on November 14, 1991 (LER 530/91-008). A 35 ton mobile crane was

required to allow maintenance personnel to perform pre-installation checks on the replacement bushing for the transformer. At approximately 0710 MST, Control Room personnel had been contacted by a senior mechanic (utility, nonlicensed) to obtain the status of the overhead power lines in the area of the transformer. The Assistant Shift Supervisor (utility, licensed) cautioned the senior mechanic about the energized 13.8 kV overhead power lines and the impact on the plant if contact was made by the crane with the energized lines (e.g., tripping of reactor coolant pumps). The crane operating engineer (contractor, non-licensed), cognizant of the energized overhead power lines, drove the crane into the area near the transformer and positioned it in front of the replacement bushing laydown area. The crane's front outriggers were extended to stabilize the crane. With the help of a second crane operating engineer as a signalman (contractor, nonlicensed), the crane operating engineer lifted the replacement bushing from the shipping container for doble testing and subsequently lowered the bushing back into the shipping container. The signalman removed the rigging slings from the bushing. The crane operating engineer exited the crane cab to inquire about additional crane support that may be required at that time.

Prior to exiting the crane, the operating engineer raised the crane hook and turned off the engine. The crane operating engineer knew that he should set the friction brake before leaving the cab, and he believed that he had set the brake. The crane boom was approximately 23 feet from the nearest energized overhead power line. After the crane operating engineer exited the cab, the boom rotated toward the energized overhead power lines, brushed the middle line, and came to a final resting position against the outside energized 13.8 kV overhead power line. This resulted in the arcing of the crane outrigger pads to ground and the burning of the asphalt area immediately in contact with the pads. At the time, a light breeze (i.e., approximately 12 miles per hour) was blowing out of the south in generally the same direction that the boom moved. At approximately 0910 MST, the site Fire Department was notified of the fire inside the protected area.

A single phase-to-ground fault of approximately 140 amps resulted when the crane came in contact with the 13.8 kV overhead power line. The fault was insufficient to trip the NAN-S05 feeder breaker (BKR) or to cause control board electrical system alarm (ALM)(IB) indications in the Control Room (NA). APS engineering determined that the circuit breaker (52) supplying the 13.8 kV overhead power line (NAN-S05) would have tripped when the crane came in contact with the line, if the crane had been properly

grounded in accordance with PVNGS procedures and the PVNGS Accident Prevention Manual.

At approximately 0913 MST on November 15, 1991, the Control Room Shift Supervisor (utility, licensed) was notified by an electrical foreman (utility, nonlicensed) via telephone that the crane had come in contact with an energized 13.8 kV overhead power line, that a fire was in progress, and that the line required deenergization. No control board electrical system alarm indications related to this event were received in the Control Room. The electrical foreman identified the line that required deenergization as NAN-S06 to NAN-S04 (i.e., Train B 13.8 kV switchgear bus). Because of his concern for personnel safety, the Shift Supervisor questioned the electrical foreman on the geographical location of the line to be deenergized rather than sending an operator to verify the information. The Shift Supervisor was confident that the electrical foreman was cognizant of the correct 13.8 kV line to be deenergized. The electrical foreman stated that he realized at the end of the telephone conversation that he had identified the wrong line to deenergize and corrected his mistake, but apparently the correction was not heard by the Shift Supervisor.

At approximately 0913 MST, Control Room personnel deenergized the overhead power line by securing power to the NAN-S06 bus which resulted in the expected loss of offsite power to the Train B 4.16 kV Class 1E bus and a Train B LOP ESFAS actuation. The ESF signal automatically load shed the Class 1E bus and started the Train B Emergency Diesel Generator (EDG). The Train B EDG started and assumed the loads as designed. In addition, securing the power to the NAN-S06 bus resulted in the deenergization of the Train B switchgear bus (NAN-S02) which supplies power to Train B reactor coolant pumps (AB)(P) (RCPs 1B and 2B), two (2) circulating water pumps (NN)(P) (CWPs), and non-essential load centers. The Control Room entered Technical Specification Limiting Condition for Operation (TS LCO) 3.8.1.1 ACTION a (i.e., one offsite circuit inoperable) and TS LCO 3.4.1.2 ACTION a (i.e., one reactor coolant loop in operation).

Subsequently, at approximately 0914 MST, the Control Room was notified that the 13.8 kV overhead power line in contact with the crane was still energized (i.e., arcing of the crane outrigger pads to ground was still in progress) and that the immediate personnel safety concerns were reduced because all personnel were clear of the crane. At this time, Control Room personnel determined that the crane was actually in contact with the Train A 13.8 kV overhead power line supplied by the NAN-S05 bus. Control

Room personnel proceeded to reenergize the NAN-S06 bus prior to deenergizing the NAN-S05 bus, thereby maintaining the availability of offsite power. At approximately 0915 MST, the Fire Department response team (i.e., personnel, fire engine, and command vehicle) arrived at the scene of the fire.

At approximately 0922 MST, Control Room personnel deenergized the NAN-S05 bus which resulted in the expected loss of offsite power to the Train A 4.16 kV Class 1E bus and a Train A LOP ESFAS actuation. The ESF signal automatically load shed the Class 1E bus and started the Train A EDG. The Train A EDG started and assumed the loads as designed. In addition, securing the power to the NAN-S05 bus resulted in the deenergization of the Train A switchgear bus (NAN-S01) which supplies power to Train A reactor coolant pumps (RCPs 1A and 2A), two (2) circulating water pumps (CWPs), and non-essential load centers. The Control Room entered TS LCO 3.8.1.1 ACTION d (i.e., two offsite A.C. circuits inoperable) and TS LCO 3.4.1.2 ACTION b (i.e., no reactor coolant loop in operation). Control Room personnel verified that heat removal was maintained via natural circulation in the reactor coolant system (AB) (RCS).

At approximately 0928 MST, the Shift Supervisor received information from the Fire Department Incident Commander that the fire was out and that there were no apparent injuries. PVNGS Emergency Plan Implementing Procedures require the declaration of a Notification of Unusual Event (NUE) for a fire in the protected area lasting longer than 10 minutes. At approximately 0928 MST, the Shift Supervisor declared a Notification of Unusual Event.

Subsequent to the deenergization of the 13.8 kV overhead power line (NAN-S05), the crane operating engineer reentered the cab and positioned the right rear outrigger against the ground in order to stabilize the crane.

At approximately 0945 MST, TS LCO 3.4.3.1 ACTION b was entered when the maximum steady-state water level in the pressurizer (PZR)(AB) exceeded 56 percent. This occurred due to a delay in restoring letdown (CB) with charging and seal injection in service. Initial attempts to open the letdown isolation valve (CB)(ISV) were not successful. Since nuclear cooling water (NCW) (CC) flow is required to enable the opening of the letdown isolation valve, the letdown isolation valve is interlocked with the NCW flow switch (FS)(CC). However, following the deenergization of the 13.8 kV busses, power had not been restored to the NCW flow switch. Power is required to activate the NCW flow switch which in turn will allow the opening of the letdown

isolation valve. The reactor operator (utility, licensed) observed proper NCW flow on a control board NCW flow indicator (FI)(CC) in the Control Room and determined that the letdown isolation valve could be opened. However, the operator did not recognize that the NCW flow switch was deenergized. Subsequent investigation by Control Room personnel revealed that power to the NCW flow switch had been secured when the 13.8 kV busses had been deenergized.

At approximately 0950 MST, forced circulation was restored to the RCS when reactor coolant pump 2B was restarted. The Control Room entered TS LCO 3.4.1.2 ACTION a (i.e., one reactor coolant loop in operation). At approximately 1002 MST on November 15, 1991, the NUE was terminated in accordance with EPIP-03 when the Control Room Supervisor (utility, licensed) determined that the incident involving the crane was under control.

At approximately 1050 MST, RCP 1B failed to start from the Control Room. An auxiliary operator (AO) was dispatched to investigate the problem with RCP 1B. During the AO's investigation of RCP 1B, the AO heard a relay chattering or a clicking noise in the cubicle adjacent to the breaker for RCP 2B and placed his hand on the RCP 2B breaker switch. At approximately 1057 MST, the AO inadvertently tripped RCP 2B when he accidently turned RCP 2B's local breaker control switch in the open direction while simultaneously inspecting the RCP 1B cubicle breaker. The Control Room reentered TS LCO 3.4.1.2 ACTION b (i.e., no reactor coolant loop in operation). At approximately 1103 MST, RCP 2B was successfully restarted, restoring forced circulation. The Control Room entered TS LCO 3.4.1.2 ACTION a (i.e., one reactor coolant loop in operation).

The Shift Supervisor determined that the unsuccessful attempt to start RCP 1B was due to a preexisting problem with the oil lift pump switch. RCP start circuitry is interlocked with the oil flow switch contact. The oil flow switch contact remained open disabling the RCP starting interlock. At approximately 1106 MST, RCP 1B was started but tripped on a low speed signal fourteen (14) seconds later. In addition, an RCP reverse rotation alarm was observed in the Control Room. In accordance with an approved procedure, local verification is required to ensure that the RCP is not rotating in reverse. A reactor operator (utility, licensed) made a containment entry and verified that RCP 1B was not rotating backwards. Subsequent investigation by Control Room personnel revealed that RCP 1B tripped because power to the speed probe circuit had been secured when the 13.8 kV busses had been deenergized.

At approximately 1118 MST, pressurizer level was restored to less than 56 percent following the restoration of power to the NCW flow switch and the subsequent opening of the letdown isolation valve. The highest pressurizer level reached before letdown flow was restored was 68 percent. The Control Room exited TS LCO 3.4.3.1 ACTION b.

At approximately 1309 MST, the loads on the Train B Class 1E bus were transferred to the Train B offsite power supply, and the Train B EDG output breaker was opened, exiting TS LCO 3.8.1.1. ACTION d (i.e., two offsite A.C. circuits inoperable).

At approximately 1436 MST, once the power to the RCP 1B speed probe circuit was restored, RCP 1B was successfully restarted. Both reactor coolant loops were operable and TS LCO 3.4.1.2 ACTION a. was exited.

Following the completion of the maintenance of the Phase A Main Transformer, at approximately 0900 MST on November 17, 1991, Control Room personnel reenergized the NAN-S05 bus, restoring offsite power to Train A 4.16 kV Class 1E bus and Train A 13.8 kV switchgear bus (NAN-S01). At approximately 0916 MST on November 17, 1991, the loads on the Train A Class 1E bus were transferred to the Train A offsite power supply, and the Train A EDG output breaker was opened, exiting TS LCO 3.8.1.1 ACTION a (i.e., one offsite circuit inoperable).

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Not applicable - no structures, systems, or components were inoperable at the start of the event which contributed to this event.

D. Cause of each component or system failure, if known:

Not applicable - no component or system failures were involved.

E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - no component failures were involved.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.

G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures that rendered a train of a safety system inoperable were involved.

H. Method of discovery of each component or system failure or procedural error:

There have been no component or system failures identified. The procedural errors which contributed to this event are discussed in Section I.I.

I. Cause of Event:

An independent investigation into this event was conducted in accordance with the APS Incident Investigation Program. The cause of the first LOP ESFAS actuation was determined to be the manual deenergization of the Train B 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S06) by Control Room personnel responding to a call from an electrical foreman that a mobile crane was in contact with an energized 13.8 kV overhead power line. This resulted in the expected loss of power to the Train B Class 1E 4.16 kV bus. No control board electrical system alarm indications related to this event were received in the Control Room. The electrical foreman identified the line that required deenergization as NAN-S06 to NAN-S04 (i.e., Train B 13.8 kV switchgear bus). Because of his concern for personnel safety, the Shift Supervisor questioned the electrical foreman on the geographical location of the line to be deenergized rather than sending an operator to verify the information. The Shift Supervisor was confident that the electrical foreman was cognizant of the correct 13.8 kV line to be deenergized. The electrical foreman stated that he realized at the end of the telephone conversation that he had identified the wrong line to deenergize and corrected his mistake, but apparently the correction was not heard by the Shift Supervisor.

The second LOP ESFAS actuation was determined to be the manual deenergization of the Train A 13.8 kV non-Class 1E intermediate switchgear bus (NAN-S05) by Control Room personnel responding to a

report that the line the crane was in contact with was still energized.

A single phase-to-ground fault of approximately 140 amps resulted when the crane came in contact with the 13.8 kV overhead power line. The fault was insufficient to trip the NAN-S05 feeder breaker or to cause control board electrical system alarm indications in the Control Room. APS engineering determined that the circuit breaker supplying the 13.8 kV overhead power line (NAN-S05) would have tripped when the crane came in contact with the line, if the crane had been properly grounded in accordance with PVNGS procedures and the PVNGS Accident Prevention Manual.

On November 18, 1991, the crane was configured in its as-found condition to determine the cause of the boom swinging into the energized overhead power line. The simulation could not duplicate the event with the friction brake engaged. Disassembly and inspection of the friction brake on November 20, 1991, indicated that the brake was in good mechanical condition and functioned properly. Based on the results of the investigation, the cause of the crane coming in contact with the energized 13.8 kV overhead power line was determined to be due to personnel error by the crane operating engineer who used poor work practices during the operation of the crane (i.e., crane was not grounded, crane was not level, friction brake was not set, and crane was left unattended) (SALP Cause Code A: Personnel Error).

The investigation also concluded that other actions involving the use of the 35 ton mobile crane contributed to the crane coming in contact with the energized 13.8 kV overhead power line:

- the work order did not identify the need for crane usage to perform the doble testing or to install the bushing,

- the guidance for the control of mobile crane operations is provided in multiple procedures and documents (i.e., Accident Prevention Manual and Engineering Evaluations). Site standards for crane operation (i.e., use of boom, use of outriggers, getting out of cab with boom extended) do not exist,

- the pre-job briefing was inadequate in that the various work groups did not have a clear understanding of the job scope, nor were the various group activities coordinated,

- the crane operating engineer did not receive a formal pre-job briefing as to the scope of the crane support necessary

to perform the work (i.e, doble testing and not installation of the bushing),

- the crane operating engineer was certified as a crane operator in accordance with the APS crane operator qualification procedure, however there is no requirement for refresher or continuing training for crane operating engineers, and

- weaknesses were identified pertaining to supervisory involvement during the crane operation. A senior electrician acting in a supervisory capacity was not at the job site at the time of the event.

The cause of the inadvertent tripping of RCP 2B was due to personnel error when the auxiliary operator (AO) accidently turned RCP 2B's local breaker control switch in the open direction. The AO did not remove his hand from the RCP 2B breaker switch after checking for chattering as he leaned over to check the adjacent RCP 1B breaker cubicle indications.

The cause of the unsuccessful attempt to start RCP 1B was that the operator was not cognizant of a preexisting problem with the oil lift pump switch. The cause of the operator not being cognizant of the previously identified problem with the starting interlock for RCP 1B lift oil pump flow was due to the unavailability of procedural guidance that documented the special process required to start the pump.

The cause of RCP 1B tripping on a low speed signal was due to the power not being available to the speed probe circuit prior to attempting to start RCP 1B. Once the power was restored to the speed probe circuit, RCP 1B was successfully restarted. However, the operators did not verify that power to the speed probe circuit was available as required by procedure (Reactor Coolant Pump Operation) prior to attempting to start the RCP.

The cause of pressurizer level exceeding 56 percent was due to the delay in the restoration of letdown flow with charging and seal injection in service. Since nuclear cooling water (NCW) flow is required to enable the opening of the letdown isolation valve, the letdown isolation valve is interlocked with the NCW flow switch. However, following the deenergization of the 13.8 kV busses, power had not been restored to the NCW flow switch. Power is required to activate the NCW flow switch which in turn will allow the opening of the letdown isolation valve. The reactor operator observed proper NCW flow on a control board NCW flow indicator in

the Control Room and determined that the letdown isolation valve could be opened. However, the operator did not recognize that the NCW flow switch was deenergized. At the time of the event, the operators were in an abnormal operating procedure for loss of letdown flow, which did not offer the appropriate guidance to assist the operators in restoring letdown flow in a timely manner (i.e., requirement for power to the NCW flow switch).

J. Safety System Response:

Following the loss of power to Trains A and B Class 1E 4.16 kV busses, the Trains A and B Emergency Diesel Generators started and energized the Trains A and B ESF busses within the Technical Specification time requirement. The load sequencer initiated a Load Shed signal and subsequently resequenced the following safety systems on the respective busses as required by design:

- Control Room Essential Ventilation (VI), Trains A and B,
- Diesel Generator Essential Ventilation (VJ), Trains A and B,
- Essential Battery Chargers and Voltage Regulators reenergized (BYC)(EI),
- Containment Normal Air Handling Units restarted (AHU)(NH),
- Control Element Drive Mechanism Normal Air Handling Units restarted (AHU)(AA)
- Auxiliary Feedwater Pump (P)(BA), Train B (on Train B LOP),
- Essential Cooling Water Pumps (P)(BI), Trains A and B,
- Essential Spray Pond Pumps (P)(BI), Trains A and B, and
- Essential Chillers (CHU)(KM), Trains A and B,

K. Failed Component Information:

Not applicable - no component failures were involved.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

Both trains of the Emergency Diesel Generators started properly and assumed the loads on both trains of the Class 1E 4.16 kV busses. All components operated as designed with no abnormalities. An assessment was performed in accordance with the APS Incident Investigation Program and it was determined that no safety limits were violated and that the event (i.e., loss of offsite power causing loss of forced circulation) is bounded by previous analyses contained in the Updated Final Safety Analysis Report Chapters 6 and 15.

The event did not result in any challenges to fission product barriers or result in any releases of radioactive materials. Other than the

personnel safety concerns, there were no safety consequences or implications as a result of this event. This event did not adversely affect the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

Per plant management directive, all crane usage at Palo Verde stopped until appropriate crane operation guidance was established. A memorandum was issued to all maintenance personnel providing guidelines for lifting near energized lines.

An action plan was developed, approved, and implemented to remove the mobile crane from the bushing laydown area to a quarantined location where a root cause investigation could be safely performed.

An inspection of the 13.8 kV overhead power lines was performed and it was determined that the lines sustained minimal damage that would not affect reenergization or structural integrity of the lines.

B. Action to Prevent Recurrence:

An investigation was initiated in accordance with the APS Incident Investigation Program. As part of the investigation, corrective actions to prevent recurrence were developed.

A night order was issued to emphasize the use of appropriate communication formalities between Control Room personnel and personnel who are not part of the Operations Department. In addition, enhanced emergency communication training will be developed by June 1, 1992.

The investigation determined that the circuit breaker would have tripped when the crane came in contact with the overhead line if the crane had been properly grounded. APS Engineering performed an evaluation of the 13.8 kV ground fault circuit and determined that the circuit performed as designed and the relay settings (ground overcurrent relay) were per industry standards. APS issued a safety briefing to site personnel on the importance of grounding of equipment, such as cranes, that is operated in the vicinity of electrical shock hazards.

The investigation determined that the following actions to prevent recurrence related to the usage of cranes are appropriate:

1. APS revoked the crane operating engineer's site access.

2. A model work order for the replacement of high voltage bushings on the station main transformers will be developed by February 1, 1992. The model work order will include the necessary precautions to ensure mobile cranes do not come in contact with energized lines.

3. APS will evaluate the work planning processes related to crane support for improvement and will develop the necessary administrative controls by March 15, 1992.

4. A procedure pertaining to mobile crane operation at PVNGS will be developed by April 15, 1992.

5. APS issued a safety briefing to site personnel on the importance of pre-job briefings.

6. APS administered appropriate positive discipline to applicable personnel for not using good operating practice and judgement in the areas of supervisory involvement and pre-job briefings.

7. APS will review the pre-job briefing requirements and identify areas for improvement, if applicable, by March 15, 1992.

8. APS has implemented a crane operating training plan.

APS administered appropriate positive discipline to the auxiliary operator who inadvertently tripped RCP 2B for not using good operating practice and judgement.

APS reinforced the requirement for Control Room personnel to stop the performance of an activity (e.g., startup of RCP 1B) if the applicable procedure does not adequately address that activity and to modify the procedure prior to continuing. APS is currently enhancing the procedure modification process to facilitate temporary procedure changes. APS administered appropriate positive discipline to the responsible personnel for not proceduralizing the special process required to start the pump. The RCP 1B oil lift pump switch was subsequently repaired.

APS administered appropriate positive discipline to the reactor operators who did not ensure that power to the speed probe circuit was available, as required by procedure. In addition, a night order was issued to further emphasize the need to ensure compliance with procedures.

The investigation determined that the abnormal operating procedure for loss of letdown flow did not offer adequate guidance to assist the operators in restoring letdown flow in a timely manner (i.e., requirement for power to the NCW flow switch). As a result, the following corrective actions were developed:

1. The abnormal operating procedure will be revised to provide the appropriate guidance by February 28, 1992.

2. Licensed training will be developed to incorporate the "loss of power to the letdown heater NCW flow switch" scenario into initial training by April 1, 1992.

3. In the interim, a night order has been issued to inform the reactor operators of the unique characteristic of the NCW flow switch and flow indication.

APS conducted the scheduled evaluation of the effectiveness of the PVNGS Operating Experience Program. The evaluation concluded that management and supervision did not provide lessons learned information to appropriate front line personnel. Recommendations resulting from the evaluation are being reviewed and considered for implementation.

IV. PREVIOUS SIMILAR EVENTS:

There have not been other previous similar events reported pursuant to 10CFR50.73. Although there have been other events in which a loss of power to the Class 1E 4.16 kV bus resulted in a LOP ESFAS actuation, there have been no similar events in which the cause was due to a mobile crane being in contact with an energized 13.8 kV overhead power line.