STUDENT MANUAL

Site Day 2

Date/Time	Operating Status	Major Equipment Status	Remarks
Day 2	Mode 1 100%	A EDG OOS	AS 3.8.1.1.a entered effective 1200 Day 1 B EDG unloaded run sat at 0230 Day 2
		Offsite Power	East ring bus returned to service 1145 Day 1
		A & B CCP	Documentation found indicating that both centrifugal charging pumps were surveilled per TS 4.5.2.e.2 during the most recent outage.
		P-205A	Surveillance test of the A centrifugal charging pump performed successfully 1155 Day 1.
0400		TDAFWP	TS LCO 3.7.1.2 AS (a) entered to support pump repair. AS exited 2300.

After arriving on-site, you decide to follow your schedule and conduct a plant status tour of the Central Alarm Station (CAS) and the Secondary Alarm Station (SAS). While viewing the video monitors in the CAS, you notice one monitor that normally covers a long section of the Protected Area Boundary is not working. The guard told you (off the record) that this monitor had been out for several days because a replacement video camera was not available. In his view, the supply system was not responsive to security needs.

You proceed to the control room to check plant status. When you arrive, the Shift Supervisor presents you with copies of the most recent operator logs, the equipment out-of-service list and the Operations Manager's night orders. You ask him why he made the copies, and he states that those are the copies you usually made yourself in the mornings and, since the CAS guards called to say you were probably on your way, he though he'd save you the time.

As you walk to your building inside the Protected Area, you notice an object wrapped in plastic and yellow and magenta tape on the back of a flat bed truck. You look inside the truck cab and see the keys in the ignition. Two men are having a discussion at the turbine building about 75 yards away.

You return to your office and check your answering machine and see that there are a number of messages. The first is from the senior who is still sick. The second is from the branch chief who wants to discuss the upcoming regulatory conference with the licensee in two (2) weeks which is open to the public. He also wants to discuss two recent events including the inadvertent, unmonitored gaseous radioactivity release.

The third call is from a local anti-nuclear activist who wants to know how an inadvertent or unplanned gaseous radioactivity release could go unmonitored. She wants to know how the station determined the amount of radioactivity released in the recent event if the discharge was unmonitored. She also wanted to know the expected increase in radiation exposure from this release for the general population living within the emergency planning zone. Finally, she wanted to know whether the operators responsible for this "criminal act" would be punished.

The last call is from the Operations Manager saying that the turbine-driven auxiliary feedwater system (TDAFW) testing after maintenance is to be completed on the pump seal and should take place between 4:00 and 8:00 p.m. today.

As you finish listening to the last recorded call, you notice a Licensee Event Report (LER) on your desk for a problem with the power operated relief valves (PORVs) that occurred during the refueling outage (LER is presented after this narrative). After reading the report (that you knew was coming), you have several questions which are going to require some research:

1. What went wrong with the maintenance and QA organization to allow this to happen?

2. What post-maintenance verification for operability was conducted when the repairs were completed?

3. Who conducted the root-cause analysis before the LER was submitted? The discussion on the cause of the event is very sketchy.

4. Who reviewed the corrective action for complete, comprehensive response to problems beyond the narrow focus of this event? You reminded yourself that IP 71111.19, Post Maintenance Testing, IP 71111.15 Operability Evaluations and IP 71152, Identification and Resolution of Problems might help to look into this event.

You decide to go to the control room to check plant status and review operating logs. The reactor is operating at 100 percent power. The Reactor Operator Log indicated that reactor coolant system (RCS) pressure was reduced from 2250 psig to 1980 psig from 1800 the previous afternoon to 0600 today to seat a leaking pressurizer code safety valve. When you asked the Shift Supervisor about this, he said the leak remained at 5 gallons per minute as determined by an RCS water inventory balance performed under Technical Specification (T.S.) surveillance requirement 4.4.6.2.1.d. after RCS pressure was returned to 2250 psig.

After discussions with Operations Department management, the operators invoked portions of an alarm response procedure to allow them to reduce RCS pressure in an attempt to reseat the leaking code safety valve. That procedure, which had been revised following reactor startup to provide specific guidance for this pressure reduction based on a vendor recommendation, allowed the operators to reduce pressure to as low as 1900 psig to stop the leakage. The vendor recommendation assumed that once the valve reseated at the lower pressure, leakage would not resume when RCS pressure was returned to normal.

While you were talking to the Shift Supervisor, he reminded you that T.S. surveillance requirement 4.6.2.1 verifying containment spray system operability would be conducted starting in about 30 minutes. You meet with the non-licensed operator who is to perform the surveillance and he starts verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

When he gets to valve CS002 on the inlet to containment spray pump P-204B, he finds the valve unlocked with a barely visible safety tag attached to it. The tag states the valve is to be closed in accordance with an isolation worksheet filled out 35 days ago shortly before the plant was started up following the recent refueling outage. The surveillance checklist requires the valve to be locked open. When the operator checks the valve position, he determines that it is closed, removes the tag, and starts to open the valve as required by the surveillance checklist.

You question him about opening the valve and ask that he find out the status of the isolation worksheet which placed the tag there. He tells you that the tagout was executed prior to plant startup for 24 hours to isolate a section of containment spray piping for minor repairs, and the tagout was cleared immediately following the work. The operator saw no reason for leaving the valve in the wrong position, and opened the valve after placing the safety tag in his pocket. You check your watch and realize that you have 15 minutes before a scheduled meeting with the Operations Manager to discuss the reduced RCS pressure operations last night, and you need to get your thoughts

and questions together.

After the meeting with the Operations Manager, you decide to go back to the control room to see the results of the completed containment spray system (CSS) surveillance. You ask to see the checklist. There are no discrepancies listed, and valve CS002 was noted to be in its correct position on the checklist.

While you are in the control room, you check on the status of the repairs to the discharge relief valve on the positive displacement charging pump and the TDAFW pump mechanical seal that were scheduled to be completed during the day shift today. You note that the repairs are on track for completion in time for you to observe post-maintenance testing before you go home.

You also note in the Control Room logs that the train "A" emergency diesel generator is still inoperable as a result of the sticking fuel rack problem that occurred almost 2 days ago. The 72-hour time limit in action statement (b) for T.S. 3.8.1.1 expires at 12:00 on day 4.

After returning to your office, you complete your homework in preparation for observing post-maintenance verification of operability of the TDAFW system and the positive displacement charging pump. IP 71111.19, Post Maintenance Testing and IP 7111.15 Operability Evaluation were reviewed, and you noted applicable inspection steps to ensure that the system and components are capable of performing their intended functions.

When you finish your review of IP 71111.19, you look at the post-maintenance test section of the repair procedure for the discharge relief valve that was given to you yesterday. The procedure calls for filling and venting the positive displacement charging pump discharge header, checking for leakage, lining the pump up as the "running" charging pump, and verifying proper operation for a period of at least one hour. There is no mention of a surveillance or inservice test requirement in the procedure.

When you get to the positive displacement charging pump, you see that it is lined up as the "running" pump and is operating with the "B" centrifugal charging pump in standby in a normal operating lineup. Two operators are observing the operational test. You ask the senior test person if there is any requirement to conduct surveillance or inservice testing. He told you the operational test serves the same purpose as the surveillance test in the technical specifications, and an inservice test is not required because the repairs were minor. You intend to look into this when you get back to your office.

When you arrive on scene for the TDAFW testing, you are told by the test supervisor that safety tags have been cleared, valves and switches are aligned for normal operation, and the TDAFW pump has been refilled and vented. There was no leakage from the shaft seal when the pump was refilled. You are told by the test supervisor that the final test is to run the turbine uncoupled from the pump to check the governor, which was adjusted during the shutdown period. When you question how this tests the operation of the pump, you are told that the pump was observed to turn freely by hand jacking it over, and no leakage was observed. Since the only repairs were to a mechanical seal, no further pump testing was required by licensee procedures. In addition, the supervisor stated that thermal cycles on steam generator feedwater nozzles is an overriding concern for not fully testing the TDAFW system.

You head home and arrive late for dinner with guests. The telephone rings while you are enjoying your brandy after dinner. The Plant General Manager tells you that while conducting TDAFW surveillance test 4.7.1.2.1.c to demonstrate that the pump develops the specified discharge pressure on recirculation flow, the turbine tripped on overspeed and the resultant overpressure cracked the casing of the downstream flow orifice, FO 3123, on the cooling supply line from the second stage impeller of the pump. He also stated his concern that you had insisted this test be conducted. You told him you were merely asking questions to clarify the requirements.

This flow orifice regulates the normal cooling water supply to the TDAFW bearing and lube oil heat exchangers. An alternative cooling water supply from the service water system is now lined up as the backup method, and the TDAFW system has been declared operable while a replacement flow orifice is being obtained from the vendor (see attached summary of this arrangement).

The Plant Review Board (PRB) met and reviewed the safety evaluation required by 10 CFR 50.59. The Board concluded that the shift to service water cooling was only a minimal risk increase and did not meet any of the conditions which would require a license amendment.

The Plant General Manager said a preliminary root cause analysis had been drafted that attributed the turbine overspeed incident to condensate buildup in the turbine steam supply line, which took place while the system was off-line for maintenance.

After the Plant General Manager hangs up, you recall that the steam supply system had been modified specifically to prevent turbine overspeed from condensate in the steam supply. You now wonder if the licensee was premature in declaring the system operable without further investigation including a root cause analysis. Your guests leave at 23:15, and you return to the plant to look into this matter.

LICENSEE EVENT REPORT (LER)

FACILITY NAME
TROJAN

TITLE
Pressurizer Power Operated Relief Valve Inoperability

EVENT DATE

9/15

OPERATING MODE
6

POWER LEVEL
0.0

ABSTRACT

During the most recent RFO, with the plant in mode 6 with the reactor vessel head removed, Power Operated Relief Valves (PORVs) PCV 455A and PCV 456 were found to be inoperable due to a leak in the diaphragm assembly. During the previous refueling outage, the PORV diaphragms were replaced with a new type made of different material and of a changed shape (see attached drawing). A lubricant was needed to help install the diaphragms due to the changed shape. The lubricant was believed to have allowed some extrusion of the diaphragm from between the base and the cover away from the bolt holes. The extrusion caused tears at several bolt holes and allowed the bolts to loosen over time and air to escape.

BACKGROUND INFORMATION

The Trojan T.S. 3.4.9.3 requires, in part, that two PORVs be operable: (1) in mode 4 when the temperature of any RCS cold leg is less than or equal to 290°F; (2) at all times in mode 5; and (3) in mode 6 when the head is on the reactor vessel and the RCS is not vented through a 3.4 square inch or larger vent. The T.S. Bases for Limiting Safety System Settings, Section 3/4.4.3, indicates that maintenance should be performed on PORVs to eliminate seat leakage during the next refueling outage after leakage is detected during mode 1, 2, or 3 operation.

EVENT DESCRIPTION

During the previous RFO (one fuel cycle ago), with the plant in mode 6 and defueled, the PORVs were disassembled, repaired, and reassembled to correct excessive seat leakage. The method used to install new diaphragms created the potential for the loss of airtight integrity in the valve actuator, making it impossible for the valves to fully open (the loss of air through the leaks which developed resulted in insufficient air pressure inside the actuator to overcome spring tension which tended to force the valve closed). The problem was corrected during the most recent RFO, following failure of the valves to pass surveillance test 4.4.3.2.1.a, full-stroke cycling with the block valves closed.

CAUSE OF THE EVENT

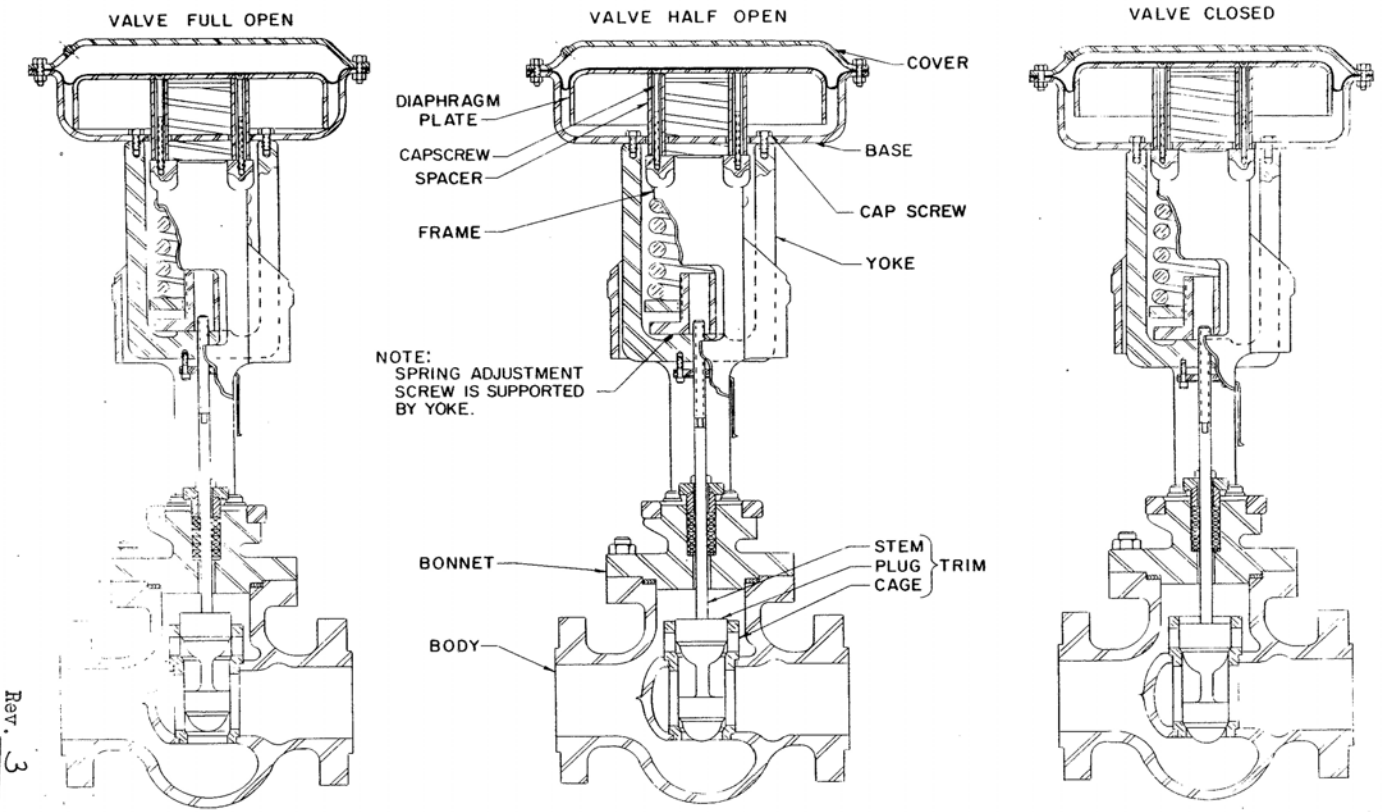
The cause of the technical specification violation as a result of PORV inoperability was human error. The valve reassembly procedure did not provide precautions to the maintenance technicians to ensure that the diaphragm was not damaged.

SAFETY ASSESSMENT

This event is reportable under 10 CFR 50.73(a)(2)(I)(B) because a condition existed that is prohibited by the plant's technical specifications.

CORRECTIVE ACTION

Subsequent disassembly and reassembly of the valves was completed successfully after consultation with the valve vendor. A cautionary note was written into the procedure to alert the technician to the possibility for damaging the actuator diaphragm, thereby, preventing the valves from opening.



REVERSE ACTING

FIGURE-2

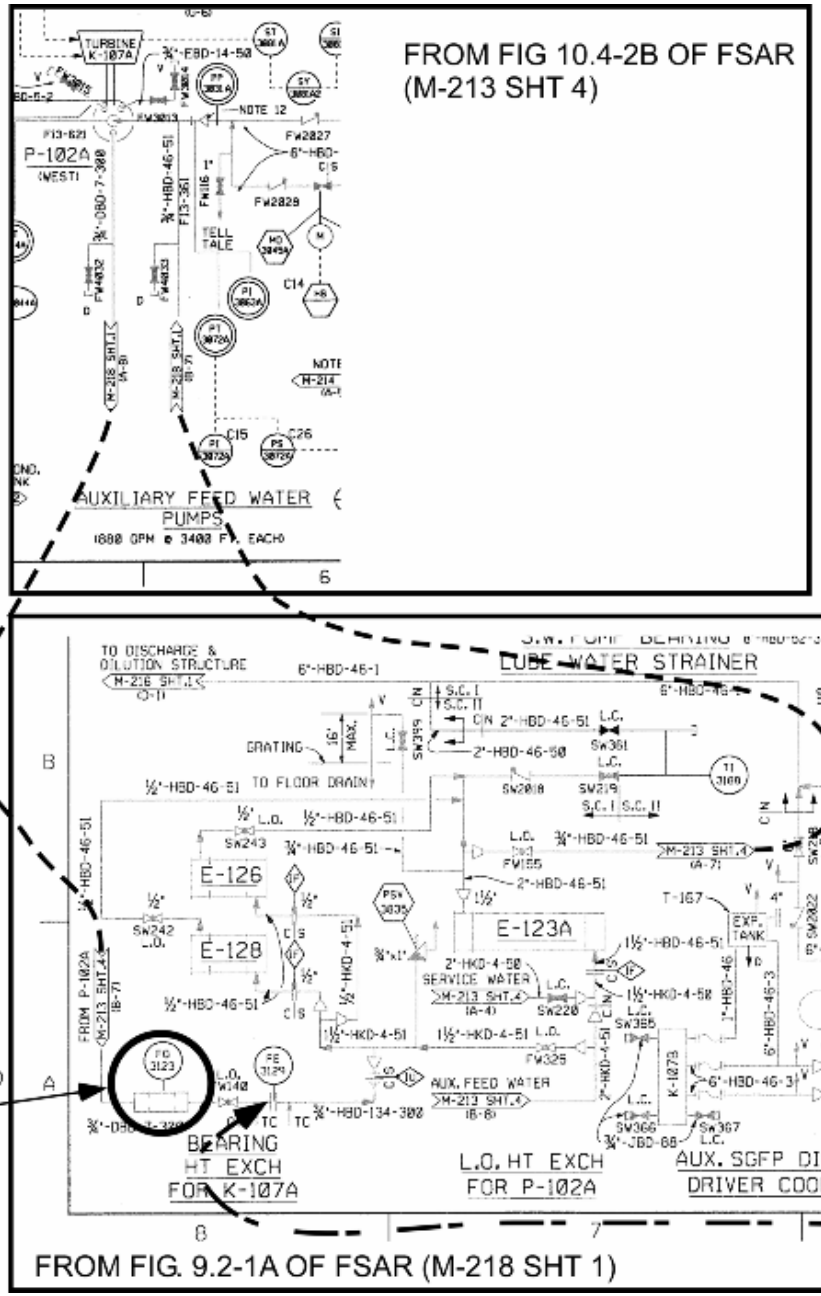
Rev. 3

14

NO.	DATE	REVISIONS	BY	CHK.	NO.	DATE	REVISIONS	BY	CHK.

COPES-VULCAN, INC.
LAKE CITY (ERIE CO.), PA. U.S.A.

DRAWN	DATE	JOB NO.	
CHECKED Neel	DATE 7-30-70		
APPR. GDH	DATE 7-30-70	SCALE	
PART CODE	DWG. NO. L-144874		REV.



SUMMARY OF TEMPORARY MODIFICATION

1. FO-3123 ISOLATED BY LOCKING CLOSED FW-140
2. ORIFICE FLANGE FOR FE-3129 BROKEN OPEN.
3. TEMPORARY MATING FLANGE WITH INSTALLED NIPPLE INSTALLED ON D/S FLANGE FOR FE-3129.
4. HOSE RUN FROM D/S OF SW-4021 (A-5 OF FIG 9.2-1A) TO NIPPLE ON TEMPORARY MATING FLANGE.
5. FW-155 (B-7 OF FIG. 9.2-1A) LOCKED CLOSED TO ISOLATE AUX. FEEDWATER FROM SERVICE WATER.
6. SW-4021 LOCKED OPEN TO PROVIDE SERVICE WATER SUPPLY TO HEAT EXCHANGERS.
7. SW-219 AND SW-361 (B-7 OF FIG. 9.2-1A) LOCKED OPEN TO ESTABLISH SERVICE WATER RETURN FLOW TO DISCHARGE AND DILUTION STRUCTURE.