

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-173-001 There was a possibility of leaks and wrong Class of fittings in the Diesel Generator Building Number 5.	X		ERT Report IN-85-173-001 evaluated the concern by the same number. Their findings were, "The CI overheard a conversation about possible leakages in the 5th Diesel Generator Building sprinkler system. The hydrostatic test report for this system . . . was reviewed which did not identify any leakage . . . a field walkdown was conducted which verified how the proper fittings were installed." This evaluation concurs with the PMO findings.	None	None	
IN-85-964-X06 Craft personnel used "Superglue" instead of "Permatex" to seal gas-kets to flanges.	X		NSRS Report I-85-677-WBN documented the evaluation of concern IN-85-964-X06. Their findings in part were, (1) . . . adhesives had not been used by crafts or permitted by the QC inspectors unless it was specified by the responsible engineer on the flange bolting operations sheets . . . . The only case observed on the records called for the use of Permatex. (2) No one in-	None	None	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-964-X06 (Continued)			interviewed was aware of "Superglue" ever being used for sealing gaskets to flanges. (3) The gaskets are normally held in place by the flange bolt studs and the craftsman doing the work until the flanges are bolted in place. Unless the installation was a very unique situation, an ad- hesive would not be benefi- cial. (4) Nuclear Power's procedure TI-35 . . . was approved for use . . . (5) The only quick setting adhesive stocked on OC's warehouse was a product called "Tite Seal." It was identified as a cyanoacry- late-type adhesive." This report concurs with the NSRS findings.			
IN-85-089-007 The wrong size ex- pansion joint was installed on a 10 to 12-inch stain- less steel (SS) pipe in the "argon pit" in the Aux- iliary Building, unit 2.	X		The concern which cited "the wrong size expansion joint is installed on a . . . pipe in the "Argon Pit" in the Auxiliary Building, unit 2 . . . the Argon Pit is east of the south valve room one level below elevation 757" was not found factual. No area/room called the "Argon Pit" was found to	None	None	



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IN-85-089-007 (Continued)			exist at the plant nor was an area/room found in the described locations that could have been construed as an "Argon Pit."			
IN-85-352-003, IN-85-793-003, IN-85-982-003, IN-86-184-002, and IN-86-184-004	X		Five employees raised con- cerns about a subject that was not a problem. Al- though the subject of the concerns was not a problem, the fact that five individ- uals perceived that a prob- lem existed implied that the CIs were ignorant of the governing criteria and implementing procedures. (CATD 17105-WBN-02)	Lack of effective communica- tion between parties.	In all five of these instances there were extenuating circum- stances which tended to make some aspects of the installation look suspicious to employees not inti- mately involved in the unique engineer- ing details of each situation. Estab- lishment of regular employee involvement meetings, along with the current manage- ment philosophy of giving quality, in- depth answers to all employee questions and concerns should reduce or eliminate this type of miscon- ception in the future.	
Different schedules of pipe were welded together.						

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-86-282-004 and WI-85-053-012 Pressure tests were not applied on many NPP-1 ASME Code data forms for con- tainment penetra- tions. The pene- trations were in- stalled and hydro- static tests were never verified and documented.	X		NCR 6420 on the subject of uninspected hidden contain- ment penetration vendor welds was still open. (CATD 17105-WBN-03)	See corrective action.	1. TVA is waiting for the results of a NRC investigation on TVAs use-as-is disposition of NCR 5609. 2. If the NRC agrees, NCR 5609 will be closed. 3. If they disagree, TVA will initiate a revision to the FSAR to explain what occurred. 4. If the NRC will not accept the FSAR revision, the unit 1 penetra- tions will be checked for leaks. 5. NCR 6420 will be closed when all penetration assem- blies listed on NCR 6420 have been checked.	
			The generic evaluation of WBN NCR-6420 to SQN had not been performed. The SQN Codes and Standards Unit was to complete the evaluation, document the findings, and initiate corrective action by	The cause for the delay in evaluation of this potentially generic CAQ to SQN was	The generic evalua- tion was completed by the PORS organization 1-15-87. The evalua- tion concluded that the WBN CAQ was not applicable to SQN because of a differ-	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-86-282-004 and WI-85-053-012 (Continued)			August 16, 1986. (CATD 17105-SQN-02)	because of the SQN Design Project not performing the evaluation according to procedure OEP-17 R3, but attempting to transfer the respon- sibility for the evaluation of this potential CAQ to the ONP Site Director's Organiza- tion. The SQN Site Director was also at fault for neither accepting nor reject- ing this responsi- bility.	ence in Design. The applicable section of SQNs FSAR was in dis- agreement with this conclusion and was to be changed to concur under PIR SQNNEB8638. When it was asked that SQNs corrective action plan be coor- dinated with the other sites. SQN responded that this was not necessary. SQNs CAP was accepted as stated; however, CATD 17105-NPS-01 was issued to address this issue and its root cause on a corporate level.	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-86-282-004 and WI-85-053-012 (Continued)			The Potential Generic Condition Evaluation of NCR-6420 R0 to BFN had not been performed. Contrary to the governing procedure (OEP-17 R3), the BFN Design Project did not determine if this CAQ existed at BFN, nor did they implement a tracking program for meeting the stated two week timeframe. The BFN Design Project attempted to trans- mit the responsibility for evaluating the BFN applicability of this CAQ to the ONP Site Director. The BFN ONP organization had no procedure/program for performing this evalua- tion and no attempt to do so had been made. (CATD 17105-BFN-01)	The cause for the delay in evaluation of this potentially generic CAQ to BFN was because of the BFN Design Pro- ject not performing the evaluation according to procedure OEP-17 R3, but attempting to transfer the respon- sibility for the evaluation of this potential CAQ to the ONP Site Director's Organiza- tion. The BFN Site Director was also at fault for neither	A PIR has been written to address NCR-6420 R0. Correc- tive action for this PIR will evaluate the disposition of this CAQ and ensure that any condition which may exist at BFN is properly documented. Future occurrences of this description should be alleviated by the implementation of the CAQR program March 30, 1987.	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-86-282-004 and WI-85-053-012 (Continued)				accepting nor reject- ing this responsi- bility.		
			Contrary to their response to WCR-6420 RO Potential Generic Condition Evaluation memorandum B45 860311 255, BLN had not revised QCP-10.4 nor CTP-7.6 to require their inspectors to specifically examine hidden penetration vendor welds during hydrostatic testing.	The cause for BLN not revising their applicable QCPs requiring their inspectors to specif- ically examine the welds in question during hydrostat testing, as stated in their response to the Poten- tial Gener- ic Condi- tion Evalu- ation mem- orandum, was attri- buted to a miscommuni- cation between the	Pending	



ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-86-282-004 and WI-85-053-012 (Continued)				cognizant DNE and DNC engineers.		
			The generic evaluation of the root cause of NCR 6420 to TVA corporate had not been performed. (CATD 17105-NPS-01)	No vehicle existed under the applicable Corrective Action program for this evalu- ation to have taken place.	A new potential generic condition evaluation will be performed for each site in accordance with NEP-9.1. The results will be re- viewed to determine if a generic root cause exists that resulted in this con- dition occurring at other sites. If a generic root cause exists, a CAQR will be generated. In addition, an evalua- tion of the Tube Turns contract will be performed to de- termine the sequence of events that re- sulted in the condi- tion occurring at each site in order to determine if this condition is an iso- lated case or an engineering process deficiency exists.	

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ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-442-X10 The repair of the cooling tower blow-down patches under FCR-3376 did not work very well.		X	The patched section of the cooling tower blowdown line was included in the ongoing evaluation to determine whether or not leakage in that line was indeed a problem. (CATD 17105-WBN-01)	None	The piping downstream from the tee to the yard pond was replaced with 48-inch concrete pipe by CCN C-47R3. The 66-inch fiberglass pipe downstream of the tee to the river is being replaced with 72-inch concrete pipe under ECN 6455. The pipe from the cooling tower to the tee is under observation. Should future leakage develop, corrective action will be taken.	
IN-85-211-001 The ERCW line coming from the pumping station to the Reactor Building has had a leak for approximately two months.	X		NSRS Report I-85-118-WBN, dated July 12, 1985, evaluated concern IN-85-211-001 which cited that the "ERCW line coming from pumping station to Reactor Building has had a leak for approximately 2 months." The NSRS evaluator reviewed the applicable drawings, the FSAR, the past year's MRs, performed a system walk-down, and contacted a number of cognizant individuals. The NSRS evaluator found no supporting evi-	None	None	

Executive Summary Table #1

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-211-001 (Continued)			dence of the cited leak nor of the other accusations cited in the concern. This evaluation concurred with the NSRS report findings.			
IN-86-055-002 There was a leaking pipe on elevation 692 in the Auxil- iary Building, unit 1 side.	X		This concern could have been factual; however, no evidence of the leak existed at the time of the NSRS evaluation. Adequate plant instructions were in place to address this type of normal maintenance activity as several leaks on that elevation had been addressed under MRs during the concern timeframe.	None	None	
IN-86-205-001 The ERCW intake pipelines could have been damaged due to excessive testing after the mortar liner was installed.	X		Based on interviews with cognizant personel, an MR review, and a review of applicable ERCW hydrotest packages, the NSRS evalua- tor found no evidence of improper ERCW hydrostatic test conduct or the use of excessive pressures. This evaluator concurred with the NSRS findings.	None	None	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-210-001 Engineers failed to fill out documentation (hydrostatic testing) in accordance with procedural requirements resulting in unnecessary rework because of lack of appropriate objective evidence.		X	Following is a summary of the PMO evaluations: All those hydrostatic tests completed before December 1980 were reviewed by a task force and any that were not acceptable were identified and dispositioned by NCRs. Since that time <u>all</u> safety-related systems both mechanical and instrumentation are tested and documented by the individual test packages which require a detailed review and approval to ensure all requirements are included before the test. After the test is completed, the same test packages are reviewed again to ensure test objectives were achieved and all requirements properly documented. My review of the 17 test packages previously stated did not find any discrepancies of documentation not completed, hold points bypassed or test data not included, or two completely different tests with the same identification and revision level. This evaluation concurred with the PMO findings.	None	None	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-534-005 The unit 1 fire protection hydro was improperly conducted by running the pump throughout the test to maintain test pressure.	X		This concern was factual but technically and procedurally acceptable. The NSRS evaluation found that this practice was acceptable according to all applicable codes and procedures. This evaluation concurred with their evaluations.	None	None	
IN-85-820-001 There was a 2-inch SS pipe rubbing against an access ladder in the unit 2 Reactor Building.		X	The concern was not factual. Walkdowns of both the unit 1 and unit 2 cited interference locations revealed the required clearance at both locations.	None	None	
WI-85-096-001 A large diameter pipe in the unit 1 radiochemical lab may have been deformed.	X		This concern was not found factual. No obvious defects were found in the round ventilation duct; however, flow rates in the non-QA vent system were found deficient. The necessary exhaust hood velocities were obtainable and were being verified under Engineering Section Letter (ENSL) M1.9 by the ONP Mechanical Test Unit (MTU).	None	None	



ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
XX-85-068-001 Bellefonte - Two pressure gages were over pressurized prior to performance of Phase 2 of Hydrostatic Test IKC H001. These gages were not properly recalibrated, and Phase 1 of the hydrotest was not reperformed, despite ANI request to do so. NCR 3075 dispositioned this test.	X		This concern was factual; however, it was not a problem. The hydrostatic test deficiency was well documented in the hydro package, an NCR was written, corrective action was recommended by TVA and approved by the ANI, and the NCR was closed.	None	None	
BNP-QCP-10.35-8-14 The employee's work has been with the Fire Protective Sprinkler System. Most recently, it has been to correct the slope of the pipes in the Auxiliary Building and other areas. The specifications called for a 2-percent tolerance in the slope, but it should have been on a downward slope, not upward as some were	X		The concern was not factual. FPS piping was not sloped for gravity feed as cited but for gravity drain after actuation/testing.	None	None	

Executive Summary Table #1

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
BNP-QCP-10.35-8-14 (Continued) installed. The system is a gravity feed system. They were correcting this problem. (BLN)						
BNP-QCP-10.35-8-15 CI concerned that air in FPS pipes could react with water and rust pipes and valves. He felt system should be charged with water at all times. (BLN)	X		This concern was factual; however, the fact was not considered a problem. The system was designed, constructed, inspected; and maintained in accordance with NFPA guidelines and NRC specifications. Also, industry experience has shown that tuberculation is not a serious problem.	None	None	
IN-85-868-003 The perceived problem was that mixed connections located in the "Pipe Chase Building" did not meet the requirements of the American Institute of Steel Construction (AISC) Code.	X		Site CEU personnel stated that these miscellaneous structural connections were mostly grating (platform) supports, both welded and bolted, found in the pipe chase area and were commonly referred to as "mixed connections."  CEU personnel indicated	None	None	

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-868-003 (Continued)			<p>that the miscellaneous steel grating (platform) connections were shown on the 48N1210 and 48W1213 series of drawings. It was also noted that the installation parameters, as called for on the drawings, were very broad and allowed considerable flexibility with respect to final installation configuration.</p> <p>A review of the WBN FSAR revealed all structural steel installed in Category I structure was required to meet AISC Code requirements. A review of the design drawings for miscellaneous steel platforms revealed that all structural steel fabrication and erection in Category I structures to be in accordance with the AISC Code.</p> <p>A review of other existing documentation revealed that in the 1981 through 1983 timeframe: NCRs were initiated to document questionable fillet weld quality on miscellaneous steel in Category I structures, questionable configuration</p>			

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-868-003 (Continued)			<p>of platforms, ladders, and stairs in Category I structures and potential over-stressing of miscellaneous steel installations.</p> <p>The dispositions of these NCRs included a platform sampling program at WBN where DNE evaluated identified discrepancies. Drawing changes and field rework were performed when required to correct these deficiencies.</p> <p>Summarization of these information revealed a comprehensive exercise to correct identified deficiencies with respect to structural steel installations in the pipe chase area(s).</p> <p>A further review of the applicable drawings revealed numerous revisions to incorporate by Field Change Request (FCR) and ECN those changes required as a result of the aforementioned NCRs.</p>			

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-868-003 (Continued)			<p>A general review of the AISC Code Manual, specifically, part 4 on connections, was performed. Of those details reviewed, no deviations/discrepancies were noted between the AISC requirements and those connection details shown on the applicable design drawings referenced above. The AISC Code Manual did not specifically address "mixed connections."</p> <p>The parameters of the NCRs and other documentation addressed previously in this report were discussed with site CEU personnel. This discussion indicated that the applicable drawing notes had been revised to allow more latitude with respect to the structural steel connections employed especially in the pipe chase areas.</p> <p>Interface with personnel in the Civil Engineering Design Branch (CEDB) indica-</p>			



Executive Summary Table #1

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-868-C03 (Continued)			<p>ted that all structural steel connections in the pipe chase areas were <u>designed</u> in accordance with the AISC Code. It was also noted that <u>typical</u> (standard detail) AISC type connections were not employed on a regular basis because of the congestion and diversified configurations required in these areas.</p> <p>Field evaluation of approximately 20 miscellaneous structural connections in the south end of the unit 1 pipe chase was made by the evaluator and CEU individual. This physical evaluation revealed no installations outside the scope of the applicable drawing configurations and drawing notes. Several AISC typical connections were found as shown on the applicable drawing as well as numerous variations to these typicals as allowed by the drawing notes.</p> <p>Based on the results of this evaluation, the statement made by the CI in the subject concern could not be verified as being</p>			

ISSUES	SR	NS	FINDINGS	CAUSE	CORR ACT.	COLLECTIVE SIGNIFICANCE
IN-85-868-003 (Continued)			factual. No evidence was found to indicate that structural steel mixed con- nections in the pipe chase area do not meet the design requirements of the AISC Code. (Note: This evalua- tion did not address weld quality. Weld quality con- cerns were addressed by the Weld Project.)			

## 1.0 CHARACTERIZATION OF ISSUES

### 1.1 Introduction

This subcategory report addressed employee concerns related to various mechanical aspects of the Tennessee Valley Authority's (TVA's) construction programs at Watts Bar (WBN), Sequoyah (SQN), Browns Ferry (BFN), and Bellefonte (BLN) Nuclear Plant sites.

Forty-four concerns were addressed within the Construction-Mechanical subcategory. Of these, 41 were raised confidentially through the Quality Technology Company (QTC) while the remaining three concerns were raised during Exit Interviews with employees leaving BLN under a Reduction In Force (RIF).

The problems perceived by the employees were related to six issues normally considered in the mechanical engineering discipline: valves; heating, ventilating, and air conditioning systems (HVAC); mechanical equipment; insulation; pipe/fittings; and mixed structural connections.

All of the concerns described below were specific to WBN unless otherwise noted.

### 1.2 Description of Elements

#### 1.2.1 Valves

Eight concerns were categorized and evaluated within the valves element. They were related to hydrostatic testing, orientation, clearance, material substitutions, and maintenance of valves. The perceived problems were:

##### (a) Hydrostatic testing

IN-85-719-001

During the 1979 hydrostatic test of a thirty-six-inch main steam line, the valve which isolated the turbine leaked. This valve was located in the south valve room.

IN-86-284-002

Valves V329 and V330 in the In-core Instrument Building were pressure tested by air in 1980; however, these valves should have been hydrotested.

1.2.1 Description of Valves Elements (continued)

(b) Orientation

XX-85-094-007

Limitorque valves at BLN were not stored nor installed in the correct attitude, nor were they maintained properly.

IN-85-055-N04

An emergency hand valve was incorrectly installed at SQN.

(c) Clearance

IN-85-463-003

Sheet metal cover box could not be installed over an electrical penetration in the unit 2 In-core Instrument Room due to interference with either Flow Control Valve (FCV)-30-20 or FCV-30-58.

EX-85-034-001

Mechanical discrepancies existed on motor operated valves.

(d) Material Substitutions

IN-85-169-001

A two-inch Class B valve was installed in a unit one Class A system.

(e) Maintenance

BNP-QCP-10.35-8-17

Some of the valves in BLN were rusted, some from leaking air conditioners, etc. They were okay inside, but just looked bad.

1.2.2 HVAC

Two concerns were categorized and evaluated within the HVAC element. The perceived problem areas were HVAC fire dampers and ductwork.

1.2.2 Description of HVAC Elements (continued)

(a) Fire dampers

EX-85-046-001

The fire dampers in Diesel Generator Buildings 1 and 5 had never been observed to operate properly.

(b) Ductwork

IN-85-879-001

The inspections done in 1981 on the air supply and return wall ducts for the unit one Ice Condenser System revealed that a number of the ducts were blocked, restricting the air flow through the ducts.

1.2.3 Mechanical Equipment

Five concerns were categorized and evaluated within the Mechanical Equipment element. The perceived problems were:

(a) PH-85-035-004

A tank in the Auxiliary Building, elevation 713, unit one, was over pressurized by approximately 200 psi. This caused a bulge in the tank at an angle iron band. The tank was bought-off by Engineering because it could not be removed for repair.

(b) IN-85-559-001

Neutron detector boxes, in-core reactor two, elevation 713 or a little above. The 40-inch by 30-inch boxes were shown on the Westinghouse drawing but were fabricated and installed onsite (1974/1975).

(c) IN-85-070-001

There was a possible cracked sleeve through the crane wall around the reactor coolant system piping in unit one. The concerned individual (CI) did not know which loop or whether it was around the hot leg or cold leg piping.



1.2.3 Description of Mechanical Equipment Elements (continued)

(d) IN-86-311-001

Bellows were installed without proper paperwork in the annulus area behind the north fire room in the summer of 1985.

(e) IN-86-205-002

Engineering personnel were allowed to give bad technical direction to the craft on unit two Feedwater Heaters (numbers one and two, on elevation 692). Both work and final hardware adequacy were affected by technical misdirection, including inaccurate "shooting-in" of heater centerlines by engineers.

1.2.4 Insulation

Three concerns were categorized and evaluated within the insulation element. The perceived problems were:

(a) IN-85-186-001

The high pressure 24-inch and 48-inch steam lines for both units were insulated incorrectly by North Brothers Contractors. The metal insulation covering overlaps one-inch which did not comply with the specification that the metal edges touch without overlap.

(b) IN-85-008-002

Some insulation over ceiling plate: and cable tray supports in the Auxiliary Building, elevation 737, was installed contrary to procedure in the fall of 1984. The slits in the material were directly over one another instead of at least 90-degrees apart.

(c) PH-85-003-004

There was no insulation between pumps on elevation 692.

1.2.5 Pipe/Fittings

Twenty-five concerns were categorized and evaluated within the pipe/fittings element. They were further categorized into the following pipe/fitting related issues: temporary support, material substitutions, leaks, hydrostatic testing, clearance, configuration, and procedure violation. The perceived problems within each pipe/fittings issue were:

1.2.5 Description of Pipe/Fittings Elements (continued)

(a) Temporary Support

IN-86-200-004

The CI observed a 100-foot to 150-foot run of 30-inch o.d. pipe drop in the Turbine Building three to 4-inches when a hanger was removed under a work package.

(b) Material Substitutions

1. IN-85-352-003, IN-85-793-003, IN-85-982-003, IN-86-184-002, and IN-86-184-004

Different schedules of pipe were welded together.

2. IN-85-211-002 and IN-85-211-001

The Essential Raw Cooling Water System (ERCW) was designed to be stainless; however, it was not constructed of stainless.

3. IN-85-964-002 and PH-85-035-001

Temporary materials/lines were put into permanent service without proper documentation.

4. Three specific concerns:

(a) IN-85-173-001

There was a possibility of leaks and wrong Class of fittings in the sprinkler system in the Diesel Generator Building Number 5.

(b) IN-85-964-X06

Craft personnel used "Superglue" instead of "Permatex" to seal gaskets to flanges.

(c) IN-85-089-007

The wrong size expansion joint was installed on a 10 to 12-inch stainless steel (SS) pipe in the "argon pit" in the Auxiliary Building, unit 2.

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1.2.5 Description of Pipe/Fittings Elements (continued)

(c) Leaks

1. IN-85-442-X10

The repair of the cooling tower blowdown patches under FCR-3376 did not work very well.

2. IN-85-211-001

The ERCW line coming from the pumping station to the Reactor Building has had a leak for approximately two months.

3. IN-86-055-002

There was a leaking pipe on elevation 692 in the Auxiliary Building, unit 1 side.

(d) Hydrostatic Testing

1. IN-86-205-001

The ERCW intake pipelines could have been damaged by excessive testing after the mortar liner was installed.

2. IN-85-210-001

Engineers failed to fill out documentation (hydrostatic testing) in accordance with procedural requirements resulting in unnecessary rework due to lack of appropriate objective evidence.

3. IN-85-534-005

The unit 1 fire protection hydro was improperly conducted by running the pump throughout the test to maintain test pressure.

4. XX-85-068-001

BLN - Two pressure gauges were over pressurized prior to performance of phase 2 of hydrostatic test 1KC H001. These gauges were not properly recalibrated, and phase 1 of the test was not performed again, despite the ANIs request to do so. NCR 3075 dispositioned this test.

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1.2.5 Description of Pipe/Fittings Elements (continued)

(e) Clearance

IN-85-820-001

There was a 2-inch SS pipe rubbing against an access ladder in the unit 2 Reactor Building.

(f) Configuration

1. WI-85-096-001

A large diameter pipe in the unit 1 radiochemical lab may have been deformed.

2. BNP-QCP-10.35-8-14

Incorrect slope on the Fire Protection System (FPS) piping (concern specific to BLN).

3. BNP-QCP-10.35-8-15

Air in the FPS pipes could react with water and rust pipes and valves. The system should be charged with water at all times (concern specific to BLN).

(g) Procedure Violation

IN-86-282-004 and WI-85-053-012

Pressure tests were not applied on many NPP-1 ASME Code data forms for containment penetrations. The penetrations were installed and hydrostatic tests were never verified and documented.

Buried penetrations have vendor welds that were not inspected during hydro tests.

1.2.6 Mixed Structural Connections

IN-85-868-003

One concern was evaluated within this element. The perceived problem was that mixed connections located in the "Pipe Chase Building" did not meet the requirements of the American Institute of Steel Construction (AISC) Code.

2.0 SUMMARY - This section has been deleted.

3.0 EVALUATION PROCESS

3.1 Evaluation Methodology

The perceived problems/issues within this subcategory were evaluated under the guidelines of four Construction-Mechanical Evaluation Plans, one for each site. Different evaluation methodologies were required at each site since the issues raised by the concerns were not always generically applicable to all sites. The evaluation methodologies generally consisted of the following steps:

- (1) Review the concern, as stated, and all related information contained in the Employee Concerns Task Group (ECTG) files.
- (2) Perform a document review for relevant procedures, requirements, reports, memoranda, etc.
- (3) Perform walkdowns of applicable systems, hardware, facilities, etc.
- (4) Interview personnel who were knowledgeable/cognizant of relevant issues.

3.1 Evaluation Methodology

Thirty-nine concerns were evaluated at WBN within six elements: (1) Valves, (2) HVAC, (3) Mechanical Equipment, (4) Insulation, (5) Pipe/Fittings, (6) Mixed Structural Connections. Four of these concerns were deemed potentially generically applicable to and evaluated at SQN (within the valves and pipe/fittings elements). Two of those concerns were also deemed potentially generically applicable to and evaluated at both BFN and BLN. Four additional site specific concerns were also evaluated at BLN (also within the valves and pipe/fittings elements). A breakdown of the evaluation criteria used for each element at each site is given below.

3.1.1 Valves

WBN

a. Hydrostatic Testing

Main Steam system flow diagram 47W801-1 Revision 20.

Process Specifications 3.M.9.1, Revision 6, dated February 8, 1985, of General Construction Specification G-29M, Section 9.2, "Hydrostatic Testing."

Main Steam Isolation Valve (MSIV) vendor manual (contract 83080).

MSIV contract 76K 38-83080 QA.

Hydrostatic Test Package 1-031-47W865-5-2-04 dated October 10, 1982.

Hydrostatic Test Package 1-031-47W865-5-2-10 dated November 23, 1983.

Containment Leak Rate Test TVA-2C, Revision 0, dated January 28, 1982.

Engineering Change Notice (ECN) 3861.

Nonconformance Report (NCR) WBN NEB 8306.

Informal "Main Steam Unit 1 Hydrostatic Test" report, June 24-28, 1979.

b. Orientation of Limitorque Valve Operators

Code of Federal Regulations, Title 10, Part 50 (10 CFR 50), Appendix B, Section V.

Engineering Design Administrative Instruction, EN DES AI-1, June 1, 1983, paragraph 7.4.6.

WBN QC procedure (QCP), WBN QCP-1.52, Revision 6, "Preventative Maintenance".

WBN DNC Standard Operating Procedure (SOP)-26, Revision 2, "Preventative Maintenance on Non-QA Equipment".

Mechanical Maintenance Section Letter (MSL)-2.2, May 22, 1985, paragraph 4.0.



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Memorandum MEB 81 1125 040 from Manager of Engineering Design to WBN Project Manager.

WBN TVA Informal Memorandum from the WBN Construction Engineer to Resident Inspector, WNC, WBN, dated October 15, 1981, paragraph 2.

Qualification Maintenance Data Sheet (QMDS) Binder WBNEQ-MOV-001, sheet 3 of 7.

WBN Quality Control Instruction (QCI)-1.36, Revision 13, "Storage and Housekeeping," paragraph 6.3 and 6.4.22.

Limitorque Vendor Manual, contract 826695, "Instruction and Maintenance Manual," dated November 27, 1979, "Installation Tips" section.

American National Standards Institute (ANSI) N45.2.2-1972, paragraph 6.4.2, "Care of Items."

WBN Quality Control Test (QCT)-3.06-2, Test 45.

SOP-14 Revision 2, paragraph 6.5.1, "Inspection of Non-QA Electrical Equipment".

Administrative Instruction (AI)-9.2, Attachment 11, Revision 17, dated March 28, 1986, ". . . ."

c. Valve Clearance Problems

General Construction Specification, G-43.

WBN Operations Section Letter (OSLA)-27, Revision 18, "AUO Work Stations."

QCP-4.10-9, Attachment A, "Test number 70 cards level A and B, for valves 2-FCV-6290 and 133, "Valve Installation Inspection."

Work Releases 26608 and 26609, dated January 31, 1986, and February 5, 1986, "Replacement of Limitorque Spring Compensator Housings."

Final report for 10 CFR 50.55e deficiency item  
WBRD-O-391/82-18 (A27 831122 005) dated  
November 22, 1983.

d. Material Substitutions

Nuclear Safety Review Staff (NSRS) report I-85-169-001  
dated July 10, 1985.

Significant Condition Report (SCR) WBN MEB 8523.

Memorandum from the WBN Project Manager to the Director,  
NSRS, dated July 19, 1985.

Memorandum from Director, NSRS, to the WBN Site Director  
dated November 29, 1985.

Engineering Change Notice (ECN) 5841 and Work Plan (WP)  
5841-1.

QCP-4.10.9, Test 70 card for 1-062-RB-X-CKV-661 dated  
April 5, 1982.

SQN

Only issues b. and c., "Orientation of Limitorque Valve  
Operators" and "Valve Clearance Problems", were applicable to  
SQN.

• Orientation of Limitorque Valve Operators.

Limitorque Vendor Manual 826695 1603.

Administrative Instruction AI-36, Revision 9; "Storage,  
Handling, and Shipping of QA Material".

3.1.1 Valves Evaluation Methodology, SQN (continued)

Maintenance Instruction MI-10.46, Revision 3; "Limitorque Operators Corrective Maintenance Procedure for SB-00, SMB-000, and SMB-00 Actuators".

SQM-62, Revision 2; "10 CFR 50.49 Program: Qualification Maintenance Data Sheets (QMDS) Implementation Environmental Qualification Deviation Report and Category II Upgrade Control."

SMI-0-317-16, Revision 2; "Special Maintenance Instruction; Field Verification of Limitorque Electric Motor Operated Data."

SMI-0-317-19, Revision 2; "Limitorque Motor Operator/Control Valve."

Surveillance Instruction SI-166, Revision 10, "Summary of Valve Tests for ASME Section XI Units 1 and 2."

Surveillance Instruction SI-166.6, Revision 21; "Post Maintenance Testing of Category A and B Valves Unit 1 and 2."

Technical Instruction TI-69, Revision 10; "Summary of Pre- and Post-Maintenance Valve Tests for ASME Section XI and 10 CFT 50 Appendix J, Units 1 and 2, Revision 10."

SQN Standard Practice SQA-122, Revision 0; "Non-CSSC Equipment Performance Assurance Program."

Administrative Instruction AI-19 (part IX), Revision 17; "Plant Modifications After Licensing."

SQN Standard Practice SQM-1, Revision 5; "Sequoyah Nuclear Plant Maintenance Program."

Standard Practice SQM-2, Revision 18; "Maintenance Management System."

• Valve Clearance Problems.

WBN OSLA-27 Revision 18, Operations Section Letter, "AUO Work Stations."

3.1.1 Valves Evaluation Methodology (continued)

BFN

Only Item b., "Orientation of Limitorque Valve Operators", was applicable to BFN within the Valves Elements. The evaluation criteria utilized was:

BFN Standard Practice (BF)-7.12, dated September 1, 1985, "Maintenance Program for Maintaining 10 CFR 50.49, Harsh Environment Equipment in Qualified Status."

Electrical Maintenance Instruction (EMI)-99, "Qualification Maintenance for Valve Actuators in Accordance with QMDS."

Mechanical Maintenance Instruction (MMI)-87, Revision 2, "Preventative and Corrective Maintenance of Limitorque Valve Operators."

Standard Practice BF-16.4, "Material, Components, and Spare Parts Receipts, Handling, Storage, Issuing, Return to Storeroom, and Transfer."

NUC PR Standard TS 01.00.15.14.03, Revision 0, "Equipment and Material Storage Requirements for Nuclear Power Stores."

Standard Practice BF PMI-6.2, Revision 0, "Conduct of Maintenance."

Standard Practice BF-7.11, Revision 1, "Preventive Maintenance Scheduling System".

Electrical Maintenance Instruction EMI-16 Revision 2, "CSSC Limit Switch Gear Box Lubricant Replacement."

Electrical Maintenance Instruction EMI-18 Revision 0, "Limit and Torque Switch Adjustment for CSSC Motor Operated Valves."

Electrical Maintenance Instruction EMI-105 Revision 4, "Motor Operated Valve Analysis Test System" (MOVATS).

Standard Practice BF7.1, "Activity Control - Maintenance Associated Activities."

Nuclear Quality Assurance Manual NQAM-II, 2.1 Revision 0, "Plant Maintenance, Model Procedure."

3.1.1 Valves Evaluation Methodology, BFN (continued)

Memorandum from Manager, Site Planning and Financial Services, BFN, to Manager, Environmental Qualification Project, BFN ((R01 860519 916). "EQ Material Warehouse Space."

BLN

Item b., "Orientation of Limitorque Valve Operators" along with a BLN specific concern related to "Valve Maintenance" were evaluated at BLN within the Valves Element.

- Orientation of Limitorque Valve Operators.

10CFR50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."

Division Procedures Manual (DPM) N82M3 dated May 19, 1982, "Limitorque Valve Operator and Limit Switch Lubricant Problems"; from the Director of Nuclear Power, to the Manager, Nuclear Production and Power Plant Superintendents, All Nuclear Plants (relative memorandums were included in this DPM).

NRC Information and Enforcement Notice 79-03, "Longitudinal Weld Defects in ASME SA-312 Type 304 Stainless Steel Pipe Spools Manufactured by Youngs Towne Welding and Engineering Company," dated March 12, 1979.

Discrepancy Report BLN-DR-85-76-R relative to initial inspection of Limitorque operators upon initial transfer to ONP as required by Standard Practice BLA-7.8.

BLN Standard Practice BLA-7.8, Revision 6, "Responsibility for Transferred Equipment."

BLN DNC Quality Control Procedure QCP-1.3 Revision 8, "Preventative Maintenance."

BLN Standard Practice BLA-9.4 Revision 8, "Storage of Procured Material."

- Valve Maintenance (BLN specific)

BLN Standard Practice BLA-10.1 Revision 0, "Preparation of Maintenance Request."

3.1.1 Valves Evaluation Methodology, BLN (continued)

BLN Standard Practice BLM-10.2 Revision 6, "Processing and Scheduling Maintenance Requests."

BLN Standard Practice BLA-7.6 Revision 2,  
"Construction/NUC PR Maintenance Interface."

ONP "Employee Concerns Procedure" ECP-1.

BNP PNC Quality Control Procedure QCP-10.35 Revision 3 and Revision 5, "Allegations/Employee Concerns/Differing Opinions."

Memorandum (U00 860109 804) from Plant Manager, BLN Nuclear Plant; to Project Manager, BLN Nuclear Plant; response to employee concern 8-17.

BLN Standard Practice BLA-14.7 Revision 17, "Specialized Training."

BLN Standard Practice BLM-3.4 Revision 7, "Preventive Maintenance Control Program."

BLN Standard Practice BLN-3.1 Revision 9, "Identification and Tabulation of Preventive Maintenance and Lubrication Requirements."

BLN Standard Practice BLM-3.5 Revision 3, "Performance of Preventive Maintenance Tasks."

BLN Maintenance Code Book, Revision 6.

Memorandum (MEB 840517 008) from Project Manager, BLN Design Project; to Project Manager, BLN Nuclear Plant; "Maintenance Program Requirements for Class 1E Limiting Operators - Standalone Quality Information."

3.1.2 HVAC

WBN

a. HVAC Ductwork

Nuclear Safety Review Staff (NSRS) Investigation Report I-85-757-WBN of concern EX-85-046-001.

Unit 1 Preoperational Test Instruction W10.9, "Ice Condenser Containment."



3.1.2 HVAC Evaluation Methodology (continued)

b. HVAC Fire Dampers

Maintenance Request (MR) Q-231000 dated January 9, 1984. This MR initiated a test on the air Handling Units (AHU) and ductwork for the u-1 Ice Condenser System.

System Description N3-61-4001, Ice Condenser System.

SQL

No issues within the HVAC Element were evaluated at SQL.

BFN

No issues within the HVAC Element were evaluated at BFN.

BLN

No issues within the HVAC Element were evaluated at BLN.

3.1.3 Mechanical Equipment

WBN

a. Overpressurization of Volume Control Tank

Nonconformance Report (NCR) 3877R Revision 1 and NCR 6379 Revision 0.

b. TVA Ironworkers Fabricated Items on Westinghouse Drawing

WBN Project Manager's Office response to concern IN-85-559-001 dated August 2, 1985.

QTC response (QTC NS-File number 1064) from ECTG request for information on concern IN-85-559-001 dated March 12, 1986.

c. Possible Cracked Sleeve

(QTC) Response (QTC NS-File number 1064) from ECTG request for information on concern IN-85-070-001 dated March 12, 1986.

3.1.3 Mechanical Equipment Evaluation Methodology, WBN (continued)

d. Bellows Installed Without Proper Paperwork

NCRs 6631, Revision 0, 6473-S Revision 0, 6630 Revision 0, 6173 Revision 0, 6173 Revision 1, 6633 Revision 0, 6420 Revision 0, 6209 Revision 0, 6259 Revision 1, and 6447 Revision 0 were all relative to bellows installation or damage.

SQL

No issues within the Mechanical Equipment Element were evaluated at SQL.

BFN

No issues within the Mechanical Equipment Element were evaluated at SQL.

BLN

No issues within the Mechanical Equipment Element were evaluated at SQL.

3.1.4 Insulation

WBN

a. Pipes Insulated Contrary to Specifications

PMO Response to concern IN-85-186-001 dated June 24, 1985.

TVA Contract Specification 2967 (Contracts 71C62-S4462 and 76K72-820594).

b. Supports Insulated Contrary to Procedure

NSRS Evaluation Report I-85-667-WBN for concern IN-85-186-001.

NRC Letter SECY-85-306 dated September 17, 1985, enclosure 5, section 3.2.2.

Problem Identification Report (PIR) WBNMEB 8618.

c. No Insulation Between Pumps

Mechanical Design Guide DG-M18.9.1, section 1.2, Insulation.

3.1.4 Insulation Evaluation Methodology (continued)

SQL

No issues within the Insulation Element were evaluated at SQL.

BFN

No issues within the Insulation Element were evaluated at SQL.

BLN

No issues within the Insulation Element were evaluated at SQL.

3.1.5 Pipe/Fittings

WBN

a. Temporary Support

PMO report for concern IN-86-200-004 (no date or revision number available).

General Construction Specification G-43 Revision 7, section 3.0.

b. Material Substitutions

QTC NS File number 1062, dated March 12, 1986, response from QTC relative to a request for additional information on concern IN-85-964-002.

NSRS Report I-85-680-WBN relative to mixed schedules of pipe welded together.

NSRS Reports I-85-118-WBN and I-85-166-WBN relative to Essential Raw Cooling Water (ERCW) system piping materials.

Employee Response Team (ERT) Report IN-85-173-001.

NSRS Report I-85-677 WBN which documents the evaluation of concern IN-85-964-X06, "Craft personnel use "Superglue" instead of "Permatex" to seal gaskets to flanges."

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3.1.5 Pipe/Fittings Evaluation Methodology, WBN (continued)

ONP Transfer Drawings 47W845-2 Revision 1 and 47W832-2 Revision 0 for system 67, ERCW, and system 26, High Pressure Fire Protection (HPFP).

System 77 (Waste Disposal System) flow and physical drawings 47W830-1 Revision 19, 47W852-2 Revision 7, 47W560-25 Revision 4, 47W560-1 Revision 26, 47W852-3 Revision 9L, 47W852-4 Revision 11L, 47W479-8 Revision 9, 47W479-9 Revision 13, 47W560-1 Revision 30, and 47W830-1 Revision 22.

QCP-4.10-2, "Pipe Location Verification" (line and grade).

Waste Disposal System Pipe Segment Identification Maps 0-077-47W879-8-1 Revision 0 and 0-077-47W879-3-1 Revision 0.

Division of Engineering and Construction (DEC)-QCP-2.2 Revision 0, "Concrete Placement and Documentation"; paragraphs 6.5.1 and 6.5.4.

Pour cards for pours A B-C1, C4, C5, and C6 to elevation 670, dated March 15, 1974.

c. Leaks

Field Change Request (FCR)-F3376, Cooling Tower Blowdown piping repair plate.

Drawing 17W 303-1 Revision 0 which showed the typical 18-inch repair plate referenced in FCR-F3376.

PMO report IN-85-442-X10 for the concern by the same number.

NSRS report I-85-414-WBN dated November 20, 1985 documented an evaluation of a leaking pipe on elevation 692 in the Auxiliary Building.

Administrative Instruction (AI)-9.2 Revision 17, "Maintenance Requests (MRs) and Equipment Maintenance History."

Computer Sort of Mechanical Maintenance MRs between July 31, 1985 and October 30, 1985.

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3.1.5 Pipe/Fittings Methodology, WBN (continued)

NSRS Report I-85-118-WBN dated July 12, 1985 relative to concern IN-85-211-001.

d. Hydrostatic Testing

NSRS Reports I-85-598-WBN and I-85-398-WBN relative to concerns IN-85-205-001 and IN-85-534-005.

PMO Report IN-85-210-001 relative to concern IN-85-210-001.

General Construction Specification G-29, Section 9.2, Process Specification 3.M.9.1 Revision 6, dated February 8, 1985, "Hydrostatic Test Acceptance Criteria."

WBN-QCT-4.37 Revision 4, "Hydrostatic Testing" and Addendum 1 to QCT-4.37 Revision 4 dated April 2, 1986.

e. Clearance (physical)

Construction Specification N3C-912 Revision 3, "Support and Installation of Piping Systems in Category I Structures," paragraph 6.3.6.5.

QCP-4.10-2 Revision 9, "Pipe Location Verification," paragraph 7.1.4.

Drawing 47W813-1 Revision 30, system 68 flow drawing.

f. Configuration

No applicable documentation for this issue.

g. Procedure Violation

NCR-5609 Revision 0 dated April 27, 1984 relative to lack of documented hydrostatic tests of vendor welds on containment penetrations.

NCR-6420 Revision 0 dated October 28, 1985 relative to NCR 5609 Revision 0.

Memorandum B26 860429 014 from DNE to DNC.



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3.1.5 Pipe/Fittings Evaluation Methodology (continued)

SQN

Two of the concerns identified at WBN in the Pipe/Fittings Element, within the material substitutions and procedure violations issues (b. and g.), were evaluated at SQN.

- Material Substitutions

NSRS Reports I-85-166-WBN and I-85-118-WBN.

Marked-up as-built drawings of the 47W450 and 47W845 series were reviewed to determine physical status of piping change-out on the ERCW system inside the plant buildings.

Drawings for SQN, 17W302-series, were reviewed to determine original design and as-built status of pipes on ERCW system yard piping.

Engineering Change Notices (ECN)-L5009, ECN-L6534, and ECN-L6560.

- Procedure Violations

NCR-5609 Revision 0; dated April 27, 1984; and NCR-6420 Revision 0, dated October 28, 1985.

Generic Implication Memorandum B45 860311 258 (NCR 6420) from Chief of Nuclear Engineering to SQN Engineering Project Manager (Those Listed).

BFN Standard Practice BF-21.17 dated February 4, 1986, "Review, Reporting, and Feedback of Operating Experience Items."

BFN Site Directors Standard Practice (SDSP)-15.2 Revision , dated August 29, 1985, "Handling of Engineering Reports from Division of Nuclear Engineering."

Office of Engineering Procedure OEP-17 Revision 3, "Corrective Action," dated March 28, 1986.

BFN Plant Manager's Correspondence Tracking Program, (item number R35-860326-021).

Engineering Procedure EN DES-EP 1.26 Revision 7, dated April 24, 1984 (all nuclear plants), "Nonconformances - Reporting and Handling by EN DES."



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3.1.5 Pipe/Fittings Evaluation Methodology (continued)

BLN

One WBN identified concern in the Pipe/Fittings Element, G. Procedure Violation, was evaluated at BLN. In addition, three BLN specific concerns were evaluated at that site.

- Hydrostatic Testing (Two BLN specific concerns)

Component Cooling System Hydrostatic Test Procedure Package 1KC-H001, page 93 A.

NCR-3075 Revision 0, against component cooling hydro procedure 1KC-H001 dated complete on September 12, 1984.

BLN Standard Practice BLS-3.5 Revision 4, "Periodic Testing of Fire Protection Systems and Equipment."

BLN DNC Concern file for concern number QCP-10.35-8-15.

NRC APCS BTP, Appendix A, paragraph 9.5-1, "Guidelines for Fire Protection."

Memorandum 84 0104T0 426 from Manager, Nuclear Licensing, to Chief, Nuclear Engineering Support Branch, titled "WBN units 1 and 2 - TVA Compliance with Appendix A to the BTP 9.5-1, Guidelines for Fire Protection."

- Procedure Violation (WBN)

NCR-5609 Revision 0, dated April 27, 1984 and NCR-6420 Revision 0 dated October 28, 1985.

Generic Implication memorandum B21 860325 001 to the above listed Generic Implication Memorandum from Acting Project Manager, BLN Engineering Project, to Chief Nuclear Engineer.

BNP Construction Test Procedure (CTP)-7.6 Revision 5, Attachment A, "Hydrostatic Test Procedure Package."

- Configuration (one BLN specific concern)

BLN DNC concern file for concern number QCP-10.35-8-14.

National Fire Protection Association (NFPA) Guidelines, Section 13, paragraph 3-10.1.3, "Drainage."

3.1.5 Pipe/Fittings Evaluation Methodology, BLN (continued)

10CFR50.48 "Fire Protection, 10 CFR 50 Appendix R Section III.G, III.J, III.O, and 10 CFR 50 Appendix A, Criterion I.3, "Fire Protection."

BLN QCP-6.22 Revision 2, "Mechanical Fire Protection."

TVA General Construction Specification G-73, "Inspections Testing, and Documentation Requirements for Fire Protection Systems and Features."

3.1.6 Mixed Structural Connections

WBN

Miscellaneous steel drawings 48N1210 and 48W1213 series.

WBN Final Safety Analysis Report (FSAR) Volume 5, Section 3.8.4.5.2.

NCRs 2375R, 3579R-R1, and 3659R relative to questionable fillet weld quality on miscellaneous steel, questionable configuration of platforms, and potential overstressing of miscellaneous steel installations.

American Institute of Structural Steel (AISC) Code Manual, Part 4, "Connections."

SQN

This Element, Mixed Structural Connections, was not evaluated at SQN.

BFN

This Element was not evaluated at BFN.

BLN

This Element was not evaluated at BLN.

#### 4.0 FINDINGS

##### 4.1 Valves Findings

###### 4.1.1 Generic

###### Discussion

The eight concerns addressed within this element cited valve problems in the areas of hydrostatic testing, orientation, clearance, and material substitutions. One concern in the area of orientation was substantiated and a concern in the area of material substitutions was found to be factual. (ECTG Subcategory MC-40300, Material Control-Installation, addressed "Valve Substitution" concerns; however, they were not related to the valve material substitution concern addressed in this subcategory.) None of the remaining six concerns were found to constitute problems.

Relative to Valve Orientation; a BLN concern, Limitorque valve operators were not oriented nor maintained properly, was found applicable to all sites as they all utilized Limitorque valve operators.

The preferred Limitorque valve operator orientation was defined by Limitorque, the vendor, in the Limitorque "Instruction and Maintenance Manual" (TVA contract B26695) dated November 27, 1979, page 3, under "Installation Tips," "Do mount motor on horizontal plane, if possible. It is preferred to keep motor on limit switch compartment from hanging down. This prevents head of grease being against motor or switch seals." DNE was responsible for specifying the installed orientation of the operators per EN DES AI-1 dated June 1, 1983, paragraph 7.4.6, "The Mechanical Design Group . . . provides drawings required by CONST and NUC PR . . . determines equipment requirements . . . reviews specifications and vendor drawings." DNE stated their position on Limitorque valve operator orientation in memorandum MEB 811125 040 from Manager of Engineering Design, to OEDC WBN Project Manager, "We have looked into the question of operator orientation. The Limitorque instructions gave a preferred orientation and further stipulated that the operator be mounted so that the motor and limit switch compartment are not hanging under the gear box and thus not having a head of grease above them. TVA has not written instructions to prohibit this since Limitorque

4.1.1 Valve Findings, Generic (continued)

engineering has stated that the operator can function in any orientation. However, for seismic design purposes, the preferred orientation for valves is vertical to the pipe run which would put the motor and the limit switch compartment in a horizontal plane with the gear box." Also, a WBN TVA informal memorandum from the WBN Construction Engineer, to Resident Inspector, NRC WBN dated October 15, 1981, paragraph 2, stated in part, "It has always been EN DES policy to position the valve as recommended. However, due to space limitations and many other variables it is not always possible to meet the recommendations." Conversations with the cognizant DNE engineers supported these statements. Relative to this subject, SQN Equipment Qualification (EQ) Binder SQNEQ-MOV-001, "MVOP's-Inside Containment," dated September 11, 1985, sheet 5 of 11 stated, "With respect to mounting and orientation . . . the mounting position of the actuator was chosen with the limit switch compartment up and the motor horizontal. Other orientations are also qualified; however, it is important to note that it is preferred to keep the motor and limit switch compartments from hanging down... For installed equipment orientations where the motor or switch compartment hangs down, plant maintenance and surveillance activities and intervals should be increased."

It is important for the reader to understand the purpose and scope of the EQ Binders. The EQ Binders are DNE's vehicle for specifying what actions each site must take to qualify electric equipment important to safety and maintain their environmentally (the environmental conditions at the location where the equipment must perform under conditions existing during and following design basis accidents) qualified equipment in a qualified state as required by 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants." At the time of this report, the EQ Binders had only been issued for SQN. The other sites had access to the SQN Binders for information and expected their Binders to be very similar. These "EQ Binders" were more specific than the former Qualification Maintenance Data Sheets (QMDS). The QMDS were DNE's former vehicle for site notification of EQ requirements and were the implementing documents of 10 CFR 50.49 for all sites but SQN at the time of this writing.

4.1.1 Valve Findings, Generic (continued)

Whereas the QMDS and EQ Binders governed orientation and preventative maintenance requirements of EQ Limitorque valve operators, another upper-tier document addressed those aspects of non-EQ operators. That document was a TVA NUC PR Division Procedures Manual (DPM)-N82M3 dated May 19, 1982 (Cancelled October 7, 1985). "Limitorque Valve Operator and Limit Switch Lubricant Problems." It was issued from the Director of Nuclear Power to the Power Plant Superintendents, All Nuclear Plants. It was denoted as a "NUC PR Requirement" and was a compendium of prior memorandums on the subject (L23 801119 823, L23 810112 938, and MEB 811125 040). The text of the DPM follows:

On numerous occasions, swollen motor leads have been discovered on Limitorque operators at TVA plants as well as other utilities' plants. Investigation revealed that lubricant separation caused oil to leak past shaft seals into the limit switch compartment and onto the motor leads. The lubricant separation was attributed to: (1) the type of lubricant being used, (2) the valves remaining idle for long periods of time, and (3) orientation of the valve operator. It has also been determined that improper screw length on the limit switch assembly has allowed oil leakage into the limit switch compartment.

In order to ensure that your Limitorque operated valves will function when required, the following shall be incorporated into your appropriate plant procedures.

- A. Perform a visual inspection of Limitorque operators in conjunction with valve maintenance to determine if any oil leakage exists and if any motor leads or control wiring have been exposed to oil. If it is determined that an oil leakage problem does exist on a valve, you shall:
  1. Evaluate the orientation of the operator and determine if it can be reoriented in the vertical position. If it can be reoriented, contact the Nuclear Central Office Electrical Equipment Group (EEG) for evaluation of cost effectiveness.



4.1.1 Valve Findings, Generic (continued)

2. Install Polyolefin sleeves on motor leads that are susceptible to oil leakage and replace any internal control wiring which has been exposed to oil.
3. Replace the present lubricant (if other than Exxon Nebula EP 1) in the operators located inside the containment or other harsh environments with Exxon Nebula EP 1 (see Note 1).
4. Replace the lubricant in the operators located outside containment or not in harsh environments with Exxon Nebula EP 1 or Exxon Nebula EP 0 (see Note 1).

Note 1: Clean the operator of all lubricant with an approved solvent from DPM Number N80E1 before adding the new lubricant.

5. When performing maintenance on the limit switch assembly, verify proper screw length when mounting the assembly to ensure secureness. Also, lockwashers shall be added to prevent loosening of the assembly.

B. Limit Switch Lubricant Problems

Some nuclear plants (including BFN) have experienced problems with the Beacon 325 lubricant being used in the limit switch gear boxes on Limitorque valve operators. When used in environments where the temperature exceeds 140°F, the Beacon 325 lubricant dries out and hardens. This results in improper lubrication and a possibility of gear damage and valve failure.

Mobil grease 28 has been accepted by the Limitorque Corporation as a replacement for the Beacon 325 lubricant. The Mobil grease 28 meets the same qualification parameters as Beacon 325; however, the net effect of using this replacement lubricant will be a longer service life because of its superior temperature rating.

Spot checks on the lubricant of limit switches located in high temperature areas (140°F or above) will be performed at least once every other operating cycle. If the Beacon 325 shows signs of hardening or drying, then it shall be replaced with Mobil grease 28 and the limit switches in the remaining high-temperature area motor-operated valves shall be inspected.



4.1.1 Valve Findings, Generic (continued)

Note 2: Clean the limit switch of all lubricant using an approved solvent from DPM Number N80E1 before adding the new lubricant.

Notify this office when you have incorporated this procedure into your appropriate plant instructions, and this procedure will be canceled.

Paragraph A.1. of DPM N82M addressed Limitorque operator orientation. The remainder of the DPM addressed operator maintenance. In addition to the maintenance activities required by the DPM, the vendor manual also recommended preventative maintenance activities on page 3, under "Installation Tips": (1) "Do connect space heaters if unit is to be stored in a damp place prior to installation." and (2) "Do set up periodic operating schedules for Limitorque control if valve is infrequently used." The QMDS and SQN EQ Binders specified the preventative maintenance activities required to maintain the sites EQ Limitorque operators in a qualified state.

The specific QMDS (WBN QMDS, Volume 1, Manual Number 9, U-1, October 3, 1985, Revision 0) qualification maintenance requirements were: "at least every 18 months . . . (1) Remove limit switch compartment cover . . . dry the compartment and components. (2) Inspect and clean all electrical controls and contacts . . . (3) Check all terminal connections for tightness. (4) Clean gasket surfaces . . . replace all damaged gaskets and seals. (5) Inspect lubricants for quantity, quality, and consistency . . . (6) Megger the motor . . . (7) Clean and lubricate the valve stem where applicable." According to the cognizant DNE and ONP system engineers, these were generic qualification maintenance requirements.

The SQN EQ Binders were formatted differently than the QMDS and contained the following "Essential" equipment maintenance requirements as well as "Recommended" surveillance and recommended preventative maintenance activities. The "Essential" maintenance requirements were, in part; "(2) Main gear case shall . . . contain only Exxon Nebula EP-O or EP-1 lubricant . . ." and "(6) Limit switch grease shall be Beacon 325 or Mobile 28 . . ." The lubrication, maintenance, and surveillance intervals were "not to exceed 36 months."

The recommended surveillance activities were, in part:

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4.1.1 Valve Findings, Generic (continued)

(1) Verify that flow path from T-drains and grease reliefs are unobstructed. . . (2) Megger the motor. . . (3) Inspect insulation materials for brittleness and discoloration. (4) Time valve operation and measure motor amps. . . (5) For actuators built before 1974, inspect spring pack for grease buildup. (6) Inspect shaft seals and penetrations for signs of failure and subsequent lubricant leakage. . . (7) Inspect switch blocks and rotors for cracks. (8) Record torque switch setting. The recommended preventative maintenance activities were, in part: (1) Lubricate the zerk fittings in the housing cover with Nebula EP-0 or EP-1. (2) Remove limit switch compartment cover. Remove accumulation of dirt and moisture. . . (3) Inspect and clean electrical contacts. . . (4) Check all terminations for tightness. (5) Clean and lubricate valve stem in rising stem applications. . . (6) Check main gear case lubricant to ensure proper amount. . . , presence of foreign matter, and consistency. . . Grease must be Exxon Nebula EP-0 or EP-1. . . (7) Check the geared limit switch lubricant to ensure proper amount, presence of foreign matter, and consistency. Grease must be Beacon 325 or Mobile 28. . . (8) When seals require replacement . . . only VITON seals shall be used. . . (9) Verify presence of a gap between the "L" bracket and finger of the limit switch . . . .

These EQ Binder surveillance and maintenance requirements were for SQN only at the time of this writing; however, these requirements were expected to be implemented at the other sites in the near future, replacing the QMDS.

Relative to the proper storage of Limitorque valve operators, Appendix B to 10 CFR 50, "Quality Assurance Criteria for Nuclear Power Plants," section XIII, "Handling, Storage, and Shipping," stated in part, "Measures shall be established to control the handling, storage, shipping, cleaning, and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. When necessary for particular products, special protective environments . . . shall be specified and provided."

The TVA Nuclear Quality Assurance Manual (NQAM), Part III, section 2.2, Revision 0 "Receipt Inspection, Handling, and Storage of Materials, Components, and Spare Parts" specified the inspection, handling, and storage requirements for Nuclear Power Stores. Paragraph 5.2.1.4 stated in part, "The originator of the purchase request or his representative

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4.1.1 Valve Findings, Generic (continued)

shall . . . specify any special handling or storage requirements where applicable to materials, components, and spare parts. Paragraph 5.4.1, "Storage Facility," stated in part, "The following controls shall be imposed as a minimum: 5.4.1.1 - The temperature in the permanent storage facility shall be maintained between 40°F and 140°F. The facility shall be provided with uniform heating and temperature control or its equivalent to prevent condensation or corrosion. . . ." Also, paragraph 5.4.2, "Packaging and Storage Environment," stated in part, "As a minimum the following shall be considered: 5.4.2.5 - space heaters enclosed in electrical items shall be energized as specified by the manufacturers." And "5.4.2.9 - Other maintenance requirements specified by the manufacturer's instruction for the item shall be performed." Paragraph 5.4.2.6 stated that additional specific storage requirements were delineated in PMP Number TS 01.00.15.14.03 (DPM N82A17). Procedure Number TS01.00.15.14.03 Revision 0, "Equipment and Material storage Requirement for Nuclear Power Stores," section V stated in part, "Inspection, tests, and maintenance performed on a periodic or planned basis ensures the integrity of the item and its storage conditions. Specific requirements are given in section 7. . . ." Paragraph 7.26 addressed Limitorque valve operators. It established the "minimum requirement for storage and periodic inspection and maintenance." The relative specific requirements were: "STORAGE AREA - Indoor controlled . . . PHYSICAL STORAGE AND PACKAGING CONDITIONS . . . Store motor-operated valves with the motor in a horizontal position to prevent possibility of oil leaking into the motor case . . . PERIODIC INSPECTION OR MAINTENANCE - None . . . SPECIAL INSTRUCTION - Limitorque Valve Assemblies - Do not attempt to lift the valve assembly by lifting lugs secured on the motor operator. . . ."

One aspect of the proper maintenance on Limitorque operators was the utilization of trained maintenance personnel. Appendix B to 10 CFR 50, criterion II, stated in part, "The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained." NQAM, Part III, section 6.1, "Selection and Training of Personnel for Nuclear Power Plants," and the Division of Construction Quality Assurance Program Manual, OC QAPP2, "Quality Assurance Program," were the applicable implementing documents for the training requirements of Power maintenance personnel and Construction maintenance personnel respectively.

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4.1.1 Valve Findings, Generic (continued)

NQAM, Part III, Revision 0, section 6.1, paragraph 5.4.3.3, "Electrical and Mechanical Maintenance Craftsmen," stated, "The training for electrical and mechanical maintenance craftsmen are delineated in PMP 0202.08." PMP Number 0202.08 Revision 0, section 6.1, "Electrical Maintenance Craftsmen Training [REQUIREMENTS]," and section 6.2, "Mechanical Maintenance Craftsmen Training [REQUIREMENTS]," both stated that "initial training should be completed before an individual performs independent maintenance or safety-related systems or components." According the scope of PMP 0202.08, it applied to "permanently assigned individuals" (ONP) in the Electrical and Mechanical Maintenance sections at BFN, SQN, and WBN. The requirements did not apply to BLN personnel until "12 months before fuel loading."

OC QAPP 2, Revision 8, Addendum Number 3, stated that the OC Quality Training Program Manual (QTPM) provided the OC program for the training of personnel performing activities affecting quality in compliance with Criterion II of 10 CFR 50, Appendix B. Paragraph 7 stated in part, "Personnel who have not satisfactorily completed all training required to enable independent performance may perform activities under the supervision of trained/certified personnel. . ." Paragraph 9, "Work Assignments," went on to state "Craft supervision . . . , Engineering supervision, and Quality Control supervision shall be responsible for ensuring that the personnel in their organizations who are assigned to a particular work package or plan are trained to the requirements of the work involved in that package or plan."

Conclusion

In the valves element, one concern or issue was determined to be potentially generic to all sites. That was the issue of Limitorque valve operators not being oriented or maintained properly. The terms "proper orientation" and "proper maintenance" were found to be defined generically by various TVA corporate and vendor documentation.