4.1.1 Valve Findings, Generic (continued)

The vendor, Limitorque, specified the "preferred" orientation as the limit switch compartment up and the motor on the horizontal plane. This "preferred" orientation should not be confused with the "proper" orientation that is the orientation which conforms to established requirements/specifications. DNE had the responsibility of specifying installed orientation according to design drawings based on reviews of specifications and vendor information. Limitorque Engineering had stated that the operator could function in any orientation and DNE specified in the latest EQ Binders that other orientations were also qualified; however, for installed equipment where the motor or switch compartment hangs down, plant maintenance and surveillance activities and intervals should be increased. Proper orientation, therefore, was defined as "any orientation." Based on this fact, the issue of Limitorque operator orientation was not addressed on a site specific basis (except for stored orientation).

The DNC generic procedure applicable to the storage and preventative maintenance of Limitorque valve operators was QAPP 13, Revision 2, "Handling Storage and Shipping." This program policy assigned responsibilities and established requirements "for the handling, storage, cleaning, packaging, shipping, and preservation of items to prevent damage or loss and to minimize deterioration." It applied to items under the CONST Quality Assurance Program before, during, and after installation (applicable only to WBN and BLN). Paragraph 7.2 stated in part that Nuclear Construction Projects and sites shall develop, maintain, control, and execute project level procedures which implement upper-tier requirements and office level policy and procedure requirements for the handling, storage, and shipping program.

The proper maintenance of Limitorque valve operators was found to be a complex and multifaceted issue. It involved maintaining and storing the operators in accordance with established requirements/specifications and the utilization of trained maintenance personnel. The maintenance specifications varied according to whether the valve operator was CSSC-EQ, CSSC non-EQ, or non-CSSC non-EQ. The storage specifications were the same in all three cases. The Limitorque valve operator maintenance requirements were further complicated by changes in those requirements mainly resulting from main gear box lubrication separation. This caused oil to leak past shaft seals into the limit switch and

4.1.1 Valve Findings, Generic (continued)

motor compartments and the ensuing contamination of the electrical components. Over a period of years (1980 to 1982), a number of memorandums were written between SQN, WBN, DNE, and the vendor in an effort to resolve the grease separation and leakage problems. In May of 1982, a DPM was issued to each site requiring certain inspection and maintenance activities for resolution of this problem as well as a lubricant problem experienced with the limit switch gear box lubricant. This DPM applied to all classes of operators.

The generic storage requirements (both installed storage and warehouse storage) for non-CSSC non-EQ operators were delineated by the Limitorque vendor manual. Technical Standard TS 01.00.15.14.03 (DPM N82A17) was applicable to the storage of non-CSSC as well as CSSC operators (according to NQAM Part III, Revision 0, section 2.2) in Nuclear Power Stores.

This Technical Standard's (TS) specifications for Limitorque valve operator storage were inadequate based on NQAM, Part III, section 2.2, paragraph 5.4.2.9, and TVA DPM recommendations. The TS specified that NO periodic inspection or maintenance was required; however, Limitorque suggested that a periodic operating schedule be set up for valver in storage. The referenced section of the NQAM stated, "Other maintenance requirements specified by the manufacturer's instruction for the item shall be performed." Also, DPM Number N82M3 cited the type of lubricant used (other than Exxon Nebula EP-0 or EP-1) and valves being idle for long periods of time as causes for lubricant separation problems and subsequent motor lead damage. Based on these recommendations/requirements, the preventative maintenance activities specified in the DPM and the vendor manual should be listed in TS 01.00.14.14.03 under "Periodic Inspection and Maintenance" for Limitorque valve operators.

The proper maintenance of non-EQ Limitorque operators was specified by DPM Number N82M3 dated May 19, 1982 and the Limitorque Vendor Manual. The maintenance requirements for EQ Limitorque operators was specified by DNE in the form of the EQ Binders for SQN and the QMDS for BFN, WBN, and BLN. The EQ Binders were to replace the QMDS at all sites but at the time of this writing, they had not yet been issued but for SQN.

4.1.1 Valve Findings, Generic (continued)

Appendix B to 10 CFR 50, Criterion II stated that personnel performing activities affecting quality shall be trained as necessary to assure that suitable proficiency was achieved and maintained. The Interim NQAM Part I, Section 2.2 Revision 0, was applicable to all personnel in Design, Construction, and Power and reiterated the Appendix B statement. It specified that the NQAM, Part III Revision 0, section 6.1, "Selection and Training of Personnel for Nuclear Power Plants," and the Division of Construction Quality Assurance Program Manual, DC QAPP 2, "Quality Assurance Program," were the applicable implementing documents for the training requirements of Power maintenance personnel and Construction maintenance personnel respectively.

One concern in the Valves element was found to be potentially generic to all sites. That concern related that Limitorque valve operators were not oriented or maintained properly. Only the issues of Limitorque proper maintenance and Limitorque warehouse stored orientation needed to be addressed at each site. Each site should have similar programs to implement the generic requirements (both Construction and Power) specified by the upper tier documentation.

4.1.2 WBN Specific

Discussion

Six concerns were evaluated at WBN relative to the hydrostatic testing, orientation, clearance, and material substitutions in valves.

The stated areas of concern were:

A. Hydrostatic Testing

1. During the 1979 hydrostatic test of a 36-inch main steam line, the valve which isolated the turbine leaked. This valve is located in the south valve room.

2. Valves V329 and V330 in the Incore Instrument Building were pressure tested by air in 1980; however, these valves should have been hydro tested.

4.1.2 Valve Findings, WBN (continued)

B. Orientation

Limitorque valves at BLN were not stored nor installed in the correct attitude, nor were they maintained properly. (This concern was found generally applicable to WBN)

C. Clearance Problems

1. Sheet metal cover box cannot be installed over an electrical penetration in the unit 2 incore instrument room because of interference with either FCV-30-20 or FCV-30-58.

2. Mechanical discrepancies exist on motor operated valves.

D. Material Substitutions

A 2-inch Class B valve is installed in a unit 1 Class A system.

The WBN specific findings were:

A. Hydrostatic Testing

1. From the description in this concern and from drawing 47W801-1, Revision 20, the valve in question was determined to be either Main Steam Isolation Valve (MSIV) 1-FCV-1-4 or 29. The cognizant WBN DNC Mechanical Engineer provided an informal report titled "Main Steam Unit 1 Hydrostatic Test," which recorded actions taken during the conduct of that test (June 24-28, 1979). The report documented problems encountered getting the MSIV's to seat against a hydrostatic test pressure of 1185 PSIG in preparation for testing of downstream Class H portions of the main steam system. After conferring with both DNE and the valve vendor (Atwood Morrill), additional measures were taken and the valves were sufficiently seated to complete the hydrostatic test. Those additional measures consisted of replacing the 1/2 inch high pressure hose at the MSIV bypass with a 2 inch hose. This hose was utilized as an upstream drain to establish a great enough pressure differential across the MSIV's to seat

4.1.2 Valve Findings, WBN (continued)

them. Per conversations with the Manager of the Atwood and Morrill Service Department (617-744-5690), this was the proper method for seating the valve seal ring in preparation for hydrostatically testing the downstream portions of piping. The fast pressure differential generated by "burping" the upstream piping through the 2" hose was necessary to seat the stainless steel poppet seal ring (contract 83080, vendor drawing 13824-01-H, item 53). This seal is not the main valve seat but is the seal utilized to seal against backflow through the pilot poppet under postulated backflow conditions. G29M, Process Specification 3.M.9.1, Revision 6, paragraph 9.2, stated in part, "The following leaks are acceptable: . . . c. Internal leakage in pumps and valves"; therefore, leakage past the MSIV seals was not a deficient condition so long as the required hydrostatic test pressure was maintained. A witness of the 1979 hydrostatic test stated he was of the opinion that the MSIV seating problems encountered during test conduct were due to the valve being operated in an abnormal mode (hydrostatic versus dynamic steam) and not due to valve seat problems. A review of the two valves maintenance histories by the cognizant WBN ONP Maintenance Engineer revealed no documented valve leakage problems to date. Review of MSIV contract 76K 38-83080 QA revealed Inspection and Testing Branch Inspection Reports 10 and 11, dated January 16, 1978 and January 27, 1978, of 1-FCV-1-4 and 1-FCV-1-29 documented satisfactory results of vendor leak testing performed under Hydrostatic Test Procedure 501-13824-00, Revision 1. All the MSIVs were vendor tested for reverse flow leakage using saturated steam with acceptable results.

2. Valves V329 and V330 (1-FCV-31-329 and 330) were found to be containment isolation valves for Incore Instrument Room chilled water piping. The "Leslie" valves were replace under WP 3379 with "Tufline" valves in late 1983. The replacement was in response to Preoperational Test Deficiency 141 (PT-141) to TVA-2C, Containment Isolation Valves Leak Rate Test;

4.1.2 Valve Findings, WBN (continued)

and performed under ECN 3861. PT-141, from the cognizant NUC-PR Test Director to the cognizant EN DES Test Program Coordinator, dated April 15, 1983, stated in part, " . . . these valves were not designed to hold air at Pa, 15 psig, and cannot be modified to do so . . . containment isolation valves at WBN are required to pass leakage rate test with air as the test medium in accordance with Appendix J to 10 CFR 50." As documented by Preop Test Data Package TVA-2C Revision 0, the new (Tufline) valves were successfully tested on January 27, 1984, and February 1, 1984. In addition to the pneumatic testing under TVA-2C; the valves, both before and after replacement, were also hydrostatically tested. These tests were documented under hydro package 1-031-47W865-5-2-04 dated October 10, 1982, and 1-031-47W865-5-2-10 dated November 23, 1983. Contrary to the stated concern, no pressure tests were performed on these valves in 1980.

B. Valve Orientation

DNE, DNC, and ONP were each responsible for aspects of the storage and maintenance of Limitorque valve operators. As stated in the generic discussion, DNE was responsible for specifying the preventative maintenance and surveillance requirements for EQ Limitorque operations. The DNC Preventative Maintenance Unit (PMU) was responsible for the PM of all Limitorque operators while in storage (WBN QCP-1.52 Revision 6 and SOP-26 Revision 2); storage was defined as " . . . from the time of receipt at the construction site until tentative transfer to P&E." At that point, ONP assumes the maintenance responsibility as specified in MSL 2.2, dated May 22, 1985, paragraph 4.0, "Upon receipt of a system or equipment transfer sheet, the vendor's manual for the corresponding equipment will be reviewed to determine the preventative maintenance requirements. The responsible engineer will base requirements and frequencies on vendor recommendations, past experience, operating and environmental conditions, sound engineering judgment, and information from other plants."

4.1.2 Valve Findings, WBN (continued)

QCI-1.36 Revision 13 governed the DNC's storage practices for both safety-related and nonsafety-related Limitorque valve operators. Paragraph 6.3 stated in part, "The methods used for storing items meet the manufacturer furnished storage instructions or the requirements below and are adequate to prevent damage or deterioration." The only specific storage requirement for Limitorque operators found "below" was paragraph 6.4.22, "Limit switch compartment covers are installed on motor operator valves." QCP-1.52 Revision 6, Preventative Maintenance, was also found applicable to the storage of Limitorque operators. Paragraph 2.1 stated in part, "This procedure is applicable to all safety-related permanent items and equipment within the scope of the WBN Quality Assurance Program while in storage . . ." SOP-26 Revision 2, Preventative Maintenance on Non-QA Equipment, was applicable to "all non-QA permanent items and equipment while in storage." It simply specified that the procedure and acceptance criteria of QCP-1.52 applied. Therefore, QCP-1.52 applied, in effect, to all Limitorque valve operators in storage. Paragraph 5.1 of this QCP specified that the "PMU identifies items and equipment requiring preventative maintenance and initiates Attachment A, specifying the storage level . . ., maintenance requirements, frequency, and the source of requirements, including vendor manual information."

The applicable Limitorque vendor manual "Installation Tips" were:

(1) Do mount [store] motors on a horizontal plane, if possible.
(2) Do connect space heaters if the unit is to be stored in a damp place.
(3) Do set up a periodic operating schedule if the valve is infrequently used.

DPM Number N82M3 was a compendium of prior memorandums on Limitorque preventative maintenance (although this was a "NUC PR Requirement," the PM activities specified were reflected in previous DNC memorandums, ie. WBN TVA informal memorandum from Construction Engineer, WBN, to Resident Inspector, NRC, WBN, dated October 15, 1981). The four additional requirements applicable to DNC's PM program specified by this DPM were:

4.1.2 Valve Findings, WBN (continued)

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. Install Polyolefin sleeves on motor leads that are susceptible to oil leakage and replace any internal control wiring which has been exposed to oil.

2. 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).

3. 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).

4. 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.

In summary, the DNC PM program for Limitorque valve operators in storage should have addressed, as a minimum, the seven criteria previously listed (3 vendor requirements and 4 additional DPM requirements). Vendor manual specification (1) was only applicable to the DNC PM program for operators located in warehouse storage, not located in installed storage. A review of the preventative maintenance assignment (Attachment A to QCP-1.52 revision 6) for warehouse stored Limitorque operator 3-000-MOV-199729 revealed no Limitorque operator storage orientation requirements; however, this operator and six other Limitorque operators stored in warehouse 25 (level B) were found oriented correctly. This assignment sheet was generic with respect to the requirements addressed. Vendor item (1), orientation was not addressed. "N/A" was noted for vendor item (2), heaters. Storage level was noted as "level C" which provides neither temperature nor humidity control.

[Note 1 of DPM N82M3 was relative to thoroughly cleaning the gearcase of old lubricant prior to adding the new lubricant.]

4.1.2 Valve Findings, WBN (continued)

DPM item (1), examining motor leads, was not addressed by the DNC PMU Attachment A. The cognizant PMU engineer explained, "Electrical QC examines motor leads and checks for grease leakage in the limit switch compartment and documents according to Test 45, WBN QCT-3.06-2, for valves in the WBN quality assurance program. No examination of limit switch compartments was performed on a routine basis." A review of this QCT (Test 45) confirmed the inspection for grease leakage and also an inspection of insulation for "obvious defects." SOP-14 revision 2, paragraph 6.5.1 governed the inspection of non-QA electrical equipment. An inspection of motor operated (Limitorque) valve limit switch compartment for oil/grease leakage and damage (insulator swelling) was not specified. Cognizant DNC EEU Supervisor verified that swelling insulation would have been noted as a deficiency and corrected under Test 45. Relative to DPM items (2) and (3), the cognizant PMU engineer stated that DNC was replacing grease in operators with Exxon Nebula EP-1 only when external oil leakage or grease separation was identified during routine preventative maintenance. He stated that the wholesale grease change-out would be done by ONP at the time of transfer. DNC EEU verified limit switch mounting secureness (DPM item 4) during Test 45 under QCT-3.06-2 according to the cognizant EEU supervisor. However, no special surveillance was conducted in this area and it was not addressed under the DNC PM program.

DNC's program for ensuring only trained craft personnel performed maintenance functions on quality related Limitorque operators was WBN-QCI--1.11-4 R3, "Craft Qualification/Certification Program." Paragraph 5.4 stated "The craft supervisors ensures that employees engaged in activities under construction procedures are qualified and/or certified as appropriate before performing the activity." No specific Limitorque training was referenced in the QCI. The cognizant General Construction Superintendent stated; however, that only experienced craftsmen were utilized to perform Limitorque PM activities under the direction of trained (OJT) foremen. The preventive maintenance quality control procedure, QCP-1.52 R6, contained no references to personnel training.

4.1.2 Valve Findings, WBN (continued)

Administrative Instruction (AI), AI-9.2, Attachment 11, revision 17, dated March 28, 1986, and Mechanical Maintenance Section Letter (MSL) -2.2 dated May 22, 1985, governed ONP's preventative maintenance program for Limitorque operators. The ONP's preventative maintenance program was found to be in a state of transition. This transition was from a program that did not incorporate the equipment Qualification Maintenance Data Sheets (QMDS) to a program that did incorporate the QMDS. Revision 17 to AI-9.2 dated March 20, 1986, dictated that the cognizant engineer document adherence to or deviation from the QMDS and vendor PM requirements for each piece of equipment in their program within thirty days of transfer. The cognizant Mechanical Maintenance Supervisor stated that this would also occur for each piece of presently transferred equipment. MSL -2.2 dated May 22, 1985, implemented the requirements of AI-9.2; however, it had not been updated to address AI-9.2 revision 17 requirements as previously outlined.

ONP's "Plant Training Program" was described in AI-10.1, R20. Paragraph 4.4 stated in part, "Each section supervisor or his representative shall be responsible for determining desired specialized training and establishing training courses as needed.". Paragraph 7.3.1 described current Mechanical Maintenance specialized training courses. Course MST, "Limitorque Valve Activator Maintenance training" addressed electrical and mechanical aspects of Limitorque Maintenance. Paragraph 5.1.9 of AI-9.2 R17, "Maintenance", stated in part, "preplanned, step-by-step instructions cannot be relied upon to prevent errors. Skills normally possessed by qualified maintenance personal shall be considered when judging the depth of detail required of the work instructions.". Cognizant engineers in the WBN Mechanical Maintenance Unit stated that it was a standard practice for at least one craftsman in a crew performing maintenance on a Limitorque actuator to have completed the Limitorque training program. No statements to this effect were made in AI-9.2.

For each piece of equipment, a preventive maintenance folder was generated containing a description of any PM to be performed and a place for it to be documented. The cognizant Mechanical Maintenance Engineer provided copies of a typical Limitorque valve operator PM folder. Each Limitorque PM folder was identical in PM requirements (cognizant PM engineer verified this). Since they were each identical,

4.1.2 Valve Findings, WBN (continued)

they should have addressed all vendor, DPM, and QMDS PM requirements, even though QMDS was applicable to CSSC operators only. (Note: The QMDS PM requirements did not apply to the DNC PM program since the operators qualified life began at initial criticality of the related unit.) The ONP PM folders for Limitorque operators were found to address all previously noted requirements applicable to their program with the following exceptions: (1) CSSC operator motors were not being meggered, and (2) non-CSSC valves were not being cycled (exercised). Meggering the motors was a QMDS (CSSC valves only) requirement while cycling the valves was both a Limitorque and DPM recommended action (for CSSC and non-CSSC operators). The cycling/exercising of CSSC Limitorque operators was found to be addressed under Surveillance Instruction SI-4.0.5. The exercising of infrequently used non-CSSC operators was not addressed under any ONP program.

ONP utilized AI-5.6 R9, "Material Storage, Handling, and Shipping Requirements for WBN," for defining the storage requirements of safety-related material and as a guide for achieving good storage practices for the balance of plant inventory. It simply stated that Technical Standard TS 01.00.15.14.03 constituted AI-5.6. This was determined to be inadequate since this Technical Standard was found inadequate. (See section 4.1.1, Generic Conclusions, of this report.)

C. Valve Clearance Problems

1. A walkdown of unit 2 incore instrument room purge air valves 2-FCV-30-20 and 58 revealed an interference problem at valve 58 but none at valve 20. The interference was between the limit switches mounted on 2-FCV-30-58 and the sheet metal cover to be installed on an adjacent electrical penetration. The penetration electrical conductors were found covered with fiberglass cloth for physical protection; however, some conductors were exposed. The unit 1 valve/penetration installation was walked down for comparison. No interference existed because of the utilization of a different mounting arrangement for the limit switches. The cognizant DNC system 30 electrical engineer participated on a second walkdown

4.1.2 Valve Findings, WBN (continued)

of the unit 2 installation and agreed that an interference problem existed. The cognizant electrical penetration engineer was aware of the interference; however, he had not communicated it to the cognizant instrument engineer for resolution because no impending schedule requirements to complete work on this penetration. When asked of the safety hazard because exposed conductors, he stated that no electrical hazard existed since no conductors would be energized until the cables were terminated, and terminations insulated, according to QCP-3.06-3R8.

2. QTC provided additional information citing 2-FCV-62-90 and 133 as the valves having "mechanical discrepancies". They also specified that the time frame was between June 1985 and August 1985; however, they did not describe the nature of the discrepancies. A review of WBN QCP-4.10-9, Attachment A, test number 70 cards for these valves revealed no noted discrepancies; however, level A and B inspections had been performed. The cognizant DNC PM engineer had no record of open discrepancies against these valves at the time of evaluation. A review of work release 26609, which were referenced on level B test 70 cards and signed complete on January 31, 1986 and February 5, 1986, provided documentation of mechanical discrepancies on these valves. These work releases were the vehicles for replacing the "Limitorque spring compensator housings" on each valve. These releases referenced 10 CFR 50.55e item WBRD-0-391/82-18, as well as an attached Limitorque maintenance instruction sheet as references. The final report for deficiency report WBRD-50-391/82-18 dated November 22,1983, (A27 83 1122 005) documented the reasons for the "Top hat" change-outs. The report stated in part, "During operational testing . . . three Limitorque motor operators failed and rendered the valves inoperable . . .all of the operators which failed are Limitorque model SB-00 units. The SB-00 design utilizes Belleville Springs . . . enclosed in a cast housing. The housing . . . receives the motor torque after the springs have compressed. On each of the failed operators, the housing fractured during valve closure . . . TVA has decided . . . to replace the cast iron

4.1.2 Valve Findings, WBN (continued)

compensator housings on all WEMD-supplied (Westinghouse Electromechanical Division supplied) valves with model SB-00 operators. All unit 1 housings have been tested and verified as being made of ductile iron, or have been replaced with ductile iron housings. All affected unit 2 housings will be replaced by December 1, 1984 . . . no further action to prevent recurrence will be taken . . . " As documented by additional memorandums in the file, the December 1, 1984, date was not met because of material restraints. The dates were moved back repeatedly including July 25, 1985 and October 25, 1985 (material restraints). QCP-4.10.9 Test 70 cards documented that the work was accomplished on 2-FCV-62-92 and 133 on January 17, 1986. They also document the fact that both valves operated properly after the change-out. Because of this fact and the limited concern information available, the defective top hats were assumed to be the "mechanical discrepancies" expressed by the concerned individual.

D. Material Substitutions

NSRS Report I-85-169-001 dated July 10, 1985, verified that a 2-inch Class B valve was installed in a Class A system. Three specific findings and three specific corrective action were noted in the ERT/NSRS report. The findings were: (1) Valve 1-CKV-62-661 was a Class B valve installed in a Class A line, (2) Drawing 47W406-9 R22 was the apparent cause of the nonconforming installation as it clearly called for the Class B valve to be installed in the Class A line, and (3) The valve was not identified with the ASME tag, TVA Class and drawing tag, and the TVA system identification tag. The NSRS recommended corrective actions to the WBN project manager. They were to initiate and process nonconformance reports as required to document the following:

(1) Incorrect installation, (2) drawing 47W406-9 R22 error, and (3) improper tagging of an ASME valve.

4.1.2 Valve Findings, WBN (continued)

SCR WBN MEB 8523 was generated to document the significant condition adverse to quality as stated in the response memorandum from the WBN Project Manager to the Director, NSRS dated July 19, 1985. This memorandum also stated that proper tagging of the valve will occur as a portion of the NCR resolution." The concern was "closed" via a memorandum from the Director, NSRS, to the WBN Site Director dated November 29, 1985. SCR WBN MEB 8523 was reviewed for root cause and corrective action statement concurrence. The root cause was stated as designer error. The corrective action was for Kerotest, the vendor, to upgrade the valve if possible or if not possible, to replace it. The valve was upgraded in response to ECN-5841. WP5841-1 was the vehicle for placing the Class 1 ASME tag on the valve. A review of this work plan and a walkdown of the valve revealed proper NPS data tag for Class 1 classification and proper ASME tagging of the valve; however, no system I.D. tag nor TVA class and drawing tag were evident. A review of QCP-4.10.9 test 70 card 1-062-RB-V-CKV-661 revealed documentation that these tags were in place at the time of the original valve installation inspection, 4-5-82. No vehicle was drafted to replace these tags contrary to the Project Managers memorandum of July 19, 1985.

Conclusion

A. Valve Hydrostatic Testing

1. This concern issue was factual in that an MSIV seal leakage problem was encountered during the 1979 unit 1 Main Steam hydrostatic test. However, applicable portions of G-29 allowed for internal valve leakage during hydrostatic test conduct; therefore, this was not considered a deficient condition. The leakage problem was attributed to the operation of the valves under abnormal conditions (hydrostatic vs dynamic steam) rather than seat failure. No valve seat performance problems had been identified nor repairs made since installation of these valves.

4.1.2 Valve Findings, WBN (continued)

2. This concern issue was not factual since both pneumatic and hydrostatic tests were required and performed on these valves. The valves in question were replaced in late 1983 after they failed and could not be modified to pass a pneumatic containment isolation valve leak rate test which was required by Appendix J to 10 CFR 50. The replacement valves were successfully retested (pneumatic) in early 1984. Both the original valves and the replacement valves were hydrostatically tested before conduct of the pneumatic test (late 1982 and late 1983). Contrary to the statement of the concern, no pressure tests were conducted on these valves in 1980. |R2

B. The issues of proper Limitorque operator storage and maintenance were evaluated at WBN. WBN was a construction site with approximately all unit one and common equipment/systems transferred to ONP and with most unit two equipment/systems under the control of DNC. Therefore, DNC and ONP were each responsible for the storage and maintenance of operators at the time of evaluation.

The DNC Preventive Maintenance Unit was responsible for the PM of all Limitorque operators in storage (from the time they were received in the warehouse to the time they were tentatively transferred to ONP) under QCP-1.52, Revision 6. The DNC PM program was evaluated and found to adequately address the PM and storage requirements for Limitorque operators with the following exceptions: (1) The storage level was specified as level "C" (no humidity or temperature control) with no requirement to energize heaters, (2) no operator warehouse stored orientation was specified, (3) no inspection of motor leads for oil/grease damage (swelling) was performed during PM; although, this was done at time of transfer on QA operators (QCT-3.06-2), and (4) the verification of limit switch assembly proper screw length and the installation of lockwashers were not specified (DPM item Number 4).

ONPs (Power Stores) procedure governing the storage of Limitorque valve operators was inadequate since it simply quoted Technical Standard TS 01.00.15.14.03 which was found inadequate in the generic conclusions portion of this report. WBN Power Stores had no Limitorques in storage for inspection at the time of this evaluation.

4.1.2 Valve Findings, WBN (continued)

The ONP Mechanical Maintenance Section was responsible for the PM of all Limitorque operators which had been transferred from DNC. In addition to the DNC PM requirements, ONP was required to incorporate the QMDS PM activities into their program. The ONP Limitorque PM program was evaluated and found deficient in the following areas: (1) the meggering of CSSC operator motors was not being performed per QMDS requirements and (2) non-CSSC operators were not being exercised according to vendor and DPM recommendations.

C. Valve Clearance Problems

1. This concern was factual in that a potential interference existed between valve 2-FCV-30-58 and the sheet metal cover for an adjacent electrical penetration. No personnel electrical hazard existed from the exposed electrical penetration conductors since no cables had been terminated at the penetration (the installation of the cover was a prerequisite to cable termination). This concern was not found to present a problem.

2. This concern was valid in that a "mechanical discrepancy" did exist on both 2-FCV-62-90 and 133 at the time the concern was expressed (September 1985). QTC for confidentiality reasons, would not provide information descriptive of the mechanical discrepancies. For organizational reasons, they were assumed to be clearance related; however, the evaluation did not support that assumption. At the time, 10 CFR 50.55e deficiency reports had been issued against these valves because of NCR-3793 documenting three compensator housing failures in 1983. These failures were on valve operators of the same model number and casting material (grey iron). Westinghouse Electric Corporation Inspection Report 999000033/83-01, Table 4 (This report was located in the Construction Licensing file for NCR-3793) identified Watts Bar units 1 and 2 as the only TVA units having the affected valve operators. As corrective action, all grey iron compensator housing on this model valve, including the valves in question, were replaced with ductile iron housings. The new housing were on material restraint for a long duration; however, they were received and installed

under a work release in early 1986. The proper operation of the valves after compensator housing replacement was documented under the work releases by test 70 to QCP-4.10.9. Because of limited concern information and since no deficient conditions were noted for these valves under test 70 of QCP-4.10.9, the "mechanical discrepancy" was assumed to be corrected by the compensator housing replacement.

D. Material Substitutions

This concern, Class B valve in a Class A line, was factual. The concern was addressed by NSRS Report I-85-169-001 and in response, an SCR was generated to document the condition adverse to quality. An ECN was written to correct the discrepant drawing and have the check valve either upgraded or replaced. The vendor upgraded the valve and a work plan installed the upgraded ASME tag; however, no vehicle was generated to replace the missing system I.D. and TVA class and drawing tags as identified in the NSRS report. The concern was closed with this deficient condition not addressed.

4.1.3 SQN Specific

Discussion

Along with the Limitorque valve operator concern, an additional valve concern was found potentially generic to and evaluated at SQN. This concern was identified by the NRC following their review of the QTC files. It related that an "emergency hand valve" was incorrectly installed at SQN.

Relative to Limitorque valve operators, SQN was an operating plant that allowed the evaluation to address the specific issues of storage and maintenance of Limitorque valve operators from ONP procedures and program perspective. The review of the maintenance procedures identified a series of instructions and procedures that met all the vendor requirements for Limitorque valve operator storage and maintenance that will keep the actuators in good working condition. AI-36 defines the storage requirements and recommended practices for safety-related material and equipment (CSSC) in order to ensure that the quality of items was not degraded as a result of improper storage. The requirements of this instruction applied to the Power

4.1.3 Valve Findings, SQN (continued)

Stores Unit - ONP. The instruction gave general requirements for all equipment storage and had specified storage instructions, paragraph 5.11.27, for Limitorque valve operators. These storage requirements were equal to those of the vendor.

Procedure MI-10.46 contained a data package with explicit instructions, inspections, and verifications incorporating the manufacturer's requirements for valve operator maintenance in various installed orientations. Technical Instruction TI-69 and Surveillance Instruction SI-166 and SI-166.6 gave the requirements for cycling the valves. The maintenance of the Limitorque valves are documented. Site Procedure SQM-62 provides the instructions for implementation of the QMDS requirements.

Cognizant engineers of the SQN Mechanical Maintenance Unit stated that craftsmen have to go through an ONP training program, MMT-16, before being allowed to perform maintenance on Limitorque valves. The formal training course is very thorough and deals with specifics of Limitorque valve maintenance. The Mechanical Maintenance Unit keeps a matrix listing of those craftsmen that are qualified. The valves are maintained the same with respect to non-CSSC or CSSC valves. The only variance is the interval, and this has been determined by a case-by-case engineering evaluation of the valve.

As an enhancement to the storage and maintenance programs in place, program Standard Practice SQM-64 has been drafted and was out for site review at the time of evaluation. This administrative guideline will encompass the SQN comprehensive safety-related Motor Operator Valve (MOV) Program for visual inspection, lubrication, and testing. The Standard Practice SQM-64 guidelines were expected to be approved before the restart of the unit 2, cycle 3 outage. The cognizant QA engineer interviewed was very satisfied with the present Limitorque valve maintenance program.

The cognizant SQN evaluator (SQN Generic Concerns Task Force) was knowledgeable of the problem and explained his evaluation and conclusions. He had observed a maintenance activity for a Limitorque valve. In addition, his sample of the maintenance records for Limitorque valves confirmed that the required items were checked on non-CSSC, as well as CSSC valves.

4.1.3 Valve Findings, SQN (continued)

The SQN Generic Concern Task Force Employee Concern Report was accurate with regard to their conclusions that:

a. There is a preferred orientation of Limitorque valve operators, but is acceptable for the valve operator to be installed/mounted in any position.

b. SQN has an effective maintenance program in use that properly implements the supplier's requirements and will have a program to ensure equipment qualification. The report was thorough in their evaluation and its documentation.

The following discussion was relative to the concern which cited that an emergency hand valve was incorrectly installed.

A review of expurgated file IN-85-055 revealed the following: the concerned individual (CI) was told by a fitter than an "emergency hand valve" was installed under a grating at SQN, such that it couldn't be manually operated. The CI went on to say, "They done that at Sequoyah and they got fined. I think it was $50,000.00 for doing that."

He added that the problem was identified at SQN as noted above and probably corrected. The CI stated the fitter then showed him where the same questionable valve installation had occurred at WBN. No other valve description or location information was given.

The SQN Compliance Licensing Supervisor stated that no fine as described above had been issued against SQN.

A conversation with two experienced SQN Reactor Operators revealed that no emergency hand valve existed at SQN as described by the CI. Conversations with both the WBN Assistant Operations Supervisor and a WBN Reactor Operator revealed the same was true at WBN. The Assistant Operations Supervisor also stated that Operations Section Letter; OSLA-27, AUO Work Stations; specifies responsibilities of Assistant Unit Operators during routine equipment/system inspections. He stated that the inspections are conducted during every shift and the inspection checklists incorporate a space for "equipment not accessible." The supervisor went on to say that any deficiencies such as the one specified by the CI would have been corrected under this instruction if not earlier.

4.1.3 Valve Findings, SQN (continued)

A review of OSLA-27, Revision 28, proved the statements of the WBN Assistant Operations Supervisor to be correct. The Checklist or "Routine Log" for each "Routine" provided blanks for each shift to list "Equipment which is not accessible." Also, note (1) of the Instructions portion of OSLA-27 stated "Any problems discovered will be noted in the remarks section of the . . . AUO Routine Sheet, reported on an MR, and to the Unit Operator. . . ."

Conclusion

Relative to Limitorque valve operators, SQN has an effective storage and maintenance program in use that properly implements the manufacturer's requirements. The procedures, instructions, and trained craftsmen combined to maintain the actuators in good working condition, regardless of the mounting position or other adverse conditions.

Based on a review of expurgated file IN-85-055, conversations with both the SQN Compliance Licensing Supervisor and two SQN Reactor Operators, and interviews with both the WBN Assistant Operations Supervisor and a WBN Reactor Operator; the concern which cited "emergency hand valve incorrectly installed" was found to be not factual. Contrary to a relevant statement the CI made during his interview with QTC, no fine was ever levied against SQN for the cited reason or anything similar. The cognizant personnel interviewed at both SQN and WBN stated that no valve installation as described existed at those sites.

4.1.4 BFN Specific

Discussion

Only the concern relative to the storage and maintenance of Limitorque valve operators was determined to be generic to and evaluated at BFN.

4.1.4 Valve Findings, BFN (continued)

Like SQN, BFN was an operating plant which allowed the evaluation to address the specific issues of storage and maintenance from an ONP procedures and program perspective.

The storage requirements for Limitorque valve operators were specified in Standard Practice BF-16.4 Revision 2, "Material, Components, and Spare Parts Receipt, Handling, Storage, Issuing, Return to Storeroom, and Transfer." Paragraph 4.0 specified the general storage level for QA equipment; ". . . The A and B level facilities shall be provided with uniform heating and temperature control, or its equivalent, to prevent condensation or corrosion." Paragraph 4.2 specified ". . . heaters enclosed in electrical items shall be energized as specified by the manufacturer if stored in unheated areas." It continued stating: "Additional specific storage requirements for equipment and material are delineated in reference 10 (TS-01.00.15.14.03)." "Other maintenance requirements specified by the manufacturer's instructions for the item shall be performed."

As determined in the generic findings and conclusions, Technical Standard TS-01.00.15.14.03 was inadequate in describing Limitorque valve operator storage requirements. The BFN Power Stores Supervisor stated that Limitorque operators were presently being stored in level B storage. However, a new level A storage facility was planned and that is where the Limitorques will be stored (along with other EQ equipment). He went on to state that no preventative maintenance was presently being pulled on Limitorques in warehouse storage. A walkdown of the Limitorques in storage was performed. Of the eight Limitorque operators found in level B storage facility OB-2, all were found orientated correctly with no heaters energized (this was a proper status since level B storage by definition provided a condensation free environment).

Like WBNs preventative maintenance program, the program at BFN was in a state of transition. The transition was from a program that did not incorporate the QMDS/vendor preventative maintenance requirements/suggested-activities to a program that did incorporate those requirements/activities.

4.1.4 Valve Findings, BFN (continued)

BFN utilized two programs for the preventative maintenance of Limitorque operators. Standard Practice BF PMI-6.2 Revision 0, "Conduct of Maintenance," governed general preventative and corrective maintenance of plant systems and equipment. It was applicable to all Limitorque valve operators. Standard Practice BF-7.12 dated May 1, 1985, "Maintenance Program for Maintaining 10 CFR 50.49 Harsh Environment Equipment in Qualified Status," governed the preventative and corrective maintenance of all plant equipment within the scope of 10 CFR 50.49.

BFN was in the process of placing the applicable Limitorque operators in a qualified state. Once the operators are qualified, the operators will be maintained in that state by utilizing Mechanical Maintenance Instruction MMI-87 Revision 5, "Preventative and Corrective Maintenance of Limitorque Operators" and Electrical Maintenance Instruction EMI-99 Revision 2, "Qualification Maintenance for all actuators in accordance with QMDS." These two maintenance instructions addressed all QMDS and expected EQ Binder (the maintenance sections had SQN EQ Binders for reference/information purposes) preventative maintenance requirements.

The Mechanical and Electrical Maintenance sections scheduled these activities under Standard Practice BF-7.11 Revision 1, "Preventative Maintenance Scheduling System." At the time of this evaluation, the Electrical Maintenance Section scheduled preventative maintenance by individual valve identifier; whereas, the Mechanical Maintenance section utilized one activity to flag preventative maintenance under MMI-87 for all applicable Limitorques. Also, Electrical and Mechanical Maintenance scheduled their preventative maintenance activities utilizing different frequencies. Electrical Maintenance scheduled their preventative maintenance activities at 36-month intervals while Mechanical Maintenance used every refueling outage (18-months). The cognizant engineers in each section stated that they were working to coordinate their PM activities and intervals on each operator.

For non-EQ Limitorque operators, Electrical Maintenance utilized either EMI-16 Revision 2, "CSSC Limit Switch Gear Box Replacement" or EMSIL-98.3, "Geared Limit Switch Gear Box Replacement," for the performance of preventative maintenance activities. Mechanical Maintenance utilized MMI-87 exclusively. These instructions completely addressed the vendor, DPM and QMDS suggested/required PM activities.

4.1.4 Valve Findings, BFN (continued)

According to conversations with the cognizant Maintenance Engineers, virtually no preventative maintenance was pulled on Limitorque operators before 1981/1982. At the time of this evaluation; however, a complete preventative maintenance program had been put into place under the procedures/programs described. As part of the complete preventative maintenance programs, both the Mechanical and Electrical Maintenance Instructions contained instructions to utilize only skilled/trained craftsmen. The cognizant maintenance foremen stated that at least one Limitorque trained craftsman was utilized on each Limitorque operator preventative maintenance activity.

Conclusion

The issues of proper Limitorque operator storage and maintenance were evaluated at BFN. The issue of proper Limitorque operator storage was not adequately addressed under BF-16.4 Revision 2. It simply referenced TS 01.00.15.14.03 for specific storage requirements. This TS was determined to be inadequate within the generic portion of this report.

Relative to the preventative maintenance of Limitorque valve operators, BFN was found to have adequate programs in place to maintain their installed operators in good working condition as per the applicable vendor, DPM, and QMDS recommendations/requirements.

4.1.5 BLN Specific

Discussion

In addition to the issue of proper Limitorque valve operator storage and maintenance, an additional site specific issue was evaluated at BLN. The additional concern cited that ". . . some of the valves in the plant were rusted. . . they were O.K. inside, but they just looked bad."

BLN was a construction site with both Construction (DNC) and Nuclear Power (ONP) organizations in place, as at WBN. DNC's programs and procedures applied prior to equipment/system transfer, when ONP assumed responsibility for the equipment/system.

4.1.5 Valve Findings, BLN (continued)

DNC's procedure governing the storage of Limitorque valve operators was QCP-1.2 Revision 17, "Storage." This procedure did not specify any specific Limitorque storage requirements; however, all operators viewed in warehouse storage were stored in a level B facility with the compartment heaters energized. They were orientated properly and the responsible personnel were aware of the preferred orientation. Paragraph 5.3 of QCP-1.2 specified that the Plant Superintendent of Maintenance (defined as the Engineering Unit administering the Preventative Maintenance Program) was responsible for reviewing the vendor manuals and determining special storage requirements. Paragraph 6.3.1.2.1 specified that the internal motor heaters for motors less than 1-hp were to be energized "regardless of storage level."

The Power Stores procedure governing the storage of Limitorque operators was Standard Practice BLA-9.4 Revision 8, "Storage of Procured Material." Section 5.0 of the instruction provided the specific storage requirements. Paragraph 5.25 "established the minimum requirements for storage and periodic inspection and maintenance" of Limitorque (as well as other valve actuators). It was basically a copy of TS-01.00.15.14.03, paragraph 7.26 and just as this Technical Standard was found inadequate, so was BLA-9.4 Revision 8, paragraph 5.25. Power Stores had no Limitorques in storage at the time of this evaluation.

Discussion

BLN's preventative maintenance program was unique in that it assigned system/equipment preventative maintenance assessment responsibilities for both non-transferred and transferred systems/equipment to one individual - the appropriate Nuclear Power system engineer.

DNC's procedure governing preventative maintenance was QCP-1.3 Revision 8, "Preventative Maintenance," while Nuclear Power utilized the following three procedures: BLM 3.1 Revision 9, "Identification and Tabulation of Preventative Maintenance and Lubrication Requirements," BLM 3.4 Revision 7, "Preventative Maintenance Control Program," and BLM 3.5 Revision 3, "Performance of Preventative Maintenance Tasks." Under BLM 3.1, the cognizant engineers were to identify equipment preventative maintenance and lubrication

4.1.5 Valve Findings, BLN (continued)

requirements (no guidelines for source material given) and input these requirements into the "BLNP Preventative Maintenance Control Program" (PM/LUB), a computer data base administered by Engineering Services. Both Construction (QCP-1.3) and ONP (BLM 3.4) maintained data bases specifying PM activities and frequencies for equipment/systems under their responsibilities.

ONP's PM/LUB program was described and governed by BLM 3.4, dated March 28, 1986. The scheduled preventative maintenance activities were then performed by either DNC (QCP-1.3) or ONP (BLM-3.5) depending on whether or not the equipment had been transferred. The preventative maintenance activities specified in the Constructions PM/LUB data base and in ONP's PM/LUB data base for Limitorques were not equivalent. Both specified the following three activities: (1) exercise the operator one complete cycle, (2) check gear box for lubricant quality and quantity, and (3) inspect limit switch compartment for excessive oil seepage; however, construction specified additional activities and the activity frequencies varied. In addition to the three activities above, DNC specified an activity for replacement of desiccant at 24-month intervals and concurrent with activity (3), they also checked for compartment heaters being energized and swelled (oil damaged) wiring insulation. The PM intervals for activities (2) and (3) were 6 and 18-months and 3 and 18-months for construction and ONP respectively. Unlike the ONP procedure, QCP-1.3 (DNCs procedure) specified that the cognizant ONP engineering unit "Prepare maintenance requirements and instructions in compliance with manufacturer's, vendor's, OE, and TVA maintenance requirements and instructions. . .". The cognizant ONP engineering personnel; however, were not under the control of this DNC Quality Control Procedure. An additional ONP Standard Practice, BLA-7.8 Revision 6, "Responsibility for Transferred Equipment," addressed Limitorque valve operators specifically. Paragraph 5.0 "Preventative Maintenance" stated in part, "In addition to the PM program that must be established for Limitorque valves when they are transferred, the system engineer must determine the type lubricant used by the operator and have it replaced (if other than Exxon Nebula EP-1 is used). If the Limitorque valve is located in an environment of 140°F above, the system engineer must determine the type of lubricant used in the . . . [geared limit switch and initiate] replacement if other than Mobil grease 28 is used." It was evident from the context of paragraph 5.0 that it had not been revised to reflect the consolidated PM program as described by BLM 3.1 Revision 9.

4.1.5 Valve Findings, BLN (continued)

In all of the maintenance procedures reviewed, none was found to address (or even mention) the QMDS requirements. Although, Standard Practice BLA 3.2 dated April 13, 1984, Part 4, paragraph 2.0 "Environmental Protection of Equipment," did generally caution preparers of maintenance instructions about environmental protection of equipment. Electrical Maintenance Instruction EMSIL-14.3.1 dated May 6, 1985, "Limitorque Actuators," addressed DPM N82M3 maintenance requirements utilizing an initial inspection at the time of transfer and reinspections at 18-month intervals if grease leakage/damage was verified.

Another document relative to Limitorque PM was a generic letter to the ONP system engineers providing recommendations for Limitorque PM (part of recommended corrective action, BLN-DR-85-76-R dated November 18, 1985). This letter was provided by the cognizant system engineer and had no tracking number or date. It provided a brief history of Limitorque problems, the three maintenance activities delineated in the ONP PM/LUB data base but in greater detail, and a restatement of the referenced section of BLA-7.8 in DR-85-76-R. It also stated that "Construction is suppose to be initiating a program to change out all Limitorque operators with sun oil lubricant to the Exxon Nebula EP-1." According to conversations with the cognizant construction personnel, this wholesale change-out did not occur. Construction only changed-out grease when an oil seepage problem was identified.

BLN Standard Practice BLA 14.7 Revision 17, "Specialized Training," addressed just that. Standard Practice BLA 14.7 Revision 17, "Specialized Training" did list course number ST 25 "Environmental Protection of Equipment" whose purpose was to "assure that maintenance personnel are adequately trained on environmental qualification requirements. . . ." No Limitorque specific training course was listed. According to the cognizant Mechanical and Electrical Maintenance Supervisors, at least one trained craftsman would be utilized during PM activities on a Limitorque. They stated that most of their current personnel had received Limitorque training. According to conversations with the cognizant Maintenance Supervisor, Standard Practice BLA-14.6, "Craft Training" was in draft at the time of this evaluation. Neither QCP-1.3 Revision 8 nor BLM 3.0 series contained requirements for utilizing trained personnel during the performance of preventative maintenance activities.

4.1.5 Valve Findings, BLN (continued)

Relative to the concern citing that "some of the valves in the plant were rusted. . . they were O.K. inside, but they just looked bad," the BLN concern file (BLN-QCP-10.35-8-17) was reviewed for information. The concern was previously evaluated under QCP-10.35 and determined to be factual. The previous evaluation found in part "some areas such as valves and piping associated with air handling units and chiller packages are sustaining some deterioration because of sweating or water leakage, and they have been identified. Corrective action has been initiated. . . " The report expounded on the "corrective action" stating, "BLN/ONP is now preparing a Preventative Maintenance and Long-Term Lay Up Program for all equipment installed at BLN. . . . Once this review is completed, lay-up or preventative maintenance specifications will be issued for each system. In addition, any specific problem areas will be identified that may require additional measures. . . ." The BLN Mechanical Maintenance Supervisor stated that Standard Practice BLE-10 Revision 3, "Long-Term Preservation and Maintenance of Plant Equipment", was the procedure governing the described program. He stated that this administrative document established a series of lay-up instructions on a system-by-system basis. He also stated that the particular technical instruction addressing the concern issue was, at the time of this evaluation, still in draft, TI-PREV-05, "Mechanical Preservation Criteria Document". Both transferred and non-transferred equipment were addressed by this ONP lay up program; however, the Mechanical Maintenance Supervisor stated that external corrosion of valves as expressed in the concern would not be addressed by this program. The proper vehicles for addressing this type of problem were the MR for ONP and the Employee Involvement program for construction. ONP's Standard Practices BLA 7.6 Revision 2, "Construction/NUC PR Maintenance Interface," and BLM 10.1 Revision 10, "Preparation of Maintenance Requests", defined the vehicles for the initiation of corrective maintenance on plant equipment for ONP employees. According to BLA 7.6 Revision 2, the Construction Maintenance Request (CMR) was the vehicle for NUC PR employees to initiate corrective maintenance on equipment before tentative transfer. BLA 10.1 Revision 10, specified the MR as the vehicle for corrective maintenance initiation on transferred equipment. Neither document specified the identifying employees responsibilities for initiating corrective maintenance on plant equipment. BLM 10.2 Revision 6, "Processing and Scheduling of Maintenance Requests", paragraph 1.0, stated "any plant employee may initiate an MR and submit it to his supervisor for further processing."

4.1.5 Valve Findings, BLN (continued)

Construction utilized BNP-QCP-10.35 Revision 3, "Allegations/Employee Concerns/Differing Opinions" (now superceded by ECP-1, "New Employee Concerns Program"), as the vehicle for employees to voice concerns related to the ". . . quality of work or nuclear safety in design, construction and operation of BLN. . .". Paragraph 5.1 stated in part ". . BNP employees are responsible for voicing views about quality related issues. . . .". The procedure outlined steps for an employee to take from voicing it to his supervisor through voicing it to the NRC. DNC did not have a program comparable to ONP's MR program.

According to the statement of the concern, a functional problem did not exist, only a cosmetic one; therefore, the concern was not a problem. A problem did exist in that DNC employees did not have a vehicle comparable to the ONP MR for initiating and tracking corrective maintenance on plant equipment. Also, the responsibilities of ONP employees for initiating corrective action (an MR) when they identified the need was not delineated in the appropriate plant procedures.

Conclusions

Two valve issues were evaluated at BLN. One issue was relative to the proper storage and maintenance of Limitorque valve operators while the other was related to some valves in the plant looking bad because of exterior rust.

DNC's storage procedure, QCP-1.2, contained no specific instructions relative to Limitorque operators - neither storage level nor preferred warehouse storage orientation. The operators viewed in storage; nonetheless, were oriented properly and were located in a proper level (level B) storage facility.

The applicable section of ONPs Power Stores storage procedure, BLA-9.4 paragraph 5.25, was inadequate since it was based on TS-01.00.15.14.03 which was found inadequate in the generic portion of this report. Power Stores had no Limitorques in storage at the time of this evaluation.

4.1.5 Valve Findings, BLN (continued)

BLN had an excellently structured preventative maintenance program in that it assigned equipment PM assessment responsibilities for both nontransferred and transferred equipment to one individual, the appropriate ONP system engineer. This type of PM program structure should provide for more uniform equipment PM both before and after system transfer and avoid the problems identified at WBN. This program structure had only been in place a short time at BLN (since March 28, 1986). This fact possibly contributed to the discrepancies identified between the Construction and Power PM/LUB data bases.

ONP Standard Practice BLM-3.1 did not outline guidelines to be used by system engineers in assessment of equipment PM/storage requirements. These ONP PM/storage assessment guidelines were specified in construction procedure QCP-1.3.

The maintenance activities specified in section 5.0 of Administrative Standard Practice BLA-7.8 Revision 6 were not found in the PM data base. Also, the PM activities specified in EMSIL-14.3.1 (reference DPM-N82M3) were not found within the PM program.

BLN had no QMDS implementation program or any recognition of Environmental Qualification maintenance requirements within their maintenance program.

Construction's and Power's storage/PM activities for Limitorque valve operators were not equivalent. This should not have been the case since nearly all Limitorques at BLN, whether transferred or not, were either in warehouse or installed storage.

Relative to the issue of rusted valves, no functional problem existed per the statement of the concern, only a cosmetic one. A problem was in evidence in that a routine plant maintenance item was raised through QCP-10.35 which was an employee concerns program. It was found that DNC employees didn't have a vehicle comparable to the ONP MR for initiating and tracking corrective maintenance on plant equipment. It was also found that the responsibilities of ONP employees for initiating corrective action (an MR) when the need for corrective maintenance was identified was not delineated in the appropriate plant procedures.

4.2 HVAC Findings

4.2.1 Generic

The concerns within the HVAC element were WBN specific; therefore, no generic evaluation was performed.

4.2.2 WBN Specific

Discussion

There were two perceived problems in this element:

- The fire dampers in Diesel Generator Building (DGB) 1 and 5 had never been observed to operate properly.
- The inspections done in 1981 on the air supply and return wall ducts for the unit 1 Ice Condenser System revealed that a number of the ducts were blocked, restricting the air flow through the duct.

NSRS Investigation Report I-85-757-WBN adequately addressed the DGB fire damper issue. According to this report and the responsible test personnel, the fire dampers in Diesel Generator Buildings 1 and 5 were tested in Preoperational Tests TVA-24 and TVA-74F, respectively. All dampers passed the tests required by the test document.

The AHUs and associated air supply and return ductwork for the unit 1 Ice Condenser System were tested according to Test Instruction No. W-10.9, on November 7, 1981 and November 8, 1981. The results of these tests revealed an average air flowrate through the ducts of 766 CFM, which is less than the 1100 CFM required by the test. To determine the cause of the deficient flowrate, a visual inspection was done on the wall panel ducts on the crane wall side of the system. The results of this visual inspection were expressed in concern IN-85-879-001, where the CI stated, "This inspection revealed that a number of ducts were blocked/restricted varying from 30-percent to 100-percent."

Interviews with various cognizant personnel revealed that some access doors were installed in the bottom of the wall panel ducts on the containment wall side to allow removal of water and debris. In addition to this removal of debris, the fan speed for the AHUs was increased in an effort to increase the flowrate through the system. Other than the aforementioned, no other actions were implemented to increase the flowrate.

4.2.2 HVAC Findings, WBN (continued)

The flowrates through the ducts were tested again on January 9, 1984, according to MR A-231000. The average flowrate was found to be 1530.4 CFM, which exceeded the required 1100 CFM. Based on this test, the flowrate deficiency was considered closed.

Interviews with various personnel indicated that some blockage exists in the ducts. However, the severity of this blockage was mitigated by the fact that these ducts served no safety function during normal operation of the plant (as cited in DNE System Description N3-61-4001 R1). These ducts serve to maintain the ice bed which is itself the passive containment heat sink. In addition to this, a review of the Ice Condenser Daily Log Sheets from December 1, 1985 to April 22, 1986, revealed no significant increases of temperature within the system and indicated that adequate flowrates were being maintained.

Based on the acceptable flowrate test, interviews with cognizant personnel, and the information provided within the Ice Condenser Daily Log Sheets, the wall panel ductwork is serving the intended design function.

Conclusions

Two concerns were addressed in this element and no problems were identified. One concern was found to be not factual while another concern, related to the unit 1 Ice Condenser System, was factual; however, not considered a problem. That concern cited that the associated ducts were "blocked/restricted varying from 30-percent to 100-percent." The cited blockages were previously identified in the related preop test. A test deficiency had been generated, corrective measures were taken, and the affected test section successfully retested to clear the deficiency. Some duct blockage was considered acceptable since the required average air flowrate was exceeded in the retesting and no significant ice condenser temperature increases were recorded.

4.3 Mechanical Equipment Findings

4.3.1 Generic

The concern issues within this element were found to be specific to WBN only; therefore, no generic evaluation applied.

4.3.2 Mechanical Equipment Findings, WBN Specific

Discussion

The perceived problems within this element were summarized and grouped into the following:

A. Overpressurization of volume control tank.

B. TVA ironworkers fabricated items on Westinghouse drawing.

C. Possible cracked sleeve.

D. Bellows installed without proper paperwork.

E. Inaccurate "shooting-in" of U-2 feedwater heaters.

A. This concern stated that a tank in the Auxiliary Building, unit 1, at elevation 713, was overpressurized. The perceived problem was that the tank was bought off by engineering because it could not be removed for repair.

From discussions with cognizant personnel and review of construction NCRs 3877, Revision 1 and 6379, it was determined that the facts were that the unit 1 and 2 volume control tanks had been or could have been overpressurized. However, the statement that the tank was "bought off" was found not justifiable. Nonconformance reports identified each case of possible over pressurization and for each NCR a comprehensive evaluation of the tank was dictated as the corrective action. These dispositions were based on significant Westinghouse input and approval and field inspection, measurements, and tests. The tanks were found acceptable as-is.

B. This concern stated that neutron detector boxes shown on Westinghouse drawings were fabricated and installed on site. A WBN-PMO response stated that fabrication by TVA craft personnel of items on Westinghouse drawings was an approved practice via numerous methods. Discussions with cognizant personnel confirmed that this was an accurate statement. These items were intended to be fabricated and installed by TVA. Therefore, this does not represent a condition adverse to quality.

4.3.2 Mechanical Equipment Findings, WBN (continued)

C. This concern stated that there was a possible cracked sleeve through the crane wall and around Reactor Coolant System piping in unit 1. A review of the response from QTC/ERT revealed the following:

1. Concern as stated cannot be factual since neither hot nor cold leg passes through crane wall.

2. Concern was expressed secondhand and was overheard nearly three years ago.

3. A sleeve generally serves as a form for concrete placement to keep concrete off the pipe going through the hole. Cracks in concrete in the biological shield wall have been evaluated by the subcategory "Concrete." Cracks were determined to be shrinkage cracks and either within the limits of G-2 or evaluated by DNE.

4. Even if a crack existed it would not affect piping since the only possible loading on the sleeve is compressive.

D. This concern stated that bellows were installed without proper paperwork in the annulus area behind the north fire room, in the summer of 1985.

Discussions with cognizant construction personnel could not identify a fire room. However, bellows installation in the summer of 1985 did occur in north valve room.

Numerous problems were encountered with fit up, alignment, and damage of the bellows. These problems were all documented via a number of NCRs.

For the problem of damaged bellows, no acceptance criteria existed. However, a consultant recently examined the bellows and recommended a "use-as-is" disposition. Therefore, the bellows are acceptable as is. There is not a problem of improper paperwork. The CI may not have been aware of the NCRs that were filed or the consultant's study of the bellows.

4.3.2 Mechanical Equipment Findings, WBN (continued)

E. Concern IN-86-205-002 stated, in part that the unit 2 feedwater heater centerlines (heaters 1 and 2 on elevation 692) were inaccurate. (This concern was shared with the ECTG MP 706 subcategory).

No additional information was found upon a review of the ECTG files for this concern.

Per the "Responsibility Descriptions" for WBN, Revision 9-84, section 3.1.2, "MEU, EEU, HEU, IEU/Systems Engineer", under Installation, the assigned System Engineer's responsibilities were: "Provide engineering support and interpretation to crafts. Ensure installation is in accordance with design, vendor, and QC requirements. Perform non-QA inspections."

Met with the DNC Mechanical Engineering Unit Engineer responsible for/cognizant of the unit 2 feedwater heater change-out. The cognizant System Engineer provided the following information:

- The number 1 and number 2 feedwater (FW) heaters were not located on elevation 692 but on Turbine Building floor elevation 708.
- These vessels were nonsafety-related and were outside the scope of the WBN QA program; therefore, site QA procedures for equipment setting did not apply.
- No specific equipment setting tolerances were given on DNE or vendor drawings/instructions.
- Nominal center line elevations were given on TVA piping drawings 47W401, 420, 425, and 410 series and on TVA revisions to the vendor drawings.
- The WBN heater bases were modified by TVA (drawing 48N338-6) to adapt the Yellow Creek Nuclear Plant (YCN) heaters to the WBN system piping and embedded rails. The finished installation was comprised of field shortened pedestals on YCN heaters bolted to salvaged wheel assemblies cut from the pedestals of the scrapped WBN heaters. This was accomplished by means of two welded base plates.
- Provision was made for shims to adjust heater center line elevation.

4.3.2 Mechanical Equipment Findings, WBN (continued)

- The heaters were set using an optical level to locate the shell-end center line (as marked by the vendor). Civil QC control points were used as elevation references for the optical level. The shell center line was transferred to the heater opposite end using a water level. Measurements were taken to the closest 1/16-inch. Shims were installed as required in 1/8-inch increments.

- The finished installation met all design requirements and was accomplished with good engineering practice.

- The heater center lines were located as close as practically possible and were determined to be acceptable by the DNC Mechanical Engineering Unit.

The Feedwater Heater Instruction Manual, IIOM1, Revision 0, "Instructions for Installation, Operation, and Maintenance of Closed Feedwater Heaters," for the number 1 and number 2 heaters transferred to WBN from YCN by transfer requisition TR-831602 was reviewed for relevant information. Under "Setting Heaters," it gave no tolerance instruction/criteria for heater center line elevation. It did state, "The fixed supports have been designed so that shims have to be used to obtain the proper elevation and orientation."

QAPP 10 Revision 3, "Quality Assurance Program Policy - Inspection", paragraph 2, "Scope", stated in part, "This program is applicable to all safety-related items (contained in the Q-List, when it is issued). . . ". The Q-List was reviewed for documentation of the statement that the number 1 and number 2 heaters were non-QA and; therefore, did not require QA inspection. Systems 2, 3, 5, and 6 were all involved with these heaters. Drawings 91 QL2-158 Revision 5, 91 QK5-54 Revision 2, and 91 Q16-309 Revision 2 (systems 2, 5, and 6 respectively) listed "all valves, instruments, equipment, and piping" as non-QA. Also, drawing 91 QL3-249 Revision 11 (system 3) listed "heater A1, B1, and C1" as non-QA. These were all Q-List drawings.

4.3.2 Mechanical Equipment Findings, WBN (continued)

Based on the above findings, the technical portion of the concern citing, ". . . Inept engineering personnel were allowed to give bad technical direction to the craft on unit 2 feedwater heaters (number 1 and number 2 on 692 elevation). . . inaccurate 'shooting-in' of heater center lines by engineers . . . Craft not permitted to field run.", was not factual.

Conclusions

Five concerns were evaluated within this element. Of these, one was found factual; however, none were considered a problem. The factual concern stated that neutron detector boxes shown on Westinghouse drawings were fabricated and installed onsite. This was found to be an approved practice as the boxes in question were intended to be fabricated and installed by TVA.

4.4 Insulation Findings

4.4.1 Generic

The concern issues within this element were found to be WBN site specific; therefore, a generic evaluation did not apply.

4.4.2 WBN Specific

Discussion

The perceived problems of this element were:

A. Pipes are not insulated according to specifications.

B. Supports are insulated contrary to procedure.

C. There is no insulation between pumps.

A. The problem concerning pipes that are not insulated according to the specifications involved the high pressure steam lines in both units. A review of the PMO response to this concern revealed that the subject insulation was installed under two contracts (71C62-54462 and 76K72-820594). Investigations by the PMO, which

4.4.2 Insulation Findings, WBN (continued)

included a physical walkdown of the area given as an example in the concern, revealed that both of the above contracts specify a two-inch lap of the metal insulation cover and that the insulation and it's metal cover were installed in full compliance with the contract specifications. Upon interviewing the individual responsible for the PMO response, it was determined that TVA Contract Specification 2967 governed the installation of insulation at WBN.

Review of TVA Contract Specification 2967 verified the fact that a two-inch overlap in the metal insulation cover was required. This specification did not require the covers to touch without overlap, as described in the concern.

Based on the acceptable response by the PMO and a review of the requirements for installing metal insulation covers, there was no problem with the pipe insulation installation.

B. The problem of supports being insulated contrary to procedure was investigated by the NSRS in report I-85-667-WBN. The insulation in question was fire barrier material supplied by the 3M Corporation and presented on 3M drawing 5300-H2. The findings of this investigation determined that at least one application of the fire barrier material was contrary to procedure (e.g., The slits in the material were directly over one another instead of 180° apart as detailed on drawing 5300-H2.) Based on this, the NSRS recommended that an engineering evaluation be performed to determine if the installed configuration was acceptable.

The Mechanical Engineering Branch (MEB) responded to this recommendation by emphasizing the fact that TVA had committed, to the NRC, to install this material in accordance with "3M-supplied documentation." This documentation was based on barrier configurations that had been satisfactorily tested. The NRC had established criteria for evaluating deviations from test configurations and these criteria could not be satisfied with the material installed as described. Therefore, an engineering evaluation could not be performed.

4.4.2 Insulation Findings, WBN (continued)

Based on the above, PIR WBNMEB 8618 was issued to track this item. The disposition of this PIR required a test to be performed by the vendor (3M, Electro Products Division) to determine the acceptability of the installed configuration. According to the responsible 3M Corporation individual knowledgeable of the test, the subject test was performed on May 22, 1986 and the results were successful in qualifying the "as-installed" configuration of the fire barrier material. A final report on this test was forthcoming.

Based on the acceptable test results, as stated above, there was no problem with supports being insulated contrary to procedure.

C. Further information obtained from QTC revealed that the CI was referring to sound and heat insulation when he said, "There is no insulation between pumps on elevation 692."

Interviews with various responsible personnel failed to reveal any problems or requirements with regard to the insulation of pumps.

Mechanical Design Guide DG-M18.9.1 defined the purpose of insulation as follows: "Insulation is used for heat conservation, temperature control, prevention of condensation, and personnel protection." With regard to personnel protection the requirements were, ". . . equipment operating at temperatures above 135°F shall be insulated a minimum of 7-feet above and 1-foot and 3-inches horizontally from any operating walkway or platform."

The Design Standard Specifications covering the various pumps at WBN required that all contractors supply equipment that was in full compliance with all Occupational Safety and Health Act (OSHA) standards.

Interviews with both the Construction and Operations Safety Engineers did not identify any pumps that were in violation of safety standards.

4.4.2 Insulation Findings, WBN (continued)

A walkdown of all pumps on elevation 692 did not reveal any conditions that conflicted with the specifications. Some of the pumps in unit 2 were not insulated. However, this was due to the ongoing construction work and will be corrected as construction progresses.

Based on the above findings, there was no problem with insulation between pumps.

Conclusions

Three concerns were addressed in the Insulation element. One concern, relating that supports were insulated contrary to procedure, was investigated by the NSRS and found factual. The other two concerns were found not factual. Their investigation determined that at least one application of the fire barrier material was contrary to procedure (e.g., the slits in the material were directly over one another instead of 180° apart). Based on this, the NSRS recommended that an engineering evaluation be performed to determine if the installed configuration was acceptable. The Mechanical Engineering Branch (MEB) responded to this recommendation by emphasizing the fact that TVA had committed to the NRC, to install this material in accordance with "3M-supplied documentation". This documentation was based on barrier configurations that had been satisfactorily tested. A PIR was issued to address and track this . As corrective action, the vendor performed a test to determine the acceptability of the installed configuration. The subject test was successful in qualifying the as-installed configuration; therefore, no problem existed with the insulation configuration.

4.5 Pipe/Fittings Findings

4.5.1 Generic

Discussion

The twenty-five concerns addressed cited pipe and fitting related problems in the areas of temporary supports, material substitutions, leaks, hydrostatic testing, clearance, configuration, and procedure violation. Three concerns in the areas of leaks and procedure violation were found to be both factual and potentially a problem. The evaluation of a concern relating that patches in the 48 inch upstream portion of the cooling tower blowdown line at WBN "didn't work very well" was indeterminate. DNE and ONP were evaluating a downstream section of this line that was showing evidence of

4.5.1 Pipe/Fittings Findings, Generic (continued)

leakage. They stated that they would also include the upper section in their evaluation since it was constructed of the same materials and in the same manner, but not because of evidence of leakage in the cited portion or piping. The concern addressed under "procedure violation," which cited that pressure tests had not been applied on many NPP-1 ASME Code data forms for containment penetrations, was found factual and potentially generic to all sites. In addition, one concern which cited that the ERCW system at WBN was installed using material other than the design specified stainless steel was deemed potentially generic to and evaluated at SQN.

Relative to the issue of pressure tests not being applied on many NPP-1 ASME Code data forms for containment penetrations, two nonconformance reports (NCRs) had previously been generated at WBN to address this problem. WBN NCR 5609 Revision 0, dated April 27, 1984 cited that various system unit 1 and 2 penetrations ". . . were fabricated per ASME Section III Class 2 requirements but have at least one internal process piping weld that was not tested in accordance with NC-6000. Each of the NPP-1s have been statused "Not Applicable" for the penetrations 'Naed' hydrostatic testing indicating that the welds were not tested by the vendor and, because of their inaccessibility after fabrication, were not inspected at hydro pressures by an ANI or TVA inspector during the individual TVA system hydro tests . . . ." The apparent cause was cited as ". . . no specific requirement in the contract for these welds to be pressure tested [by the vendor]." The NCR was designated as "significant" and "generic." The nonconformance was closed on a use-as-is basis on May 22, 1984. Per the cognizant DNE engineer, no formal potential generic condition adverse to quality (CAQ) site notification was performed (for NCR 5609) since no procedural requirements to do so existed. DNE procedure EN DES-EP 1.26, "Nonconformance - Reporting and Handling by EN DES," Revision 7 (April 24, 1986) was the governing procedure. Section 6.0, "Handling NCRs Coming to EN DES from the Construction Site" paragraph 7(a), stated in part "Project Manager (or delegate) . . . determines and documents the cause, action required to prevent recurrence, and generic implications. . . ." As stated by the cognizant engineer, there was nothing in EP-1.26 which implied/specified formal notification of other sites or provided responsibility or vehicle for doing so when an NCR was received by DNE from a

4.5.1 Pipe/Fittings Findings, Generic (continued)

site. The cognizant DNE engineer notified BLN of the potential generic condition by phone. The cognizant BLN engineer informed DNE that the CAQ did not exist at BLN since their hydro procedure addressed the welds in question. The cognizant DNE engineer stated that only BLN was notified since BLN was the only other ASME plant.

According to the cognizant Codes and Standards Engineer, BFN piping was installed and tested to ANSI-B31.1 1967 edition. ANSI-B31.1, 1967, did not specifically state that all welds had to be visually inspected during hydrostatic tests. Section 137, "Leak Tests," stated "It shall be mandatory that the design, fabrication, and erection of power piping, constructed under this code demonstrates leak tightness . . . ."

Per the SQN FSAR, Tables 3.2.2-1 and -2, "Summary of Codes and Standards for components of the SQN," SQN was fabricated, inspected, and tested to ANSI-B31.7 and ASME Section III. USA Standard B31.7, "Nuclear Power Piping," Section I-737.1.1 "Hydrostatic Tests" stated in part ". . . examination for leakage shall be made of all joints and connections and all regions of high stress, such as regions around openings, and thickness transition sections" (same as ASME Section III, NC-6215). ASME Section III, NC-6121 also stated "All joints including welds shall be left uninsulated and exposed for examination during the test." These ASME Codes also applied to WBN and BLN.

WBN NCR 6420 R0 was written 10-28-85 against the same CAQ as 5609. It was written to nonconform 32 of the unit 2 penetrations listed in 5609 which had not been hydrostatic tested at the time of NCR 5609 closure. This was necessary since part of the justification for closing 5609 on a use-as-is basis was that the " . . . welds are so close to TVA welds, which <u>were</u> inspected, that it is reasonable to assume leakage from these welds would have been detected during the [individual system hydro] inspection . . ." (memo MEB 840517258 from Project Manager, WBNP). This NCR was still open at the time of this evaluation.

4.5.1 Pipe/Fittings Findings, Generic (continued)

The cognizant WBN DNC N5 Engineer explained that when NCR 6420 was generated recommending the same use-as-is corrective action; however, the ANI failed to give approval (memo B26 85 1220 007 from Project Manager, WBNP, to Project Manager, WBN Engineering Project). As documented by memorandum B26 8604 29 0014 from DNE to DNC, an approved correction method was agreed upon in a January 24, 1986 meeting between concerned parties. NCR 6420 R0 was open pending arbitration between the NRC and TVA relative to the acceptability of the NCR 5609 penetration welds (use-as-is).

Office of Engineering Procedure OEP-17 R3, "Corrective Action", was DNEs procedure which governed the documenting, evaluating, and resolving of NCR 6420 (this procedure replaced EN DES-EP 1.26). Paragraph 3.2, "Timeframes," stated in part "All OE employees are responsible for immediately documenting any CAQ identified and to promptly evaluate generic implications especially with respect to OL [Operating Licensed] nuclear plants. . ." Paragraph 4.5, "Construction NCRs/SCRs," stated in part "The ([Design] Project Manager) PM receives OC NCRs/SCRs sent to OE for dispositioning; assigns each to a responsible (Project Engineer) PE to handle . . . ." It went on to state, the PE/GH "Reviews the OC NCR/SCR; if required, provides corrective action to prevent recurrence on the SCR; confirms the determination of significance on the NCR. Assesses the condition to determine if a potential generic condition evaluation is required within OE; if yes, completes a potential generic condition evaluation memo (attachment 5)."

As specified by the above portion of OEP-17, a Potential Generic Evaluation Memo (B45 86 0311 255 from Chief Nuclear Engineer to the appropriate SQN, BFN, and BLN Design Project Managers) was sent to each Design Project.

No instructions existed or responsibilities outlined within the text of OEP-17 relative to what each Engineering Project was to do upon receipt of a Potential Generic Condition Evaluation Memo. The memo form (attachment 5 of OEP-17) was self explanatory and gave the Chief or Manager of the respective design project two disposition choices: a) Does not exist [CAQ] or b) Does exist. If, upon evaluation of the CAQ for applicability to that site, the CAQ was found to apply, an NCR/SCR was to be generated at that site and the NCR/SCR number listed in the provided blank.

4.5.1 Pipe/Fittings Findings, Generic (continued)

Conclusion

The concerns which cited pressure tests were not applied on many NPP-1 ASME Code Data Forms for containment penetrations at WBN was found factual as documented by WBN NCRs 5609 R0 and 6420 R0. NCR 5609 R0 was closed on a use-as-is basis while NCR 6420 was still open at the time of the evaluation.

Relative to this CAQ being generic to other sites, no formal notification of the other sites was made at the time of NCR 5609 due to no DNE procedural requirement to do so (EN DES EP-1.26). BLN was notified by telephone of the potential CAQ. They responded that their procedures adequately addressed the issue. Only BLN was notified since BLN " was the only other ASME plant." Sequoyah, however, was fabricated, inspected, and tested to ANSI B31.7 which also required the same level of piping examination during hydrostatic tests (ANSI B31.7, 1-737.1.1 and ASME Section III, NC-6215) as WBN or BLN. When NCR-6420 R0 was issued from WBN, a Potential Generic Condition Evaluation memo was issued, as required by the then current governing procedure, OEP-17 R3, to all sites. This new procedural requirement resolved the previously described deficiency in the DNE CAQ program relative to no documented site notification and site evaluation of potentially generic CAQs.

Documentation of the potential generic condition evaluations at each project in compliance with OEP-17 shall suffice in completing the evaluation of this issue.

4.5.2 WBN Specific

Discussion

Twenty-two concerns were evaluated at WBN within the pipe/fittings element. The stated areas of concern were:

A. Temporary Support

The concerned individual (CI) observed a 100 foot run of 30 inch dia. pipe drop 3 inches to 4 inches when a hanger was removed under a work package in the Turbine Building.

4.5.2 Pipe Fittings Findings, WBN (continued)

B. Material Substitutions

1. Different schedules of pipe are welded together.

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

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

4. Three specific concerns:

(a) There is a possibility of leaks and wrong class of fittings in the sprinkler system in the 5th Diesel Generator Building.

(b) Craft personnel use "Superglue" instead of "Permatex" to seal gaskets to flanges.

(c) The wrong size expansion joint is installed on a 10 to 12 in. dia. SS pipe in the "argon pit" in the Auxiliary Building, unit 2.

C. Leaks

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

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

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

D. Hydrostatic Testing

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

2. Engineers fail to fill out documentation (hydrostatic testing) in accordance with procedural requirements resulting in unnecessary rework because of the lack of appropriate objective evidence.

4.5.2 Pipe/Fittings Findings, WBN (continued)

3. The unit 1 Fire Protection System Hydro was improperly conducted by running the pump throughout the test to maintain test pressure.

E. Clearance

There is a 2 inch dia. stainless steel (SS) pipe rubbing against an access ladder in the unit 2 Reactor Building.

F. Configuration

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

G. Procedure Violation

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.

The respective findings were:

A. Temporary Support - The CI observed a 100 foot to 150 foot run of 30 inch o.d. pipe drop 3 to 4 inches when a hanger was removed.

1. None of the other Employee Concerns Task Groups (ECTG) were found to be addressing a similar concern.

2. The PMO investigation (PMO Report IN-86-200-004) found no 30 inch o.d. pipe in the cited area; however, they did locate and inspect a 24 inch pipe which was in the cited area and undergoing rework by the Welding Engineering Group (Work Package NH06B09). Their report stated that it appeared to be in no apparent stress and seemed adequately supported by temporary and permanent supports.

4.5.2 Pipe/Fittings Findings, WBN (continued)

3. The cognizant DNC Hanger engineer cited Work Package NH06A09, R6 as the package under which work was performed on the 24 inch dia. pipe in question. He stated that he was unaware of the pipe moving the 3 to 4 inches as described by the concerned individual. He stated that the work package was complete; however, the hangers had not been permanently set (they were temporarily pinned) since that would be done at the time of the applicable hydrostatic test with the pipeline full of water. Any hanger misadjustment would be identified and corrected at that time.

4. A review of G-43, R7, Section 3.0, supported the cognizant DNC Hanger engineer's statements relative to hanger setting sequence.

B. Material Substitutions

In response to a request for additional information relative to a concern (IN-85-964-002) citing that a "superintendent had temporary materials put into permanent service in the intake pumping structure," QTC provided the following information:

1. The craft superintendent had installed carbon steel fittings (elbows and tees) which were purchased as "temporary non-Q in permanent Q-systems." They went on to say that the size of the fittings was "3 inches and under butt welded fittings," the location was the "intake pumping structure," and the timeframe was "late 1984 or early 1985."

2. The previous evaluations performed by the NSRS and the PMO were found to adequately address the concerns in Subgroups a, b, and d:

   (a) Subgroup a - Concerns: IN-86-184-002, IN-86-184-004, IN-85-532-003, IN-85-793-003, and IN-85-982-003. Mixed schedules of pipe welded together.

4.5.2 Pipe/Fittings Findings, WBN (continued)

NSRS Report I-85-680-WBN specifically evaluated concern IN-86-184-002 and IN-86-184-004. This evaluation was also found applicable to concerns IN-85-352-003, IN-85-793-003 and IN-85-982-003. The NSRS findings were: (1) The appropriate safety classes for piping systems and components were based on the evaluation of various criteria such as location (e.g., inside/outside containment), pressure, temperature, auxiliary versus mainline, shutoff capabilities (or orifices) upstream and/or downstream, and redundancy (alternate paths available), and (2) in any given piping system, system design change points could be designated where any of the above criteria changed. This report concurs with those findings.

(b) Subgroup b - Concerns: IN-85-211-001 and IN-85-211-002. The ERCW line coming from pumping station to Reactor Building has had a leak for approximately 2 months. ERCW line originally was to be stainless; however, SS was not installed. At least one, if not two, pumps had to be replaced because of insufficient water.

NSRS Report Numbers I-85-118-WBN and I-85-166-WBN evaluated concerns IN-85-211-001 and IN-85-211-002 (concern 001 was inclusive of 002). The NSRS findings were in part: (1) Review of MRs and performance of a system walkdown revealed no leaks beyond small flange drips . . . due to confusion as to which line the CI was discussing, NSRS had QTC contact CI for additional information. CI was not sure and had no personal knowledge of the specific line involved. CI had received information "second-hand." (2) . . . the portion of the ERCW between the pump house and plant has always been specified as carbon steel not stainless as stated by CI. (3) . . . there has been replacement work on pump shafts because of manufacturing defects . . . no failures in pumps have been attributed to any system leaks or water starvation." This report concurs with the NSRS findings.

4.5.2 Pipe/Fittings Findings, WBN (continued)

(c) Subgroup d - Two specific concerns - IN-85-173-001 and IN-85-964-X06: (1) There is a possibility of leaks and wrong class fittings in the sprinkler system in the 5th Diesel Generator Building; and (2) craft personnel use "superglue" instead of "permatex" to seal gaskets to flanges. IF2

(1) 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.

(2) 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 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 adhesive would not be beneficial. (4) Nuclear Power's procedure TI-35 . . . addressed adhesives approved for use . . . was approved for use . . . (5) The only quick setting adhesive stocked on QC's warehouse was a product called "Tite Seal." It was identified as a cyanoacrylate-type adhesive." This report concurs with the NSRS findings.

(d) Subgroup c - Concerns: IN-85-964-002 and PH-85-035-001. Temporary materials were improperly placed in permanent service.

4.5.2 Pipe/Fittings Findings, WBN (continued)

No previous evaluations had been performed relative to the two concerns in this subgroup.

Neither the Materials nor the QA/QC category ECTGs were addressing concerns similar to those in subgroup c (above) according to the Data Base (ECPS) printout and conversations with cognizant category personnel.

The following findings relate to concern IN-85-964-002, citing that a superintendent had temporary materials put into permanent service in the intake pumping structure.

According to interviews with the named WBN Craft Superintendent, an additional WBN Craft Superintendent and other knowledgeable individuals, the implicated craft superintendent was not involved in any work at the Intake Pumping Station (IPS) during the specified timeframe (late 1984, early 1985). Interviews with the cognizant system engineers supported that fact. (System 67, Essential Raw Cooling Water (ERCW) and system 26, High Pressure Fire Protection (HPFP) were the 'Q' systems located at the intake pumping station.) They also stated that the systems located in the IPS were already transferred at that time. A review of applicable ONP transfer documentation supported this. The cognizant engineers were not aware of any work performed that fit the concern description. They also stated that the fittings could only by 2-1/2 or 3 inch dia. since fittings smaller than 2-1/2 inch dia. are socket welded, not butt welded. A review of workplans performed during the specified timeframe on the referenced systems revealed that no work of the nature described had been performed during the timeframe specified by the CI.

The following findings related to concern PH-85-035-001 citing that a 4 inch dia. SS drain line running from elevation 676 to 713 from the collector tank in unit 1, system 77 or 26 was installed as a temporary line; however, the line was left as permanent, with no inspection or paperwork documented.

4.5.2 Pipe/Fittings Findings, WBN (continued)

Conversations with DNC, DNE, and ONP engineers determined that the line could not be a Fire Protection Line (system 26) since the fire protection system did not utilize SS nor any tanks in the described location. System 77, waste disposal, utilized both SS piping and tanks on the described elevation and was assumed to be the system in question.

The cognizant DNC and DNE system engineers (the DNC engineers consulted were cognizant of system 77 back to 1973) had no knowledge of any temporary SS line being installed much less the described case of one being installed temporary and left permanent without proper paperwork.

A review of the applicable flow and physical drawings 47W830-1, R19; 47W852-2, R7, 47W560-25, R4; 47W560-1, R26; 47W852-3, R9L; 47W852-4, R11L; 47W479-8, R9; 47W479-9, R13 with the aid of the cognizant NU CON engineer as well as conversations with DNE revealed that only the tritiated drain collector tank, not the floor drain collector tank, had 4 inch dia. SS lines coming from elevation 713. There were six of these lines shown on drawing 47W852-2, R7. According to this drawing, all of these lines were class H; therefore, they provided no safety function.

A comparison of the tritiated drain collector tank and the floor drain collector tank piping installation (by field inspection) with the applicable as-constructed drawings revealed no discrepancies.

According to note 10 and 11 of drawing 47W830-1, R19 and notes 25 and 26 of drawing 47W560-1, R30 hydrostatic tests did not apply to these lines (QCT-4.37). Also drawing 47W830-1, R22 note 3 states ". . . all system piping shown is TVA class H unless indicated otherwise . . ." QCP-4.10-2, "Pipe Location Verification" (line and grade), was not applicable to the sections of pipe in question since they were embedded drains having no

4.5.2 Pipe/Fittings Findings, WBN (continued)

segment I.D. (Waste Disposal System Pipe Segment Identification Maps 0-077-47W879-8-1, R0 and 0-077-47W879-3-11, R0). The only documented inspections applicable to these class H embedded drain lines was DEC-QCP-2.2, R0, "Concrete Placement and Documentation." Paragraphs 6.5.1 and 6.5.4 stated that the pour card is the control and concrete record for each pour and that the card functions as a release when signed by the appropriate engineers and the Construction Shift Engineer. The pour cards applicable to the concrete where the drain lines come through the ceiling (692) above the tritiated drain collector tank (Pour AB-C1, C2, to elevation 690 dated March 11, 1974, and Pour AB-C3, C4, C5, and C6 to elevation 690, dated March 15, 1974) had been initiated by both the lines and grades engineer and the mechanical engineer. Their signature signified that installations conformed to drawings dimensional tolerances and notes.

The following findings were relative to concern IN-85-089-007, "The wrong size expansion joint is installed on a 10 to 12 inch dia. SS pipe in the "Argon Pit" in the Auxiliary Building, unit 2. . . . The Argon Pit is east to the south valve room one level below elevation 757."

None of the knowledgeable individuals contacted were familiar with a room or area which the CI cited as the "argon pit." The described location of the "argon pit" was confusing. The area "east of the south valve room," was a location in the yard adjacent to the Auxiliary Building, elevation 729. However, the CI also stated that it was located "in the Auxiliary Building, unit 2. . . one level below 757", which would have been elevation 737 inside the Auxiliary Building. A walkdown of both of the described locations was conducted but revealed no area/room which could have been described as an "argon pit."

C. Leaks

No additional information was received from QTC relative to IN-85-442-X10. This concern cited that FCR-F3376, which was issued to repair failed patches in the Cooling Tower Blowdown Line, did not work very well.

4.5.2 Pipe/Fittings Findings, WBN (continued)

FCR-F3376 simply added a detail to cooling tower blowdown piping drawing 17W303-1, Revision 10, showing a typical 18 X 18-inch SS repair plate.

A review of drawing 17W303-1, Revision 10 supported the above statement. No plate locations were specified on the drawing.

PMO Report IN-85-442-X10 documented the events leading up to the patch of the line referenced in the concern. It specified the patches general locations as from the cooling tower weir box to the tee and goes on to state, "This [patch] procedure did not stop the leaks totally, but reduced the inflow and outflow of water enough to be acceptable to OE."

Walkdowns of the cooling tower blowdown piping location between the weir and the tee did not reveal any evidence of pipe leakage.

Interviews with the cognizant DNE, ONP, and DNC personnel were inconclusive relative to whether or not the repair was "acceptable." The cognizant DNC engineer stated that the patches in question were installed by divers who took photographs of groundwater leaking in after installation. He went on to state, the leakage was acceptable to OE. They reasoned the hydraulic pressure in the pipe, when full, would improve the sealing effectiveness of the patches (since the patches were installed from the inside of the pipe) and that in leakage would lessen as the water-logged found dried with time. The cognizant DNE engineers emphasized that the blowdown line was never designed to be watertight by virtue of the material originally used . . . corrugated metal pipe (CMP). DNE stated that they were presently evaluating, with input from ONP, a leakage problem in the downstream (66-inch) section of piping between the tee and the diffuser valves. (This section of piping was not patched with the SS patches in question). A meeting was held June 9, 1986 at the site with representatives from modifications, operations, mechanical maintenance, and DNE to discuss solutions to the downstream leakage problem. No solution was determined during this meeting. The cognizant DNE system engineer stated that the entire fiberglass lined section of piping would be

4.5.2 Pipe/Fittings Findings, WBN (continued)

addressed in the resolution to the leakage problem in the 66-inch dia. section of piping even though there was no evidence of leakage in the 48 dia. inch section of piping at present. The cognizant ONP personnel concurred that the present leakage problem just upstream of the diffusers must be addressed and that 48-inch section also be evaluated.

Note: ECTG Report number 10000, "Blowdown Lines Backfill," section 4.3 also addressed this issue from a backfill standpoint.

NSRS Report I-85-414-WBM (concern IN-86-055-002) dated November 20, 1985 documented an evaluation of an alleged leaking pipe on elevation 692 in the Auxiliary Building, unit 1. The evaluators requested additional information from QTC; however, none was provided. They performed two walkdowns of the cited area but found no indications of an existing pipe leak. The concluded, ". . . the alleged leak had been corrected prior to the walkdowns or was too small to have provided visible indicators during the walkdowns."

The applicable plant instruction, AI-9.2, Revision 17, page 5 of 33, paragraph 5.1.1 stated, "All plant personnel shall report the need for maintenance on plant equipment or systems by the use of an MR.

A review of an MR printout, sorted for the Mechanical Maintenance Section MRs between July 31, 1985 and October 30, 1985 revealed that a number of MRs had been written against leaking pipes/valves/lines, etc., on elevation 692 in the Auxiliary Building.

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 walkdown, and contacted a number of cognizant individuals. The NSRS evaluator found no supporting evidence of the cited leak nor of the other accusations cited in the concern. This evaluator concurred with the NSRS report findings.

4.5.2 Pipe/Fittings Findings, WBN (continued)

D. Hydrostatic Testing

NSRS Reports I-85-598-WBN and I-85-398-WBN, and PMO Report IN-85-210-001 (concerns IN-86-205-001, IN-85-534-005, and IN-85-210-001, respectively) documented evaluations of three concerns related to hydrostatic testing. The first concern was specifically related to possible damage of the ERCW piping because of hydro testing at excess pressure. Based on interviews with cognizant personnel, an MR review, and a review of the applicable ERCW hydro test packages, the NSRS evaluator found no evidence of improper ERCW hydrostatic test conduct or the use of excessive pressures. This evaluator concurred with the NSRS findings.

The second concern cited that a particular hydrostatic test was conducted improperly since the pump was run throughout to maintain test pressure. The NSRS evaluator found, in part, "there is no restriction in any of the applicable codes against maintaining hydrostatic test pressure with an auxiliary pump, and there was no lower level test procedure which included or described utilizing this pump." The associated NSRS report recommended that DNC generate an addendum to QCT-4.37 showing the procedure for the use of such a pump. A review of Section 9.2 of G-29, Process Specification 3.M.9.1, Revision 6, dated February 8, 1985, "Hydrostatic Test Acceptance Criteria," and WBN-QCT-4.37, Revision 4, "Hydrostatic Testing," supported the NSRS findings. Also, Addendum 1 to QCT-4.37, Revision 4, dated April 2, 1986, had been incorporated as a result of the NSRS recommendation. This evaluation report concurs with the NSRS findings.

The third concern related to engineers not documenting hydrostatic test in accordance with procedural requirements. The 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

4.5.2 Pipe/Fittings Findings, WBN (continued)

included before the test. After the test is completed, the same test package is 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 evaluator concurred with the PMO findings.

E. Clearance

This specific concern cited that a 2 inch dia. SS pipe was rubbing against an access ladder in the unit 2 Reactor Building.

Construction Specification N3C-912, Revision 3, "Support and Installation of Piping Systems in Category I Structures," paragraph 6.3.6.5-a stated, "interferences between pipe and adjacent structures or equipment during a seismic or design basis accident event which could result in structural failures, loss of pressure boundary, or adversely affect equipment operability shall be prevented . . . ." Also, QCP-4.10-2, Revision 9, "Pipe Location Verification," paragraph 7.1.4 "Acceptance Criteria" stated, "clearance - no part of a system is installed touching any other object except for supports on the system."

With the aid of the cognizant DNC MEU engineer, a walkdown of the cited unit 2 interference was performed. "Daylight" clearance existed between the ladder and the 2 inch dia. SS pipe. This clearance was not obvious; however, there was enough clearance for a piece of paper to be placed between the ladder and the pipe. According to the cognizant engineer, this clearance amount was adequate. The cognizant engineer had inspected the interference location on unit 1 and found obvious clearance.

A review of drawing 47W813-1, Revision 30 revealed that the line in question was a class G, system 68 (RCS), miscellaneous valve leakoff line.

An interview with the ONP Preop Test Director for Thermal Expansion (Preop Test W-1.7) revealed that by virtue of rigid pipe supports the pipe in question was not designed to move during heatup.