U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-461/86045(DRS)

Docket No. 50-461 License No. CPPR-137

Licensee: Illinois Power Company
500 South 27th Street
Decatur, Illinois 62525

Facility Name: Clinton Nuclear Power Station, Unit 1

Inspection At: Clinton Site, Clinton, Illinois

Inspection Conducted: June 16-20 and June 30-July 2, 1986

Peter R. Wohld

Inspector: P. R. Wohld

July 30, 1986
Date

Approved By: M. P. Phillips, Chief
Operational Programs Section

July 30 1986
Date

Inspection Summary

Inspection on June 16-20 and June 30-July 2, 1986 (Report No. 461/86045(DRS))
Areas Inspected: Routine, announced safety inspection of an allegation on motor-operated valve limit switch gear greasing; licensee action on IE Bulletin 85-03 (Motor-Operated Valve - Improper Switch Settings); motor-operated valve lubrication, mechanical condition, and electrical condition; Limitorque operator environmental qualification; and plant security.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Illinois Power Company and Contract Personnel

*K. Baker, Supervisor, I&E Interface
*E. Corrigan, Director, Quality Engineering
*H. Daniels, Jr., Project Manager
R. L. Dawson, Electrician
M. Delacruz, Assistant Supervisor, Mechanical Maintenance
*S. Fisher, Manager, NP&S
*J. Greene, Manager, NSED
*D. Hall, Vice President, Illinois Power
*V. Harris, Technical Advisor
R. Hoem, Supervisor, Maintenance Planning
*H. Lane, Manager, Scheduling and Outage
M. Maher, Supervisor, Electrical Maintenance
*J. Perry, Manager, Nuclear Program Coordination
*W. Quinn, Senior MOVATS Technician
*R. Schaller, Director, Nuclear Training
*F. Spangenberg, Manager, Licensing and Safety
*K. Temple, Plant Staff, Technical
*J. Wilson, Manager, Clinton Power Station

The inspector also contacted and interviewed other staff and contractor personnel.

*Denotes those attending the exit meeting on July 2, 1986.

2. Followup on Allegations

The inspector performed followup inspection activities relative to an allegation pertaining to activities at the Clinton site. Results are as indicated below.

(Closed) Allegation RIII-86-A-0086 (Memorandum dated May 9, 1986)

In May, 1986, an individual, who had been employed at Clinton Power Station, indicated that he had been terminated because of failure to prevent mixing of grease in a limit switch gear compartment of a valve motor-operator. The individual was following maintenance procedure CPS No. 8451.01, Revision 6, "Generic Procedure for Motor-Operated Valves," at the time. The person indicated that if the work done was unacceptable, then, the procedure was inadequate and all valves worked under this procedure had the potential for being in a degraded state.

NRC Review

The adequacy of the regreasing procedure was reviewed in relation to other activities that control the quality of the work process including formal training, on the job training, "tool box" skills, and administrative controls. The inspector interviewed the individual raising the concern, the involved job foreman, the job supervisor, and the Stone and Webster training supervisor. Training records were reviewed, the regreasing procedure and documentation were evaluated, and ten safety-related valves were physically inspected for degraded grease conditions in the limit switch gear compartments.

The review indicated that the procedure alone does not provide enough information on the mechanical details involved in regreasing the limit switch gears, including the lack of a precautionary note on the potential for misaligning the gears during the process. Hence, technical training requirements and "tool box" skills are required to supplement the procedure. Training records, signed by the concerned individual, indicate that valve regreasing training was provided, but no records (such as lesson plans, etc.) are available to indicate the details covered. The individual indicated that the training (given in the shop) was relatively brief and covered regreasing the gearbox of the valve operator, not the limit switch gear compartment.

After discussing the limit switch gear grease mixing concern with those indicated above, and as confirmed by the valve physical inspection, mixing of grease types did not occur; instead, in replacing old Beacon 325 grease with new, some residual amount of the old grease was allowed to remain in the gears before regreasing because the gears were not disassembled in the regreasing process. In the inspector's opinion, the gear lubrication was improved by removing most of the old grease and adding new grease of the same type. In addition, periodic inspections are in the maintenance program to assure the continued adequacy of the lubrication. Procedural steps are clear on not mixing greases of different types.

Conclusions

The inspector concluded that no valve degradation has occurred as a result of grease mixing in the valve operator limit switch gear compartment; however, training controls need to be improved or procedural details provided to assure that the job requirements are properly understood in the future.

The licensee has indicated that appropriate training has been completed for all involved and a possible revision to the procedure is being considered. The inspector recommends that, with respect to the procedure, a caution note be included about the potential for misaligning the gears during regreasing. Completion of the licensee's activity in this area and subsequent inspector review is considered an open item (461/86045-01(DRS)).

3. Licensee Action on IE Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings"

The licensee has responded, as required, by letter dated May 15, 1985. Preliminary indications from the Office of Inspection and Enforcement (IE) are that the response does not contain adequate information for evaluation. The inspection was done without the benefit of IE input, however, because of the advanced status of the licensee's implementation of commitments made, a need to evaluate plant equipment conditions to support plant licensing, and because of an allegation and concerns expressed by others in this area.

From an overall perspective, with respect to the concern in the bulletin for valve operator switch settings, the motor-operated valves at Clinton Power Station should be fully acceptable at this time. First, the electrical schematic design for safety-related valve strokes minimizes much of the need for critical adjustment of the torque and limit switches; second, MOVATS test equipment has been used to increase the confidence level that torque and limit switches have been set properly. The licensee has been conservative and timely in this respect; however, the adequacy of differential pressure testing to be done and long-term operability testing need further evaluation.

Below are inspection finding details:

a. Valve List and Valve Control Logic

All valves identified in the licensee's response are rising stem types, 12 gate valves and 11 globe valves. These valves "open on limit" and "close on torque," which is typical, and incorporate thermal overload and "anti-hammer" protection in the circuitry. For safety-related valve strokes, a keylocked, TEST/BYPASS switch is provided in the main control room that is always in the BYPASS position except during valve testing. In the BYPASS position:

For an open stroke -

(1) The thermal overload is bypassed, and
(2) The open torque switch is bypassed for the full stroke.

For a close stroke -

(1) The thermal overload is bypassed, and
(2) The close torque switch is bypassed until less than 1 second of valve travel remains before torque switch trip.

The safety-related strokes are not identified in the licensee's bulletin response; hence, these were extrapolated from the draft Plant Technical Specification, Table 3.8.4.2-1, "Motor-Operated Valves Thermal Overload Protection," which lists the safety-related valve strokes for which continuous bypass protection must be periodically verified. The below list identifies these valve

strokes (which are the only ones considered by the inspector under the bulletin requirements). Valve 1E51-C002E, RCIC Turbine Trip and Throttle Valve, still needs additional review by the inspector and is considered an open item pending that review (461/86045-02(DRS)).

Safety-Related Valve Strokes

Valve ID	Valve Function	Safety-Related Stroke Direction: OPEN	CLOSE
High Pressure Core Spray System			
1E22-F001	HP Suction Valve	X	X
1E22-F004	Injection Valve	X	X
1E22-F010	HP Test Return Valve		X
1E22-F011	HP Test Return Valve		X
1E22-F012	Low Flow Bypass Valve	X	X
1E22-F015	Suppression Pool Suction Valve	X	X
1E22-F023	Suppression Pool Test Valve		X
Reactor Core Isolation Cooling System			
1E51-F010	Cond. Storage Tank	X	X
1E51-F013	Pump Discharge Valve	X	X
1E51-F019	Pump Min-Flow Bypass Valve	X	X
1E51-F022	Pump Test Return Valve	X	X
1E51-F031	Suppression Pool Pump Section Valve	X	X
1E51-F045	Steam Supply Valve	X	X
1E51-F046	Cooling Loop Shut-off Valve	X	X
1E51-F059	Pump Test Return Valve	X	X
1E51-F063	RCIC Steam Flow Iso. Valve	X	X
1E51-F064	RCIC Steam Flow Iso. Valve	X	X
1E51-F068	Turbine Exhaust Iso. Valve	X	X
1E51-F076	Steam Warm-up Iso. Valve	X	X
1E51-F077	Vacuum Breaker Iso. Valve	X	X
1E51-F078	Vacuum Breaker Iso. Valve	X	X
1E51-F095	F045 - Bypass Valve	X	X
1E51-C002E	RCIC Turbine Trip and Throttle Valve (not listed in T.S. Table 3.8.4.2-1)		

b. Valve Stroking Under Differential Pressure

Differential pressure testing planned or already completed by the licensee is with a very low capacity hydro pump, useful only during the initial portion of an open stroke. The open torque switch is bypassed during the differential pressure condition; hence, there is no torque switch setting or "torque switch bypass limit switch" setting to be challenged or verified adequate (which was one of the primary goals of the differential pressure test). It is the

inspector's opinion that, regardless of test method, instrumentation should be used and data collected and evaluated to 1) show the closure torque switch setting adequacy, and 2) show valve margin to failure that will allow for future changes (e.g., stem packing friction increase) or degradation.

With MOVATS used to set or check the valve operator torque switches, the operators are assured to provide the stem thrust required by the valve manufacturer at the time of testing. This leaves the question of adequacy of the vendor supplied thrust number and long-term adequacy after age-related or other degradation occurs. For the Clinton Power Station design, the torque switch setting can only affect the last bit of valve closure travel and, hence, is of less importance than the question of overall, long-term valve operability.

The question of the adequacy of differential pressure testing to be performed, the information to be derived from such testing, and the use of this information in evaluation of valve adequacy is considered an open item pending further evaluation by both the licensee and NRC (461/86045-03(DRS)).

c. Long-Term Operability

In the bulletin response, the licensee has indicated a trending capability for a number of parameters that may be used for long-term valve operability monitoring; however, there is no program described or commitment to develop a program in the response nor is a program developed that adequately addresses this area. There are a number of measures that can be considered to address long-term operability involving the areas of preventive and predictive maintenance. Until a satisfactory program is developed, there is no assurance that valve torque switches or other valve mechanical equipment shown adequate today will be adequate to handle the system functional design requirements in the future. The development and implementation of an adequate, long-term valve operability program is considered an open item (461/86045-04(DRS)).

d. Open Limit Switch Setting to Prevent Valve Stem Backseating

The licensee opened each valve electrically, then used the operator handwheel to verify that additional stem travel occurred before valve stem backseating. MOVATS was used to determine the backseating stem load and potential damage if backseating was suspected. The open limit switch was adjusted in each case, after backseat load verification, to assure that valve stem motion was available on the handwheel prior to backseating (after electrically stroking the valve open).

4. Motor-Operated Valve Lubrication

The licensee needs to improve the control of valve lubrication, particularly for valve stem threads. It appears that some valve stem

threads were not lubricated during construction. Physical inspection of ten valves resulted in identifying 2 that were "dry" (OMC010 and 1CC050), 4 that were acceptable, and 4 that were within the operator housing and could not be observed by simple inspection (1B21-F067C, 1B21-F019, 1E51-F064 and 1E51-F045). Where there is a lack of lubrication, low stem thrust loads can result. Recent testing using MOVATS, while assuring vendor thrust requirements are met, may have resulted in increasing torque switch settings to compensate for the lack of lubrication if the lubrication problem was not addressed first.

Inspection of the geared limit switch gear lubrication indicated the use of both Beacon 325 and Mobile 28. Either is acceptable, but Beacon 325 has hardening characteristics that require more frequent inspection. The inspector noted that both greases are fairly solid so that most of the grease is pushed aside. The grease that was effective in providing lubrication was only the small amount physically clinging to the gears. It would appear desirable to smear some of the excess grease onto the drier gears during periodic inspections. This could be included in the maintenance procedure.

Inspection in 10 gearbox grease compartments indicates that lubricant separation has begun in some valves. Valve 1E22-F015, HPCS Suppression Pool Suction Valve, had the most separation evident. The lower area appeared satisfactory but the upper gearbox grease was more like a soft wax. The grease was pushed to one side so that rotating components could be seen from the upper inspection hole. The inspector requested that the licensee further evaluate the condition of this valve. (Guidance is provided on this in Limitorque Bulletin SMB-82C, page 11, stating that the main gearbox lubricant should be slightly fluid, approximating a standard NLG1-1 grade consistency or less.)

Periodic greasing of the valve operator upper bearing cap was not evaluated during the inspection.

The overall program for valve lubrication, the assignment of responsibility, training, personnel qualifications, procedures, implementation of vendor recommendations, etc., is considered an open item pending further evaluation by the licensee and subsequent inspector review (461/86045-05(DRS)).

5. Motor-Operated Valve Mechanical Condition

There currently is no valve preventive maintenance program within the mechanical maintenance department. The valve operators are assigned to the electricians jurisdiction and they perform all periodic testing and inspections. This is not a satisfactory situation unless the electricians are adequately trained and are assigned and accept responsibility for the valve operator mechanical condition as well as electrical.

During a physical inspection of 10 valve operators, a number of items were identified that indicated a need for better control of valve mechanical quality. These were:

a. Two valve handwheel operators were broken.

b. A threaded, electrical conduit hold plug was missing on one valve operator inside containment (valve OMC010), defeating its environmental qualification.

c. Two of six valve stem threads observed were not properly lubricated.

d. Two valve operators seemed to require excessive handwheel force to move the valve. (The most noticeable was 1E22-F015 which was also found to have an improperly set torque switch, documented to be set at 1.5 and found set at 2.5.)

e. One valve limit switch interior compartment showed signs of corrosion and aging that indicated a lack of protection during construction (as if it had been filled with water for some period of time).

f. An environmentally unqualified wire was found in valve 1E22-F010. (See paragraph 7 for additional details.)

For 10 valves, this is a high incidence of degraded mechanical condition. Programmatically, these conditions indicate a need for better maintenance - administrative controls, procedures, maintenance and operational training, personnel qualifications, etc. The missing conduit hole plug, the lack of grease on the valve stem threads, the improperly set valve torque switch, and the environmentally unqualified wire are examples of a failure to control activities affecting quality. The root cause of these problems and their extent needs further evaluation by the inspector and discussion with the licensee. This is considered an unresolved item (461/86045-05(DRS)).

6. Motor-Operated Valve Electrical Condition

Overall, of the 10 valves physically inspected, the electrical field work appeared to be carefully done and of good quality. The inspector recommended that limit switch compartment heaters, already disconnected, be removed in the future to increase the room available for other wiring and motor lead splices.

7. Limitorque Operator Environmental Qualification

The wiring of ten motor-operators was inspected according to the requirements of NRC Inspection and Enforcement Manual, Temporary Instruction 2515/75, "Inspection of Limitorque Valve Operator Wiring to Determine if Wiring is Environmentally Qualified," Item 06.01. Two valves were identified as having unqualified wire installed by Limitorque. The wire was identified as Narragansett NANA Wire Type TW, a blue wire with blue terminal lugs, found on valves 1E22-F015 and 1E22-F010. The licensee had already identified the problem with 1E22-F015, but the other valve was a new finding by the inspector.

The licensee has documented a phone conference indicating verbal assurances from Limitorque that only qualified wire was used, two 100 percent walkdowns are documented, and MOVATS testing involved another 100 percent check of valve internal wiring. All of this did not result in identification of the unqualified wire prior to the NRC inspection. This constitutes a failure to control activities affecting quality and is included as one of a number of items for further evaluation as an unresolved item identified in paragraph 5.

The licensee has indicated that Raychem Flametrol and Rockbestos Firewall III are the qualified wire types used in the valve operators. Information from the MOVATS test data sheets indicates primarily "Rockbestos." Since the inspection, the inspector learned that not all Rockbestos Firewall III wiring is qualified; hence, there is still some question on the wire qualification which is considered an open item pending additional inspector review of the licensee's qualification records (461/86045-07(DRS)).

8. Plant Security

The inspector identified a break in the security barrier between a "vital area" and the "protected area" of the plant. The licensee was notified and the matter was referred to the Region III security plan inspectors. Since the plant is not licensed to operate at this time, no violation of regulations was involved.

9. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. One unresolved item identified during this inspection is discussed in paragraph 5.

10. Open Items

Open items are matters which have been discussed with the applicant, which will be reviewed further by the inspector, and which will involve some action on the part of the NRC or applicant or both. Open items disclosed during the inspection are discussed in paragraphs 2, 3.a, 3.b, 3.c, 4, and 7.

11. Exit Meeting

The inspector met with the licensee representatives (denoted in paragraph 1) on July 2, 1986, to discuss the scope and findings of the inspection. The licensee acknowledged the statements made by the inspector with respect to items discussed in the report.

The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The applicant did not identify any such documents/processes as proprietary.