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September 30, 1981

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Mr. K. V. Seyfrit, Director
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Feedwater Turbine Overspeed Event
(File: 2-1510)

Gentlemen:

Your letter of August 11, 1981, expressed concern that the June 22, 1981 destruction of the ANO-2 Feedwater Turbine could render a safety system inoperable and requested an evaluation of the occurrence and description of preventive steps. AP&L's letter of September 11, 1981, provided our interim response and indicated that our investigation into the Turbine failure had revealed that no safety related system could have been damaged by this event. The September 11, 1981 letter also committed to provide a more detailed response by October 1, 1981. The purpose of this letter is to provide a summary of the overspeed event, identified deficiencies and preventive action taken by AP&L. This information is a summary of an investigative report that was initiated by AP&L immediately following the incident and completed in mid-July.

The overspeed incident occurred during calibration of the Main Feedwater Pump Turbine speed control circuits. This calibration was being performed as the final phase of the first year inspection, which was being conducted on both ANO-2 Feedwater Pump Turbines. The first year inspection includes a complete mechanical disassembly and inspection of the rotors, diaphragms, bearings, valves and auxiliary equipment. After reassembly, the turbine supervisory instruments and control circuits are thoroughly checked before coupling the turbine to the pump and returning the equipment to service.

The speed control calibration includes testing of sensors, interlocks, amplifiers and valve stroking to insure that the turbine/pump combination will properly respond to required signals. This calibration had been successfully completed on the "A" turbine and was in progress on "B" when the incident occurred.

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MIDDLE SOUTH UTILITIES SYSTEM

In order to obtain proper testing conditions, a number of interlocks must be bypassed. Additionally, the plant must be in a cold condition or special isolation must be accomplished since the testing requires repeated cycling of the steam control valves. Testing on the "A" turbine was completed while the plant was in cold shutdown. Testing of the "B" turbine was attempted when the plant was in hot shutdown, and in the absence of adequate isolation. As a result, when the turbine inlet valve was stroked, steam was admitted, and the uncoupled turbine oversped causing extensive turbine damage.

The fundamental problem was that the personnel performing the testing on the turbine were not aware that the plant conditions had changed and personnel who were aware of the plant conditions were not informed as to the nature of work in progress on the turbine. Several additional factors also contributed to the occurrence.

The Main Feedwater Turbine speed control checks were identified as a prerequisite for heatup but were not specifically identified on the particular job order for work authorization. Turbine overhaul work was performed by a vendor under a general job order. Speed control system checks were performed under direction of a different vendor with AP&L technician support, using a job order that had been issued for the supervisory system checks. The distinction between control and supervisory checks is significant from the standpoint of operational impact. At the time of plant heatup, the overhaul work was complete. The assumption was made that control checks were included in the overhaul job order. This coupled with the fact that there was no explicit specification of the speed checks on the supervisory system job order, combined to mask the extent of the remaining work when pre-heatup review of outstanding work was conducted.

Additionally, in the preceding days, the speed control checks were successfully completed on "A" FWPT along with preliminary checks on "B". This work was completed by the vendor and an AP&L technician using a vendor manual, and under a job order not specifically keyed to the nature of the job. Discussions at that time between test and operations personnel had verified that there was little operational consequence since no steam was available at the turbine throttle. The work was secured at the end of Saturday (June 20, 1981) with test equipment in place for continuing with the "B" turbine checkout. No work was completed on Sunday (June 21, 1981).

When work resumed on the following Monday (June 22, 1981), a different AP&L technician was assigned, as the one previously involved had rotated to night shift duty. The vendor did not verify plant conditions, which had changed from cold to hot shutdown. Work was confined to electronics in a rear control room cabinet. This contributed to the fact that AP&L operations personnel were not totally aware of the work in progress. Since the work was physically removed from the field, and the control room tachometer was disabled by the test setup, actual turbine rollup was not evident until damage had already occurred.

As stated in our September 11, 1981 letter, no safety related equipment was damaged and AP&L does not feel that this situation would have developed on a safety related piece of equipment.

Safety related systems are subjected to a much higher degree of procedural control by virtue of Technical Specifications and administrative procedures. Every task on safety related equipment requires a specific, detailed procedure to insure adequate controls are incorporated. For example, vendor manuals can be used but not as "stand alone" documents; they must be supplemented to insure that necessary special process controls, jumpers, valve line-ups, and testing requirements are incorporated. In many cases, redundancy of equipment must be assured and equipment that is specified into Limiting Conditions for Operation of the Technical Specifications are strongly keyed to plant operating modes. Surveillance and ISI tests are used to accomplish post-maintenance proof of operability and have been routinely performed in addition to their detailed development. Job orders issued for safety related repair require that a specific job scope is identified during work plan development. Demonstrations of equipment operability are prerequisites to plant mode changes following an outage. The QA manual provides a constant check of the ANO procedural program and the QA/QC audit programs continually monitor compliance.

Safety related procedures and work plans also require approval by the Plant Safety Committee. The quorum requirements dictate the involvement of a number of senior individuals from various sections of the organization. This assures that review for specific area involvements (such as operations) is accomplished.

In order to prevent a reoccurrence of this type of event, AP&L has addressed the following aspects of work control.

Immediate awareness of such situations was increased by virtue of the investigative report compiled and subsequent review with appropriate levels of AP&L supervision.

Prior to the incident, an ANO improvement plan was under development. Areas included therein specifically reference review of plant status controls. An assessment of further needs in development of maintenance procedures will pay direct dividends in these areas as the program continues.

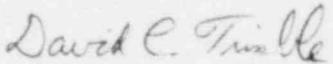
Emphasis has been placed on more specifically identifying work to be accomplished on a job order. These are being incorporated into revisions of maintenance control procedures and the development of a different job order form.

Refueling outages create the major problem with work control due to the large number of personnel on-site and the significant work volumes underway at any one time. Planning efforts will emphasize work and test control aspects. A detailed review of outstanding work will be conducted prior to plant mode changes. Provisions in work control procedures will require reverifications of initial conditions where operations impact is involved and work continuity has been interrupted. Vendor personnel will work under the cognizance of assigned AP&L personnel who will be responsible for plant/vendor interfaces to prevent improper work authorizations.

CONCLUSION

The FWPT overspeed incident was precipitated by stroking the turbine steam inlet valves at inappropriate plant conditions. This situation presented itself because of insufficient identification of work scope. This type of event is unlikely to involve a safety-related system due to extensive procedural and license requirements. Continued AP&L efforts at keying work to necessary plant conditions during outage situations will increase the assurance of preventing additional incidents.

Very truly yours,



David C. Trimble
Manager, Licensing

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