Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

October 4, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Byron Generating Station Units 1 and 2
Technical Specifications
NRC Docket Nos. 50-454 and 50-455

References (a): August 27, 1984 letter from B. J. Youngblood to D. L. Farrar.

(b): September 19, 1984 letter from T. R. Tramm to H. R. Denton.

Dear Mr. Denton:

This letter provides additional information to support proposed technical specification requirements for inservice testing of steam valves associated with protection against turbine overspeed. NRC review is needed to finalize the Byron technical specifications.

Attachment 2 to reference (b) transmitted proposed technical specification section 3/4.3.4 regarding turbine overspeed protection. These changes were discussed in detail with the NRC Staff shortly after the Proof and Review version of the Byron Technical Specifications was issued in December, 1983. The Technical Specification changes proposed in reference (b) are included in Attachment A to this letter.

The bases for the proposed valve testing requirements are provided in Attachment B to this letter. Attachment C is the Westinghouse Steam Turbine Division's "Operation and Maintenance Memo 041" which contains the manufacturer's recommendation on the testing of the steam admission valves for the Byron/Braidwood turbines.

Attachment D is a revised FSAR Figure 10.1-1 which depicts the correct number and arrangement of the extraction steam non-return check valves. A completely revised figure will be incorporated into the FSAR at the next amendment.

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We will be happy to make cognizant design and operating personnel available to discuss these specifications further. Please direct questions to this office.

One signed original and fifteen copies of this letter the attachments are provided for NRC review.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

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cc: Byron Resident Inspector

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ATTACHMENT A

Proposed Changes to Final Draft

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FINAL DRAFT

AUG 28 1984

3/4.3.4 TURBINE OVERSPEED PROTECTION

LIMITING CONDITION FOR OPERATION

3.3.4 At least one Turbine Overspeed Protection System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one throttle valve or one governor valve per high pressure turbine steam line inoperable and/or with one reheat stop valve or one reheat intercept valve per low pressure turbine steam line inoperable, restore the inoperable valve(s) to OPERABLE status within 72 hours, or close at least one valve in the affected steam line(s) or isolate the turbine from the steam supply within the next 6 hours.

b. With the above required Turbine Overspeed Protection System otherwise inoperable, within 6 hours isolate the turbine from the steam supply.

SURVEILLANCE REQUIREMENTS

4.3.4.1 The provisions of Specification 4.0.4 are not applicable.

4.3.4.2 The above required Turbine Overspeed Protection System shall be demonstrated OPERABLE:

a. During turbine operation at least once per ~~7~~ 31 days by direct observation of the movement of the ~~cycling each of the following~~ valves below through ~~at least~~ one complete cycle from the running position:

1) Four high pressure turbine throttle valves,
2) Four high pressure turbine governor valves,
3) Six turbine reheat stop valves,
4) Six turbine reheat intercept valves, and

b. Within 7 days prior to entering MODE 3 from MODE 4, by cycling each of the 12 extraction steam nonreturn check valves ~~shall be cycled~~ from the closed position.

~~c. At least once per 31 days by direct observation of the movement of each of the above valves through one complete cycle from the running position,~~

c ~~d~~. During turbine operation at least once per 31 days by direct observation, ~~verify~~ of freedom of movement of each of the 12 extraction steam nonreturn check valve weight arms.

d ~~e~~. At least once per 18 months by performance of CHANNEL CALIBRATION on the Turbine Overspeed Protection Systems, and

e ~~f~~. At least once per 40 months by disassembling at least one of each of the valves given in Specifications 4.3.4.2a. and b. above, and performing a visual and surface inspection of valve seats, disks and stems and verifying no unacceptable flaws or corrosion.

ATTACHMENT B

BASIS

3/4.3.4 TURBINE OVERSPEED PROTECTION

This specification is provided to ensure that the turbine overspeed protection instrumentation and the turbine speed control valves are OPERABLE and will protect the turbine from excessive overspeed. Protection from turbine excessive overspeed is required since excessive overspeed of the turbine could generate potentially damaging missiles which could impact and damage safety-related components, equipment, or structures.

SURVEILLANCE REQUIREMENT 4.3.2a (High Pressure Turbine and Reheat Valves)

These valves isolate large quantities of steam with high potential for delivering energy to the rotor system. The turbine design recognizes this potential in providing rapid action, dual shut off capability in each path, remote testing capability, and a flow path that reduces the effects of changes in flow distribution, load reductions and thermal transients during testing. The testing intervals are in accordance with the latest manufacturer's recommendations: "Operation and Maintenance Memo 041," Steam Turbine Division, Westinghouse.

SURVEILLANCE REQUIREMENTS 4.3.4.2b and c (Extraction Steam Non-Return Check Valves)

These valves are provided to protect the turbine from reflux of steam remaining in the feedwater heater shells and piping following the pressure reduction caused by the actuation of valves in specification 4.3.4.2a. The quantities of stored steam controlled by these valves are smaller and are divided up into separate, heater shells. The feedwater heating system design, including these valves, did not intend routine full stroke testing.

The extraction steam check valves are self closing swing disk non-return valves which shut under the combined effect of gravity and reverse flow of steam. The weight of the disk is partly balanced by a counterweight and lever on the pivot shaft. A spring cylinder acting on the lever assists the start of the automatic closing, but is not intended to close the valve fully against normal steam flow and pressure. In normal operation the spring assist is held clear by air pressure acting on a piston under the spring. The turbine trip system releases the air pressure to assist the closing.

Manually stroking of the extraction steam non-return valves is possible under shutdown conditions by latching the turbine and applying the air pressure to the spring cylinder. It is possible to hear and feel the disk contact the the seat solidly. This manual stroking was not provided for in the design but will be done within 7 days prior to entering Mode 3 from Mode 4.

The engineering specifications provided for testing the extraction steam non-return check vaves during operation by equalizing the air pressure across the piston in the spring cylinder, permitting the spring to partially close the disk against the steam flow. The rotation of the shaft accompanying the disk closure can be observed by movement of the weight lever. The amount of movement observed in other stations has depended on the extraction steam conditions and valve size, but has been ample to indicate freedom of movement, and this will be verified during startup testing.

Partial stroking demonstrates that the disk system is free at the beginning of the closing stroke where the steam closing forces are smallest. As the disk enters a reverse steam flow the closing forces build up rapidly with progressive closure.

The design of the feedwater heating system is such that full stroke testing of the extraction steam non-return valves during turbine operation involves several penalties without significant additional advantages over partial stroke testing. The motor-operated isolating valve must be closed on on individual heater. Heater stages 1, 2, 3 and 4 are arranged in three parallel strings with cascaded drains in each string and heater stages 5, 6 and 7 are similarly arranged in two parallel strings. An entire string is taken out of service, isolated and bypassed for maintenance. Isolating the extraction steam to a single intermediate heater involves several complications.

The motor operated valves are too large for routine manual operation, do not have bypasses to allow controlled warmup conditions, stroke quickly (about 15 seconds), and are intended for turbine protection against heater flooding. A comparison of the thermal capacity of a heater and the rate of heat transfer to the flowing condensate or feedwater shows that cycling an extraction steam isolating valve would cause rapid cooling and heating transients.

Isolating the steam to a top heater drops the feedwater temperature to the steam generators. Isolating the steam to an intermediate heater causes the next heater to assume the heating load, approximately doubling the steam demand and drain flow, and nearly quadrupling the potential for erosion and vibration in the affected heater and piping. The shell pressure collapses in the isolated heater causing insufficient head to discharge the cascading drains to the next lower heater. Rapid action of the emergency drain control is required to prevent flooding, with the potential for flashing in the drain cooler section from pressue decay.

Isolating a heater degrades the cycle thermal performance, requiring a corresponding drop in electrical output for the same reactor thermal power.

Partial closing of the extraction steam non-return check valves with the installed test provisions demonstrates freedom of movement while avoiding transient states. A 31 day interval will be adequate since it is likely that sticking conditions would develop during shutdown conditions rather than in operation.

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ATTACHMENT C

WESTINGHOUSE STEAM TURBINE DIVISION RECOMMENDATIONS

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Availability today & tomorrow

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OPERATION & MAINTENANCE MEMO 041

RECOMMENDED TESTING FREQUENCY FOR STEAM ADMISSION VALVES ON BB 296 NUCLEAR TURBINES WITH STEAM CHESTS

NOVEMBER 14, 1983

roved: RMReber

R. M. Reber, Manager
Technical Development
Power Generation Service Division

Approved: C.W. Meck

C. W. Meck, Product Manager
Commercial Operations
Steam Turbine-Generator Division

OPERATION & MAINTENANCE MEMO 041

1 REASON FOR MEMO

Based on a review of testing frequency and performance data from Westinghouse turbine and component incidents records and a 1982 survey of utilities operating Westinghouse nuclear turbines, Westinghouse concluded that for nuclear units with steam chests there is no significant difference in the valve failure rate between valves tested weekly and those tested monthly. It was further noted that monthly versus weekly valve testing frequency may be beneficial because it reduces the time a plant is operating in a "transient state."

2 OPERATION AND MAINTENANCE INFORMATION

Westinghouse recommends that the throttle, governor, interceptor and reheat stop valves of nuclear turbine-generator units with steam chests be tested monthly.

ATTACHMENT D

REVISED FSAR FIGURE 10.1-1

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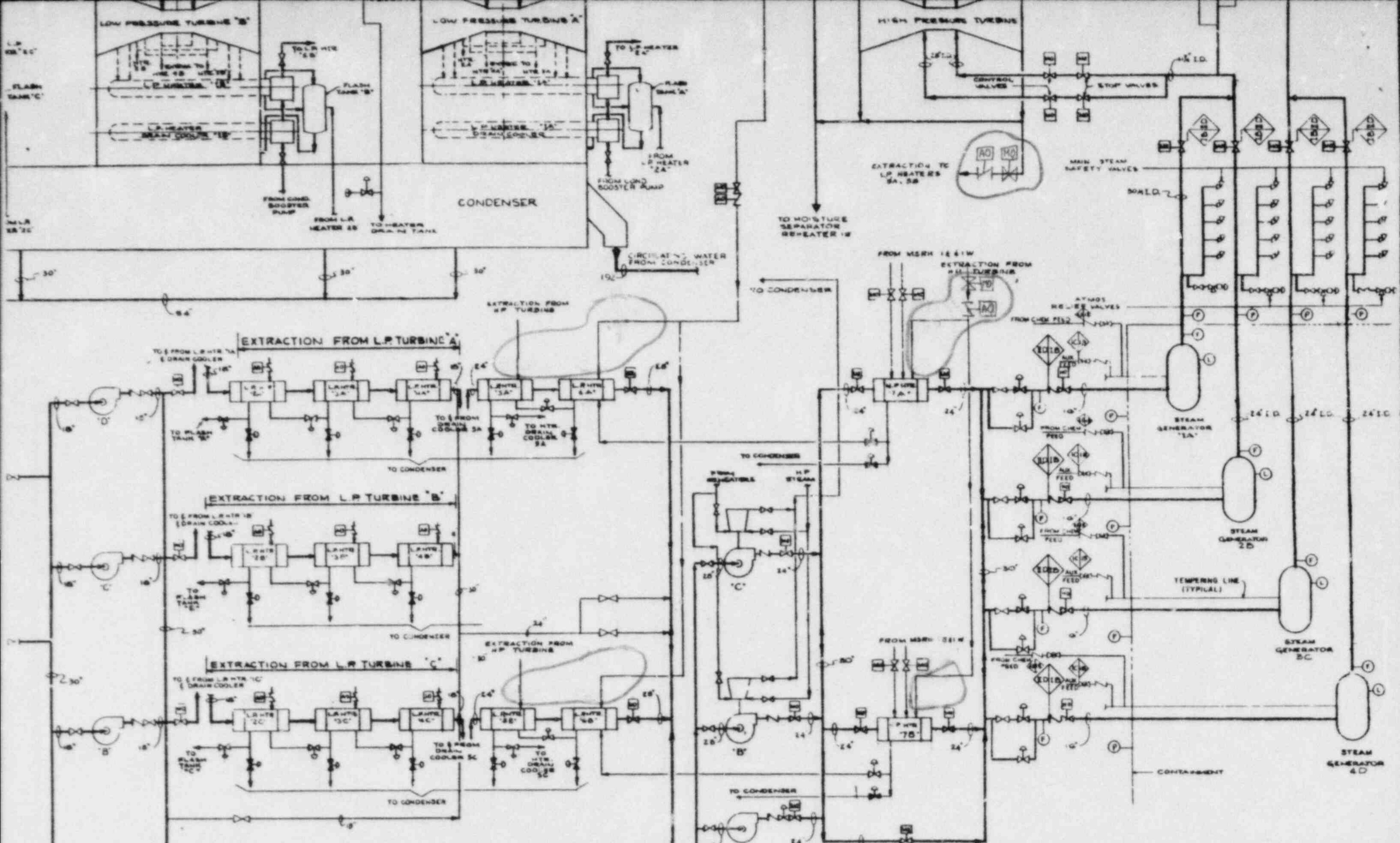

BYRON/BRAIDWOOD STATIONS

FINAL SAFETY ANALYSIS REPORT

FIGURE 10.1-1 (revised)

STEAM, CONDENSATE AND FEEDWATER PIPING