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July 15, 1985

1CANØ785Ø3

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Reply to Additional Information Request:
Comparison of ANO-1 and Oconee-3
Abnormal Transient Operating Guidelines (ATOG)

Gentlemen:

In your letter dated July 26, 1984 (1CNAØ784Ø1) you requested that we justify the adequacy of the ANO-1 plant-specific technical guidelines by referencing the NRC-approved Babcock & Wilcox guidelines as applicable, and identify and justify safety-significant differences between the ANO-1 guidelines and the referenced guidelines. As discussed with members of your staff, this request was to be interpreted as a comparison of the Oconee-3 (NRC-approved) ATOG guidelines and the ANO-1 technical guidelines, which were part of the Procedures Generation Package submitted on April 15, 1983 (ØCANØ48312).

Based upon our comparison, we have found that the differences between the guidelines are related to plant-specific system differences and are not safety significant.

Attached is a document which addresses and explains the significant differences between the ANO-1 and Oconee-3 ATOG guidelines. This document should satisfy your request for additional information.

Very truly yours,

J. Ted Enos
Manager, Licensing

JTE:RBT:ds

Attachment

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ABNORMAL TRANSIENT OPERATING GUIDELINES

(ATOG)

COMPARISON

OF

ARKANSAS NUCLEAR ONE - UNIT 1

TO

OCONEE UNIT 3

INTRODUCTION

The Owners of Babcock and Wilcox-designed nuclear power reactors have developed guidelines to aid preparation of operating procedures for the mitigation of transients and accidents in response to Item I.C.1 of NUREG-0737 Supp. 1, "Clarification of TMI Action Plan Requirements". The approach selected by the B&W Owners Group resulted in plant-specific Abnormal Transient Operating Guidelines (ATOG) based on generic symptoms of upsets in heat transfer.

Since there is no generic version of ATOG, the Nuclear Regulatory Commission initially began their review of the ANO-1 guidelines, which were the first prepared and which were provided to the NRC in 1980. Later the review effort was transferred to the ATOG developed for the Oconee Nuclear Station, Unit 3 (ONS-3). Thus the Safety Evaluation Report issued in September of 1983 is based on the ONS-3 version of ATOG (Ref. 1). Further NRC review of the ANO-1 ATOG was to be based on comparison to the ONS-3 version.

The purpose of this document is to facilitate NRC review of the plant-specific ATOG developed for the Arkansas Power & Light (AP&L) Arkansas Nuclear One Unit 1 (ANO-1) station (Ref. 2) by comparison of "Fundamentals of Reactor Control for Abnormal Transients" and "Discussion of Selected Transients" of the ANO-1 and ONS-3 ATOG (Part II, Vol. 1 and 2). The ANO-1 ATOG guidelines and related documents were transmitted to the NRC as part of the AP&L Response to NUREG-0737 Supp. 1 on April 15, 1983 (Ref. 3).

The ANO-1 ATOG is consistent with the ONS-3 ATOG in overall philosophy, use of symptoms, priority of major actions and technical bases. However, the plant-specific nature of ATOG results in differences which are identified and discussed in this document.

SCOPE

This document contains sections corresponding to each major heading of the ANO-1 ATOG Part II, "Fundamentals of Reactor Control for Abnormal Transients" (Vol. 1), and "Discussion of Selected Transients" (Vol. 2). Each section identifies differences between the ANO-1 version and the ONS-3 version previously reviewed by the NRC and explains the reasons for these differences. In general, each difference exists for one of the following reasons:

1. Plant-specific differences in equipment, NSSS design, setpoints or procedures.

2. Improvements incorporated as a result of the NRC review of the ONS-3 ATOG or as a result of the "learning curve" related to ATOG development. Changes due to the NRC review primarily consist of items identified in References 4 and 5. References 5 and 6 were issued after completion of the final ANO-1 ATOG.

3. Preferential differences of a non-technical nature that reflect AP&L preferred methods for operation or training.

Minor wording, syntax or layout differences are not addressed here.

VOLUME 1 - FUNDAMENTALS OF REACTOR CONTROL FOR ABNORMAL TRANSIENTS

CHAPTER A - BASIC HEAT TRANSFER

The only significant difference between this section of the ANO-1 and ONS-3 ATOG is in the discussion of draining and filling the pressurizer (ANO-1 pp. 33-36). The ANO-1 ATOG contains a more thorough discussion of the various concerns and possible consequences of draining and filling the pressurizer and some related heat transfer theory.

ADDENDUM A - SUBCOOLED, SATURATED, SUPERHEATED WATER

There are no significant differences in this section.

ADDENDUM B - NATURAL CIRCULATION

There are several differences in this section, all of which are related to plant-specific differences between the ANO-1 and ONS-3 main and auxiliary feedwater systems. For example, the upper (emergency) feedwater nozzles on the ANO-1 OTSGs are only fed by emergency feedwater, whereas ONS-3 has the capability to supply main feedwater to them. Also, ANO-1 uses the term "emergency feedwater" (EFW) instead of "auxiliary feedwater" to designate the system for feeding the upper OTSG nozzles, since ANO-1 has an auxiliary feedwater pump in parallel with the two main feedwater pumps. These three pumps feed the OTSGs through the main (lower) feedwater nozzles, whereas the two emergency feedwater pumps feed the upper nozzles in the event of a loss of normal feedwater.

CHAPTER B - USE OF THE P-T DIAGRAM

There are no significant differences in this section.

CHAPTER C - ABNORMAL TRANSIENT DIAGNOSIS & MITIGATION

This section contains several differences, most of which are related to plant-specific system differences and preferred methods of operation.

The ANO-1 immediate actions section (p. 77) has the operator proceed to the SGTR section of the ATOG procedure if a SGTR is indicated. AP&L considers the SGTR to be a unique event which demands immediate action to minimize the possibilities of radiological releases and therefore a specific section of the ANO-1 procedure is provided.

At the time the ATOG was written, ANO-1 had a Steam Line Break Isolation and Control (SLBIC) system, used to isolate a rapidly depressurizing (leaking) OTSG. This system is mentioned in appropriate sections of the ANO-1 ATOG (pp. 78, 86 and 87, for example). Also, ONS-3 has an automatic MFWP trip on high OTSG level, while ANO-1 does not (footnote, ONS-3 ATOG p. 77).

The ANO-1 ATOG contains discussions of consideration and control of reactor building conditions in appropriate places throughout (pp. 79-80, for example), whereas the ONS-3 ATOG has a specific section for this subject (Chapter G).

The ONS-3 ATOG contains a paragraph (p. 86) which differs from ANO-1 operating philosophy in that HPI cooling is an undesirable condition and should only be used in cases of total loss of feedwater or secondary heat sink after all possible means of restoring feedwater have been attempted.

CHAPTER D - BACKUP COOLING METHODS

This section of the ANO-1 ATOG is similar in content to the ONS-3 ATOG, although the layout of the various topics is different. For example, both discuss boiler-condenser cooling, but the ANO-1 ATOG lists this method as a separate topic (p. 97). The ANO-1 discussion addresses this topic in more detail (pp. 103-105) and provides operator guidance for this situation.

The discussions of HPI Cooling after a total loss of all feedwater differ only in text format and the sections on Restoration of Natural Circulation are identical.

At the time the ATOG was written, ANO-1 did not have RCS high point vents installed. Therefore, they are not mentioned in the ICC section as in the ONS-3 version (p. 114, item 5).

CHAPTER E - BEST METHODS FOR EQUIPMENT OPERATION

Differences in this section are due primarily to plant-specific equipment differences. Statements concerning the number of HPI pumps actuated and relative flow rates (ONS-3 pp. 128-129) are not applicable to ANO-1. LPI flow rates, HPI minimum and maximum flow rates and pressurizer level setpoints are also different between ANO-1 and ONS-3.

Differences in feedwater systems (see previous comparison of Chapter B) result in slight differences in the EFW discussions, although the content is the same.

The ONS-3 ATOG contains a section (pp. 160-161) concerning RCS high point vents which was not applicable to ANO-1 at the time.

The ONS-3 ATOG contains a section (pp. 161-165) which discusses loss of LPI recirculation. This section was not included in the ANO-1 ATOG because of differences in relative equipment elevation inside the reactor building which make the recommended steps in the ONS-3 ATOG (filling the reactor building) unfeasible for application at ANO-1.

CHAPTER F - POST TRANSIENT STABILITY DETERMINATION

This section of the ANO-1 ATOG contains a discussion of post-LOCA Boron dilution in the reactor vessel (p. 171) which is not in the ONS-3 ATOG.

It should be noted that the ONS-3 ATOG contains a Chapter H on use of the guidelines (adding no technical detail) which the ANO-1 ATOG does not.

VOLUME 2 - DISCUSSION OF SELECTED TRANSIENTS

A. EXCESSIVE MAIN FEEDWATER

Differences in this section are due to plant-specific system differences. ANO-1 does not have an automatic MFWP trip on high OTSG level as does ONS-3. The ONS-3 ATOG mentions uncertainty of the consequences of water-filled main steam lines (p. A-2). ANO-1 does have analysis to support the integrity of water-filled main steam lines, although this is a situation to be avoided. At the time ATOG was written, ANO-1 had a SLBIC system (see discussion of Chapter C). With the exception of these hardware differences, the discussion of the specific transients are identical.

B. LOSS OF MAIN FEEDWATER

The differences in this section are in the layout of the text and figures; the content of the discussions are identical. For example, Figures B-4 and B-5 are reversed between the ANO-1 and ONS-3 ATOG and Figures B-1 through B-3 are at the end of the section in the ANO-1 ATOG whereas they are in the text of the ONS-3 ATOG.

C. STEAM GENERATOR TUBE RUPTURE

Several plant-specific system and terminology differences occur in this section. For example, ANO-1 has a make-up tank (MUT); the same tank at ONS-3 is a let-down storage tank (LDST). Differences in feedwater systems, the ANO-1 SLBIC system and pressurizer minimum level setpoints have been mentioned previously. Also, ONS-3 does not have main steam isolation valves (MSIV).

The ANO-1 ATOG contains an extra step (4, p. C-13) to ensure ESAS is bypassed before reaching the actuation setpoint while depressurizing.

The ANO-1 ATOG contains an additional condition (d, p. C-25) to allow entry into the emergency cooldown mode if an unisolable steam leak exists.

The ANO-1 ATOG lists an emergency cooldown rate of $\leq 240^{\circ}F/hr$ to $500^{\circ}F$ to minimize possible radiation release when RCS pressure/temperature is high enough to cause leakage through the ruptured tube(s) and out the main steam safety valves (MSSVs) (p. C-34). This limit is discussed in the ONS-3 ATOG but is not listed in the section on Limits for RCS Cooldown.

The ONS-3 ATOG contains an extra step (6, p. C-35) to depressurize the RCS to decay heat system conditions before using service water to feed the OTSGs. This decision is based on the poor quality of the backup feedwater at ONS-3.

D. LOSS OF OFFSITE POWER

The majority of differences in this section are due to the fact that ANO-1 uses redundant diesel generators for backup AC power, whereas ONS-3 uses hydro generators. The discussion of operator actions to verify backup power availability and equipment restoration are basically the same. The discussion of actual plant transient history is the same.

E. SMALL STEAM LEAK

The main difference in this section is that the discussed ANO-1 steam leak is 15% of capacity, whereas the ONS-3 leak is 25% of capacity. Plant-specific differences (the ANO-1 SLBIC system) and text format differences account for the majority of other differences in this section.

The ANO-1 ATOG (p. E-18) contains expanded discussion and operator guidance concerning a total loss of secondary pressure control.

F. LOSS OF COOLANT ACCIDENT

The differences in this section are again related to plant-specific system differences (LPI flow rates, for example) and text format differences (the tables are in the text of the ONS-3 ATOG and at the end of the section in the ANO-1 ATOG).

The only significant difference is the addition of discussion and operator guidance (ANO-1 ATOG p. 57, 58) concerning reactor building Hydrogen control. As previously mentioned, the ONS-3 ATOG contains a separate chapter for reactor building conditions concerns, while the same information is put in appropriate places throughout the ANO-1 ATOG.

REFERENCES

1. Abnormal Transient Operating Guidelines for Oconee Nuclear Station Unit 3, 74-1123297-00, March 23, 1982.

2. Abnormal Transient Operating Guidelines for Arkansas Nuclear One Unit 1, 74-1122058-00, August 20, 1982.

3. Letter and Attachments, J. R. Marshall to D. G. Eisenhut, "Response to NUREG-0737 Supplement 1", ØCANØ48312, April 15, 1983.

4. Enclosure to Letter, D. D. Whitney to D. G. Eisenhut, June 15, 1982.

5. Enclosure to Letter, D. A. Napior to B&W Owners Group, "Resolution of NRC Comments on Oconee ATOG", March 14, 1983.

6. Enclosures to Letter, D. D. Whitney to D. G. Eisenhut, "Supplement to ONS-3 Final ATOG", July 2, 1983.