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 FACIL: 50-269 Dcone Nuclear Station, Unit 1, Duke Power Co.
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 RECIP. NAME: REGION 2, Atlanta, Office of the Director

DOCKET #
05000269

SUBJECT: LER 80-031/01T-0: on 800902, as result of dropped control rod & power tilt, reactor protection sys flux/flow/imbalance trip set points were set contrary to Tech Specs. Caused by personnel & station misinterpretation of required specs.

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 TITLE: Incident Reports

NOTES: M Cunningham: all amends to FSAR & changes to Tech Specs. AEOD, Ornstein: lcc. 05000269

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	I&C SYS BR 29	1	1	I&E 05	2	2
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DUKE POWER COMPANY
OCONEE NUCLEAR STATION, UNIT 1

Report Number: RO-269/80-31

Report Date: October 24, 1980

Occurrence Date: September 2, 1980

Facility: Oconee Unit 1, Seneca South Carolina

Identification of Occurrence: RPS Flux/Flow/Imbalance Trip Setpoint
Incorrectly Reset

Conditions Prior to Occurrence: Oconee 1 - ~ 60% FP

Description of Occurrence:

At approximately 2300 hours on September 2, 1980, as the result of a dropped control rod and subsequent power tilt on Unit 1, the RPS flux/flow/imbalance trip setpoints were incorrectly set to 83.9% FP instead of the required 65.5% FP. The fact that the flux/flow/imbalance trip setpoints had been set non-conservative with respect to Technical Specification requirements was discovered during a review of the completed procedures on October 2, 1980. This constitutes operation less conservative than the least conservative aspect of an LCO and is thus reportable pursuant to Technical Specification 6.6.2.1.a(2).

Apparent Cause of Occurrence:

This incident was the result of two separate deficiencies. First, the personnel involved misinterpreted the procedure in calculating the percent power reduction required. The second error involved a misinterpretation by the Station of the "thermal power allowable."

Analysis of Occurrence:

The actual and required flux/flow/imbalance trip envelopes per Technical Specification 3.5.2.2.d are shown on the attached graph. The actual trip envelope was about 18.4% FP above the required envelope for continued operation with a misaligned rod. As discussed below, several mitigating circumstances would have prevented core thermal limits (i.e., 20.05 kw/ft maximum linear heat rate (MLHR) and 1.30 departure from nucleate boiling ratio (MDRBR)) from being approached for any achievable core power distribution or loss of RCS flow.

The nuclear overpower trip was set at 65.5% FP, so that for full flow conditions a trip would have occurred before reaching the required flux/flow/imbalance trip envelope except for the cross-hatched region on the attached graph. Since the unit was operating with an asymmetric rod, the ICS would have run the unit back to 55% FP if reactor power had increased to 60% FP. This further reduces the extent to which the required flux/flow/imbalance trip envelope could have been exceeded. It should also be recognized that the cross-hatched region to the right side of the graph represents positive reactor power imbalance which are not physically achievable. (Based on BOC Power Imbalance Detector Correlation Test Results)

Reduction in RCS flow rate if RCP(s) had been lost is the most limiting case to be considered. If two RCP's had been lost, a RCP pump monitor trip (set at 54% FP for loss of two RCP's) would probably have occurred since the unit operated between 55 and 60% FP for virtually all the period when the improper flux/flow/imbalance curve existed. If two pumps had been lost with reactor power below 54% and above 41% a flux/flow/imbalance trip would have occurred, though it would have been delayed relative to the intended trip. Between ~ 42 and ~ 32 FP a flux/flow/imbalance trip upon loss of two RCP's would not have occurred--the intended flux/flow/imbalance trip curve would have produced a trip down to ~ 32 FP. Loss of one RCP would not have produced a trip. The intended trip envelope would have produced a trip if reactor power had been above ~ 49% FP.

To summarize the above, core conditions which could have been attained and for which an intended reactor trip would not have occurred are:

- operation at full flow with power between ~ 52 and 60% and imbalance between ~ 23% and 35%.
- loss of one RCP while operating above ~ 49% FP.
- loss of two RCP's while operating between ~ 42 and ~ 32% FP.
- flux/flow/imbalance trips due to loss of two RCP's when operating between ~ 54 and ~ 42% FP would have been delayed relative to the intended trip.

All of the above represent situations in which the core conditions are only marginally outside the intended trip curve.

The intent of the Technical Specification requirement to reduce the overpower and flux/flow/imbalance trip setpoints for continued operation with a misaligned is to provide an increase in safety margin to compensate for the effect of possible increase in core power peaking due to the misaligned control rod. However, during this incident, the core power peaking did not increase significantly as reflected in the following comparison of the values of the maximum linear heat rate (MLHR) and the minimum DNBR measured during the operation with the misaligned rod and during normal full power operation.

<u>During This Incident</u>	<u>During Normal Operation</u>
Power Level: 56% FP	100% FP
MLHR: 6.79 kw/ft	12 kw/ft
Minimum DNBR: 6.13	3.0

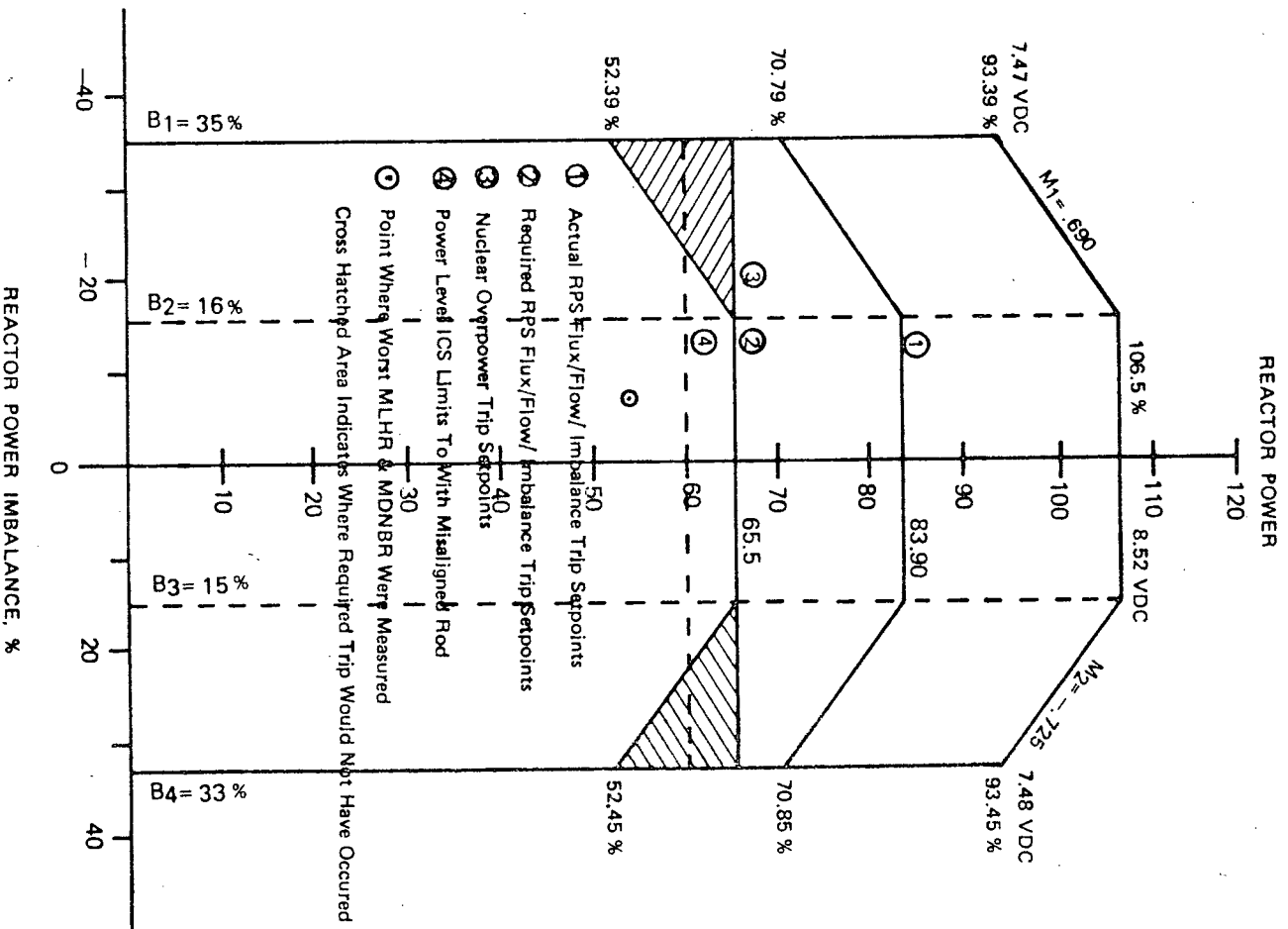
With these conditions, the actual flux/flow/imbalance trip setpoint was sufficient to provide the necessary flux/flow/imbalance trip protection, if required.

Therefore, though the flux/flow/imbalance trip function was degraded, other trips, physical operating restraints, and the existing non-worst case core parameters combined to protect the core for any achievable already state or transient condition. Therefore, this incident was of no significance with respect to safe operation, and the health and safety of the public were not affected.

Corrective Action:

The incorrect flux/flow/imbalance trip setpoints went undetected while Unit 1 operated at approximately 57% FP. The group 7 control rod malfunction was corrected when the unit came down September 10, 1980. The flux and flux/flow/imbalance trip setpoints were reset to 104.75% and 106.5% respectively on September 15, 1980. The procedure for calculating the reduced RPS setpoint has been controlled to prevent use until it is revised. The following corrective actions will be taken:

1. The supervisors and engineers have been directed to perform a more timely review on all procedures. Also proposed organizational changes should improve the timeliness of these reviews.
2. The procedure will be revised and retyped to improve clarity. Also, incorporated into the procedure will be an independent means of setting and verifying the revised setpoints.
3. The correct interpretation of the technical specification will be incorporated into the procedure. This change will significantly simplify the calculation of the reduced setpoints.
4. The personnel involved will be instructed in the correct calculation of the setpoints.



Unit 1, Cycle 6 RPS Flux/Flow/Imbalance
Trip Setpoints

LICENSEE EVENT REPORT

EXHIBIT A

CONTROL BLOCK: _____ (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

01 | S | C | N | E | E | 1 | 2 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 3 | 4 | 1 | 1 | 1 | 1 | 4 | 5
7 8 9 14 15 25 26 30 37 38 39 40 41 42 43 44 45 46 47 48 49 50
LICENSEE CODE LICENSE NUMBER LICENSE TYPE CAT 58

CON'T
 01 | R | P | T | S | O | U | R | C | E | L | 6 | 0 | 5 | 0 | 0 | 0 | 2 | 6 | 9 | 7 | 0 | 9 | 0 | 2 | 8 | 1 | 0 | 8 | 1 | 1 | 1 | 3 | 8 | 0 | 9
7 8 60 61 68 69 74 75 80
REPORT SOURCE DOCKET NUMBER EVENT DATE REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 | On September 2, 1980, as the result of a dropped control rod and subsequent
 03 | power tilt on Unit 1, the RPS flux/flow/imbalance trip setpoints were
 04 | incorrectly set to 83.9% FP instead of the required 65.5% FP. The fact that
 05 | the setpoints had been set non-conservative with respect to Technical Specifica-
 06 | tion requirements was discovered during a review of the completed procedures on
 07 | October 2, 1980. Although the flux/flow/imbalance trip function was degraded,
 08 | other trips, physical operating restraints, and the existing non-worst case
 09 | core parameters combined to protect the core for any achievable steady state or
 10 | transient condition. Therefore, this incident was of no significance with
 11 | respect to safe operation, and the health and safety of the public were not
 12 | affected.

08 | _____

09 | SYSTEM CODE: I B (11) CAUSE CODE: A (12) CAUSE SUBCODE: A (13) COMPONENT CODE: Z Z Z Z Z Z Z (14) COMP. SUBCODE: Z (15) VALVE SUBCODE: Z (16)
9 10 11 12 13 18 19 20
 17 | LER/RO REPORT NUMBER: 80 (17) EVENT YEAR: 80 (21) SEQUENTIAL REPORT NO.: 031 (24) OCCURRENCE CODE: 01 (28) REPORT TYPE: T (30) REVISION NO.: 0 (32)
21 22 23 24 26 27 28 29 30 31 32
 18 | ACTION TAKEN: E (18) FUTURE ACTION: H (19) EFFECT ON PLANT: Z (20) SHUTDOWN METHOD: Z (21) HOURS: 01000 (22) ATTACHMENT SUBMITTED: Y (23) NPRO-4 FORM SUB.: N (24) PRIME COMP. SUPPLIER: Z (25) COMPONENT MANUFACTURER: Z999 (26)
33 34 35 36 37 40 41 42 43 44 47
 CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 | This incident was the result of two separate deficiencies: 1) personnel mis-
 11 | interpretation and 2) station misinterpretation. The group 7 control rod mal-
 12 | function was corrected when the unit came down September 10, 1980. The flux
 13 | and flux/flow/imbalance trip setpoints were reset to 104.75% and 106.5%
 14 | respectively on September 15, 1980. The procedure for calculating the reduced
 15 | RPS setpoint has been controlled to prevent use until it is revised. The pro-
 16 | cedure will be revised and retyped to improve clarity. Personnel will be
 17 | instructed in the correct calculation of the setpoints.

15 | FACILITY STATUS: E (28) % POWER: 06.0 (29) OTHER STATUS: NA (30) METHOD OF DISCOVERY: A (31) DISCOVERY DESCRIPTION: Engineer's Review Procedure (32)
7 8 9 10 12 13 44 45 46 80
 16 | ACTIVITY CONTENT RELEASED OF RELEASE: Z (33) AMOUNT OF ACTIVITY: NA (35) LOCATION OF RELEASE: NA (36)
7 8 9 10 11 44 45 80
 17 | PERSONNEL EXPOSURES NUMBER: 000 (37) TYPE: Z (38) DESCRIPTION: NA (39)
7 8 9 11 12 13 80
 18 | PERSONNEL INJURIES NUMBER: 000 (40) DESCRIPTION: NA (41)
7 8 9 11 12 80
 19 | LOSS OF OR DAMAGE TO FACILITY TYPE: Z (42) DESCRIPTION: NA (43)
7 8 9 10 80
 20 | PUBLICITY ISSUED DESCRIPTION: N (44) DESCRIPTION: NA (45)
7 8 9 10 80
NRC USE ONLY

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