December 13, 1993

Docket No. 50-302

LICENSEE: Florida Power Corporation (FPC)

FACILITY: Crystal River Unit 3 (CR-3)

SUBJECT: SUMMARY OF MEETING ON AUGUST 11, 1993 - REGARDING LTOP PROTECTION

Representatives of the licensee met with members of the staff on August 11, 1993, in Rockville, Maryland, to discuss FPC's justification for the use of non-Appendix G methodology for LTOP protection at CR-3.

Enclosure 1 is a list of attendees. Enclosure 2 is a copy of the licensee's agenda and handouts used at the meeting.

Areas of concern expressed by the staff included: history of LTOP events and precursors at CR-3 and other B&W plants; justification that one PORV and operator action with a steam bubble in the pressurizer constitute a single-failure-proof LTOP system; and explanation as to why Appendix G or Code case methodology is not adequate for the licensee. The licensee addressed these concerns in its presentation, but the staff needed to consider further whether an LTOP event could be considered as not being expected to occur during the life of the plant, and whether the CR-3 LTOP system could be considered single-failure proof. This review is continuing.

(Original Signed By)

Harley Silver, Sr. Project Manager
Project Directorate II-2
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Enclosures:
As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Harley Silver, Sr. Project Manager
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As stated

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Enclosure 1

Crystal River Unit 3

LTOP Meeting
August 11, 1993

Attendees

Name	Office
Harley Silver	NRR/PDII-2
Barry Elliot	NRR/EMCB
Jack Strosnider	NRR/EMCB
Keith Wichman	NRR/EMCB
Chris Grimes	NRR/OTSB
Rolf Widell	FPC
Ken Wilson	FPC
Ronnie Lo	NRR/OTSB
Herb Berkow	NRR/PDII-2
Tim Collins	NRR/SRXB
Bob Borsum	BWNT
L. Zerr	STS/EPRI
Ed Hackett	NRR/EMCB
John Tsao	NRR/EMCB
LRaghavan	NRR/PDII-2
Richard Croteau	NRR/PDII-2
Robert DePriest	NRR/PDII-2
Lambros Lois	NRR/DSSA/SRXB
Ken Yoon	BWNT
Robert Enzinna	BWNT
David Miskiewicz	FPC
Blair Wunderly	FPC
Jim Andrachek	Westinghouse
Darrell Gardner	TVA/Watts Bar
Tom Porter	TVA/WBN Licensing
Bob Jones (Part Time)	NRR/SRXB

AGENDA FOR CR-3 LTOP Meeting

1. Review prior licensee commitments for CR-3 LTOP analysis.

2. Review justification for considering LTOP events as non-anticipated operational occurrences at CR-3.

3. Compare fracture mechanics criteria and pressure-temperature limits for:

    a. ASME Code, Appendix G methodology

    b. Code Case N514 methodology

    c. Licensee's proposed methodology

4. Compare LTOP setpoints, enabling temperatures and operating windows using:

    a. ASME Code, Appendix G and SRP 5.2.2 methodology

    b. Code Case N514 methodology

    c. Licensee's proposed methodology

5. Summary:

    a. Bases of proposed fract. mech. criteria for LTOP limit curves

B&W LTOP EVENT FREQUENCY

OBJECTIVE

LTOP EVENTS THAT EXCEED APPENDIX G P/T LIMITS ARE NOT ANTICIPATED OPERATIONAL OCCURRENCES FOR B&W PLANTS

BACKGROUND

NUREG-1326 (REGULATORY ANALYSIS OF GI-94, 1989):

> "THE B&W PLANTS HAVE BEEN EXCLUDED FROM THIS EVALUATION BECAUSE THESE UNITS HAVE NOT EXPERIENCED ANY LTOP TRANSIENTS AND, BASED ON THEORETICAL RISK, DO NOT CONTRIBUTE TO THE OVERALL RISK OF LTOP EVENTS."

NUREG/CR-5186 (VALUE IMPACT ANALYSIS OF GI-94, 1988):

- AT B&W PLANTS DURING 1980 TO 1986, THERE WERE NO EVENTS THAT CHALLENGED THE OVERPRESSURE MITIGATION SYSTEM HARDWARE (RELIEF VALVE)

- BASED ON OPERATING EXPERIENCE DURING 1980 TO 1986, NUREG/CR-5186 PREDICTS LESS THAN 0.0016 OVERPRESSURIZATIONS PER REACTOR YEAR FOR PORV-AND-BUBBLE CATEGORY (B&W) PLANTS

REVIEW OF B&W OPERATING HISTORY

- INVESTIGATED B&W EXPERIENCE OF POTENTIAL CHALLENGES TO LTOP SETPOINTS

- CONFIRMED THAT OPERATING EXPERIENCE SUPPORTS THE RESULTS OF NUREG/CR-5186 (I.E LTOP IS NOT AN ANTICIPATED OPERATIONAL OCCURRENCE FOR B&W PLANTS)

FRACTURE MECHANICS BASES
FOR
LTOP SET POINT

K. K. YOON
B&W NUCLEAR TECHNOLOGIES
Lynchburg, Virginia

FOR
FLORIDA POWER CORPORATION
August 11, 1993

CODE CASE N-514
AND
REVISED APP. G, SECTION XI
(LEVEL A & B LTOP)

- LTOP SET POINT - 110% OF TECH SPEC APPENDIX G LIMIT
- ENABLE TEMPERATURE - RT_{NDT} + 50 F OR 200 F WHICHEVER IS GREATER

FRACTURE MECHANICS BASIS FOR TECHNICAL SPECIFICATION APPENDIX G LIMIT

- FLAW SIZE - REFERENCE FLAW (t/4)
- FRACTURE TOUGHNESS - KIR CURVE
- SAFETY FACTOR - 2 ON PRIMARY LOAD
- LTOP IS AN ISOTHERMAL TRANSIENT

FRACTURE MECHANICS ANALYSIS
FOR
LEVELS A & B VERSUS C
SERVICE LOADS

SERVICE LEVEL	A AND B	C	FACTOR
FLAW DEPTH	t/4	t/10	$\sqrt{10/4}=1.58$
TOUGHNESS	KIR	KIc	> 1.2
S.F ON PRIMARY STRESS	2	1.4	2/1.4= 1.4
ACCUMULATED SAFETY FACTOR OVER TECH. SPEC. APP. G LIMIT			2.65

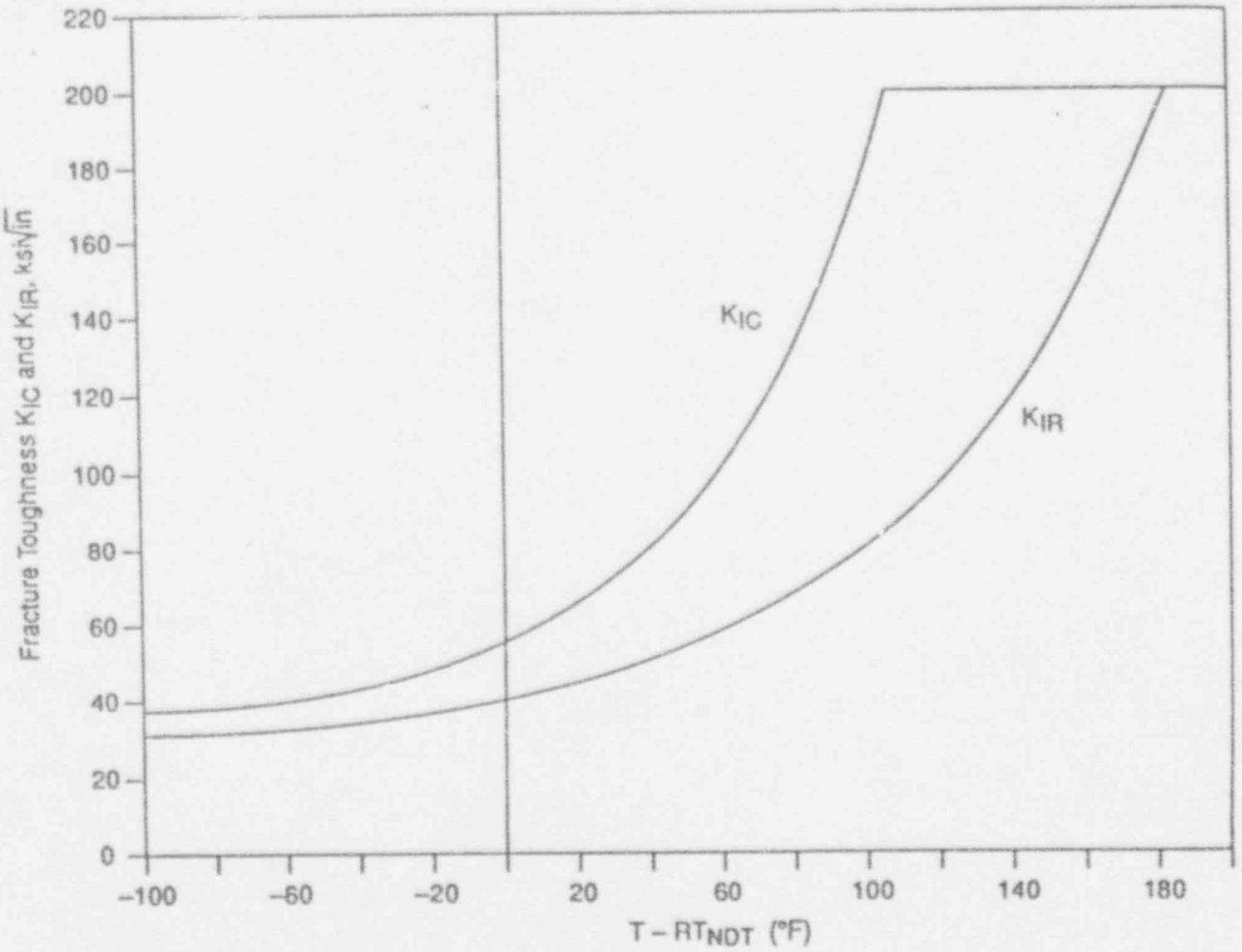

Figure 3-3. ASME Code K_{IC} and K_{IR} Curves

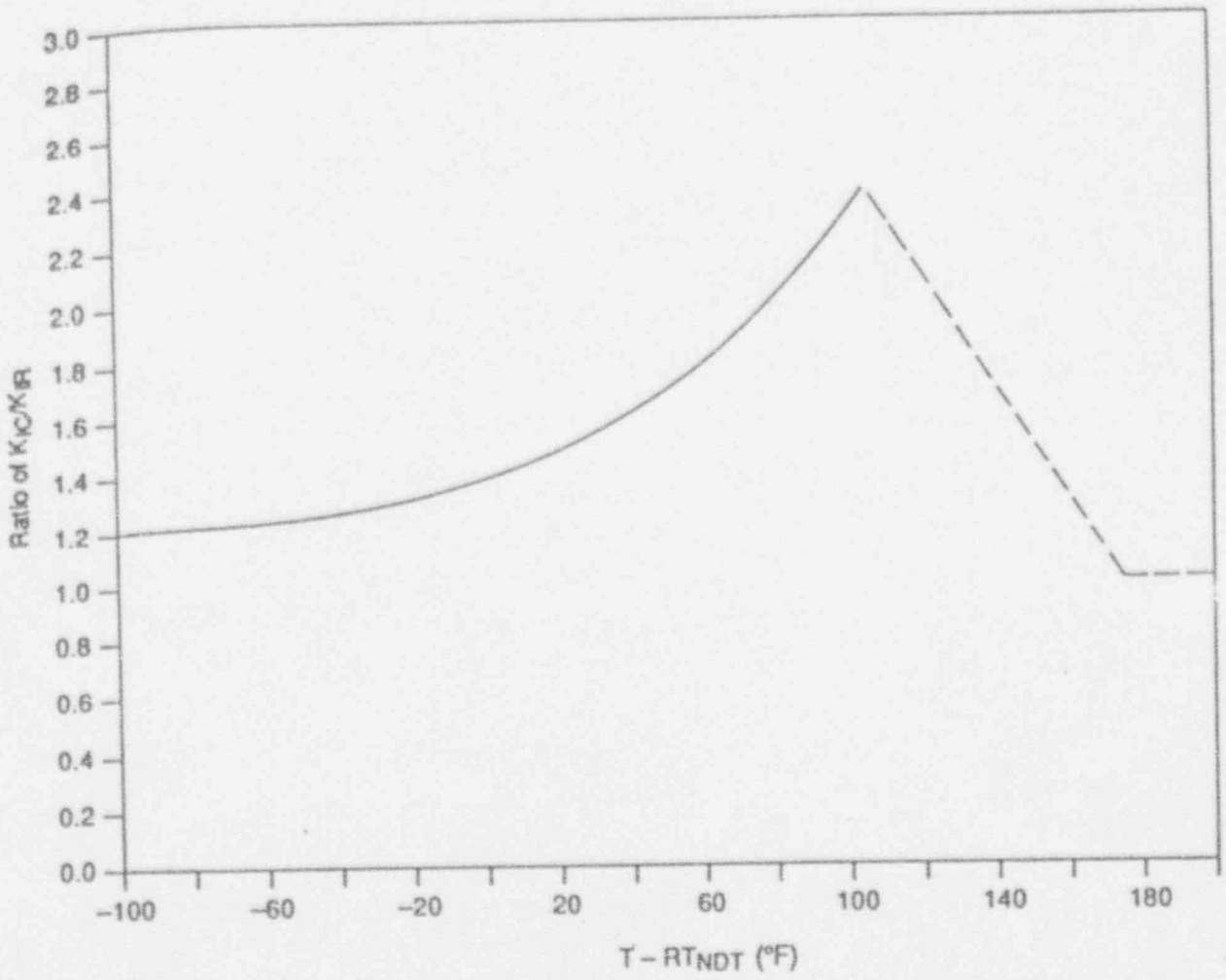

Figure 3-4. Ratio of Fracture Toughness

FRACTURE MECHANICS BASIS

SERVICE LEVEL	A AND B	OTHER B&W LTOP	FACTOR
FLAW DEPTH	t/4	t/4	1
TOUGHNESS	KIR	KIR	1
S.F ON PRIMARY STRESS	2	1	2
ACCUMULATED SAFETY FACTOR OVER TECH. SPEC. APP. G LIMIT			2.0

LTOP SET POINT FOR CR-3

- LTOP SET POINT - 250% OF TECH SPEC APPENDIX G LIMIT
- ENABLE TEMPERATURE - RT_{NDT} + 50 F OR 200 F WHICHEVER IS GREATER

MEMORANDUM DATED: December 13, 1993

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