Enclosure 2

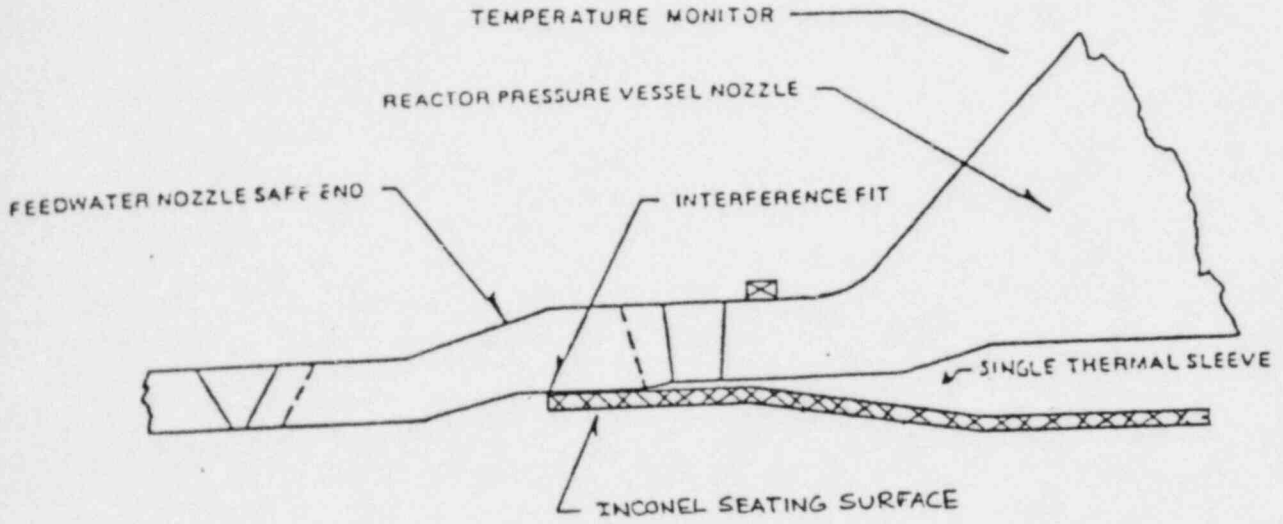
HISTORY OF VERMONT YANKEE FEEDWATER SPARGER MODIFICATIONS AND FUTURE PLANS

1976

- LIQUID PENETRANT INSPECTION OF NOZZLES REVEALED CLAD CRACKS AT BLEND RADIUS PRIMARILY AT THE 180° (BOTTOM) LOCATION AFTER FOUR (4) YEARS OPERATION
- NO BORE CRACKS
- MAXIMUM DEPTH AT ANY GRINDOUT = .3125" TOTAL DEPTH AT 175° LOCATION
- SHALLOWEST DEPTH OF ANY BWR WHICH EMPLOYED A LOOSE FIT SPARGER
- CRACKS GROUND OUT
- NEW INTERFERENCE FIT FEEDWATER SPARGERS INSTALLED ALONG WITH JUNCTION BOX TEE
- INTERFERENCE FIT THERMAL SLEEVE SEATING SURFACE IS INCONEL WITH A .010" - .013" INTERFERENCE
- STAINLESS STEEL CLADDING WAS NOT REMOVED
- STARTUP OPERATING PROCEDURES MODIFIED TO REDUCE FEEDWATER FLOW CYCLING AND MINIMIZE OPERATING TIME AT LOW FEEDWATER TEMPERATURES

VERMONT YANKEE FEEDWATER SPARGER

THERMAL SLEEVE



1977

- IN VESSEL LIQUID PENETRANT EXAMINATION PERFORMED ON INNER BLEND RADIUS OF EACH NOZZLE WITH SPARGERS IN PLACE
- EXAM EXTENDS ABOUT 5" INTO BORE AT 0^{o} AND 180^{o} SECTORS
- NO INDICATIONS FOUND

1979

- SECOND IN-VESSEL LIQUID PENETRANT EXAM PERFORMED SINCE INSTALLATION OF INTERFERENCE FIT SPARGERS

- NO INDICATIONS FOUND

1980

- NUREG-0619 ISSUED FOR COMMENT

- VERMONT YANKEE STATES DISAGREEMENT WITH NUREG CONCLUSION THAT INTERFERENCE FIT SPARGER THERMAL SLEEVE IS NOT A LONG TERM SOLUTION TO NOZZLE CRACKING PROBLEM

- JANUARY, 1981 - NUREG-0619 ISSUED

- INTERFERENCE FIT FEEDWATER SPARGERS ARE NOT CONSIDERED A LONG TERM FIX AND SHOULD BE REPLACED BY 7/83

- IN INTERIM, CONTINUE BIENNIAL OR 30 STARTUP - SHUTDOWN IN-VESSEL LIQUID PENETRANT EXAMS

APRIL 1981

- FOLLOWING TELECON WITH NRC STAFF, VERMONT YANKEE SUBMITTED DATA SUPPORTING OUR POSITION THAT THE INTERFERENCE FIT SPARGER WAS PERFORMING VERY WELL AND DID NOT REQUIRE REPLACEMENT

BASIS FOR JUSTIFICATION

- PT INSPECTIONS INDICATED NO CRACKING AND THEREFORE LITTLE OR NO BYPASS LEAKAGE WHICH IS NEEDED TO INITIATE CRACKING
- LOWER RADIATION EXPOSURE BY INSPECTING THAN REPLACING SPARGERS
- OPERATING PROCEDURES WHICH MINIMIZE FEEDWATER FLOW CYCLING AND TRANSIENTS
- MUCH REDUCED NUMBER OF CRACK PROPAGATING STARTUP - SHUTDOWN CYCLES SINCE PLANT "MATURED"
- NO RELEVANT CLAD CRACKING HAS OCCURRED IN BWRS WITH ORIGINAL INTERFERENCE FITS
- INSTALLATION OF BYPASS LEAK DETECTION SYSTEM TO MONITOR DELETERIOUS LEAKAGE
- IN GENERAL, THE INTERFERENCE FIT DESIGN HAS SOLVED THE NOZZLE CRACKING PROBLEM AT VERMONT YANKEE AND INSUFFICIENT JUSTIFICATION EXISTS TO REPLACE SPARGERS AND EXPOSE PERSONNEL TO SIGNIFICANT RADIATION

FEEDWATER TEMPERATURE COMPARISON BETWEEN GENERAL ELECTRIC GENERIC AND VERMONT YANKEE

HRS/YR

T_{FW} (°F)	GENERAL ELECTRIC	VERMONT YANKEE (MATURE OPERATION)
350 - 380	0	7073
300 - 350	5545	312
200 - 300	2354	14
100 - 200	116	53
100	28	16*

* 1/6 RATED FLOW

TEMPERATURE DIFFERENCE MAP

$T_{REACTOR} - T_{FEEDWATER}$
HRS/YR

ΔT	VERMONT YANKEE	GENERAL ELECTRIC
450	--	28
400	16	98
350	21	19
300	36	2354
250	14	5545
200	561	8
175	5824	--

NOVEMBER 1981

- THIRD IN-VESSEL PT EXAMINATION PERFORMED WITH IDENTICAL RESULTS

  NO INDICATIONS

- NUTECH BYPASS LEAK DETECTION SYSTEM INSTALLED

JANUARY 1982

- LETTER SENT TO NRC STAFF PROVIDING INSPECTION RESULTS AND INITIAL LEAK DETECTION SYSTEM READINGS

FUTURE PLAN

- CONTINUE TO MONITOR LEAKAGE WEEKLY ON LEAKAGE MONITORING SYSTEM
- PERFORM IN-VESSEL PT EXAMS AT THE CYCLIC INTERVAL (30 STARTUP - SHUTDOWNS) SPECIFIED IN NUREG-0619
- CONTINUE TO OBSERVE STARTUP PROCEDURES WHICH REDUCE CYCLING OF FEEDWATER FLOW AND TEMPERATURE
- CONTINUE TO OPERATE WITH INTERFERENCE FIT SPARGERS AND CLAD IN PLACE

FEEDWATER NOZZLE TEMPERATURES
NOZZLE D