

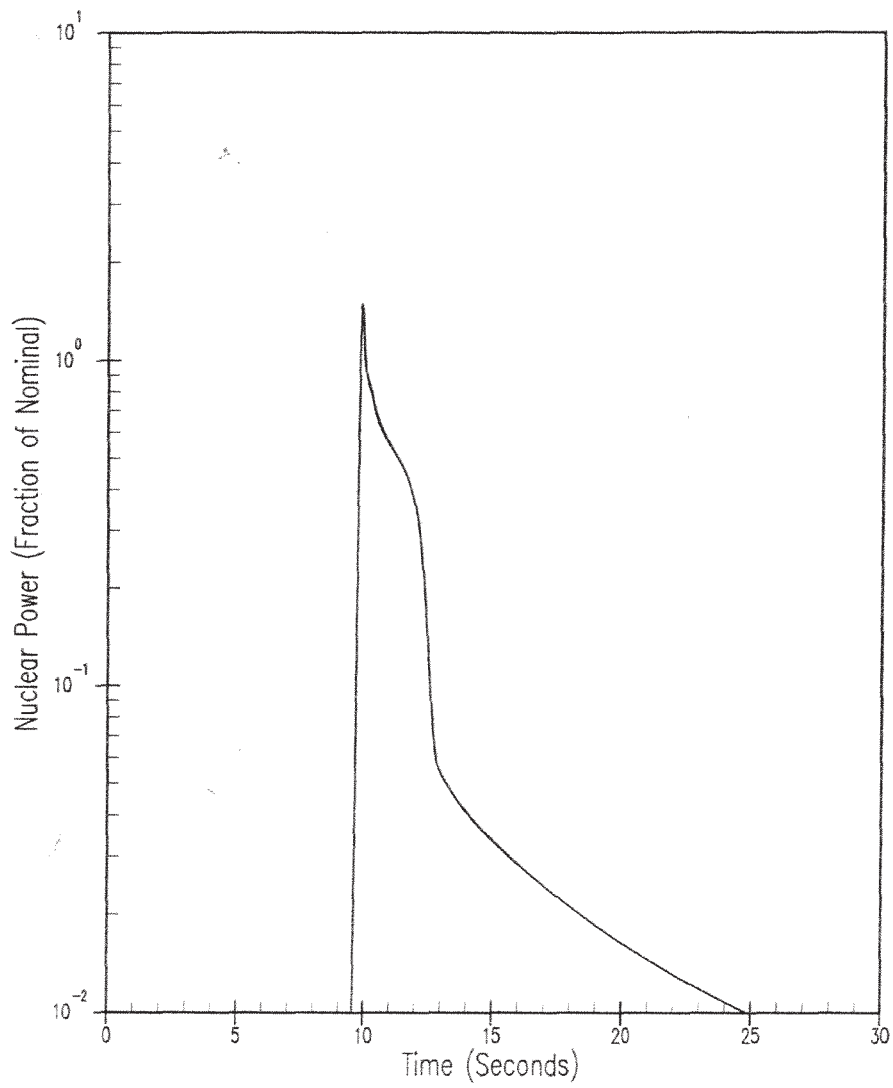
INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.0-1

REACTIVITY INSERTION vs  
TIME FOR REACTOR TRIP

MIC. No. 1999MC3969

REV. No. 17A

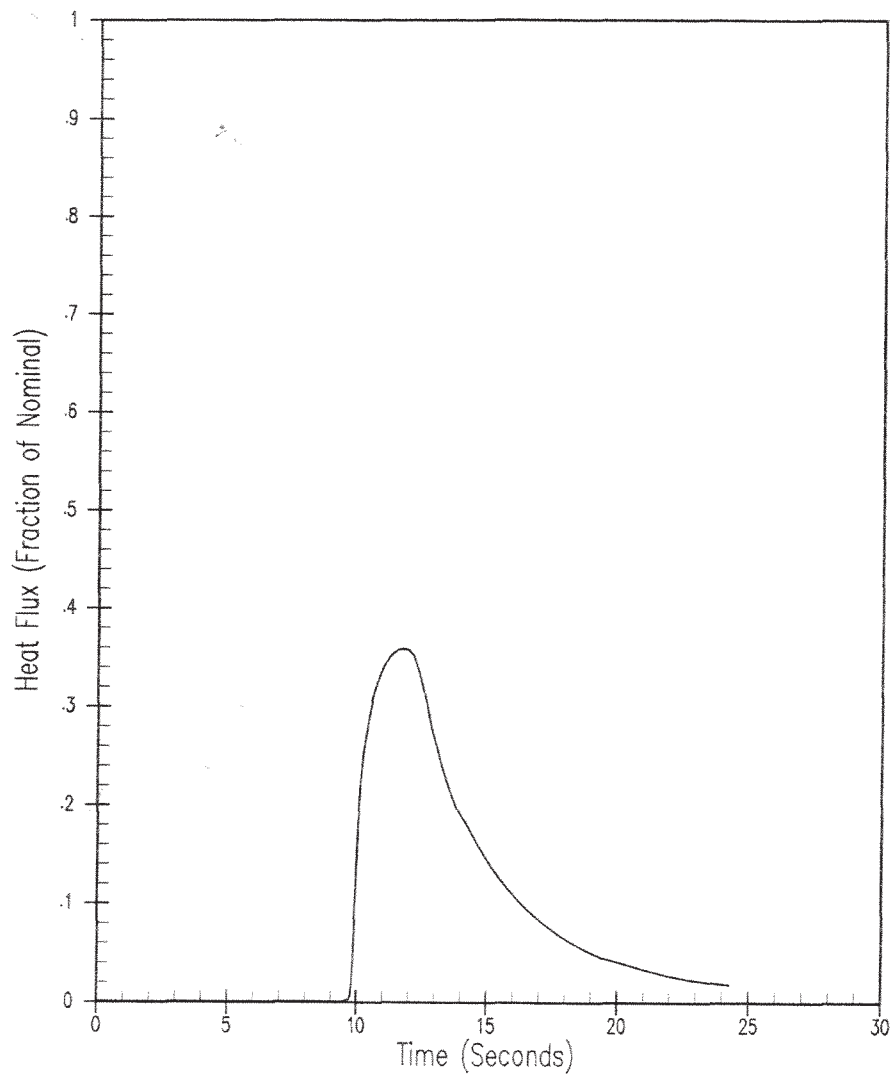


INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA WITHDRAWAL  
FROM A SUBCRITICAL CONDITION  
NUCLEAR POWER vs TIME

UFSAR FIGURE 14.1-1

REV. No. 19

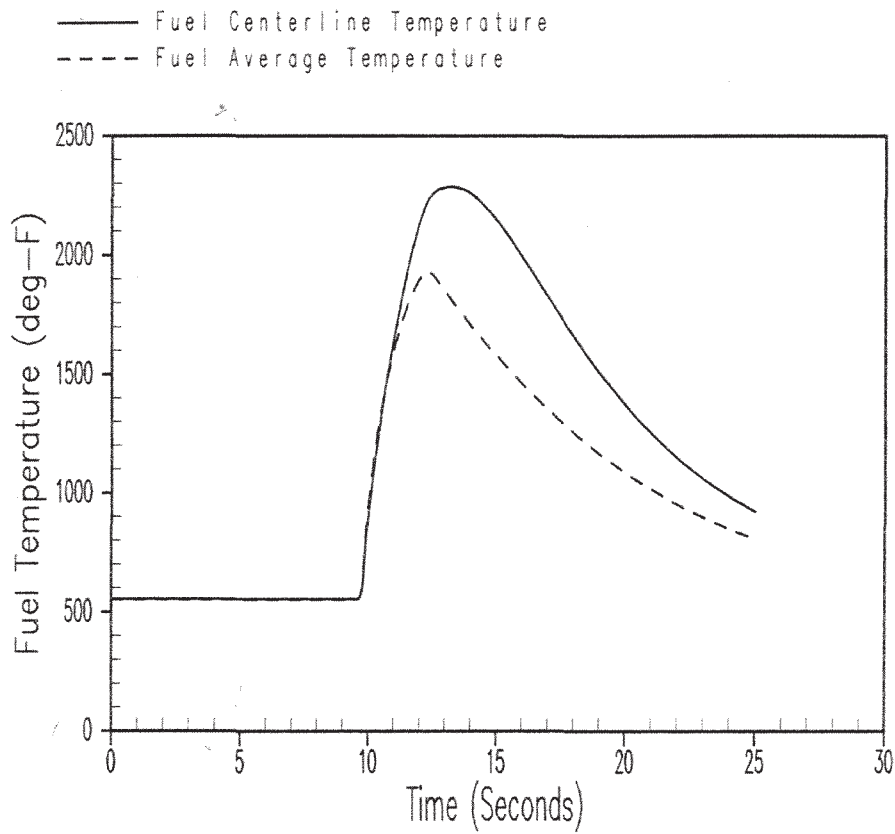


INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA WITHDRAWAL FROM  
A SUBCRITICAL CONDITION HEAT FLUX  
vs TIME, AVG. CHANNEL

UFSAR FIGURE 14.1-2

REV. No. 19

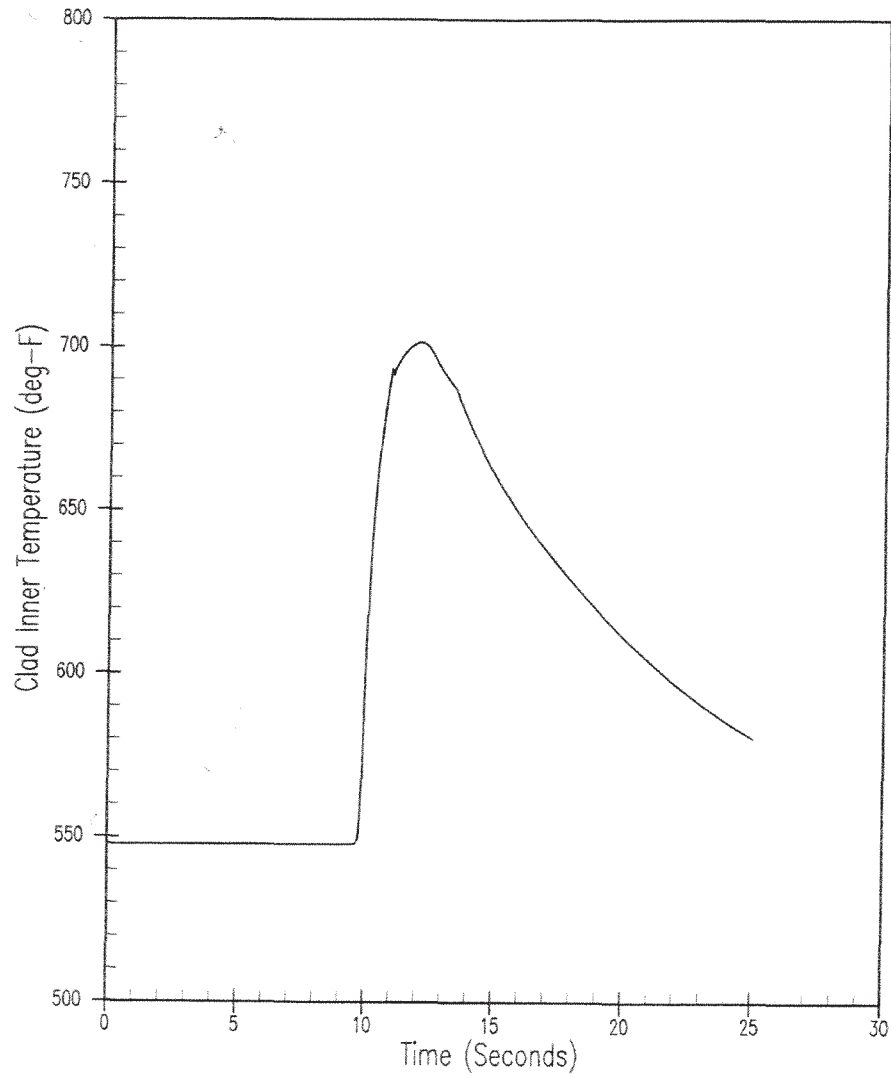


INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA WITHDRAWAL FROM  
 A SUBCRITICAL CONDITION FUEL AVERAGE  
 TEMPERATURE vs TIME AT HOT SPOT

UFSAR FIGURE 14.1-3

REV. No. 19

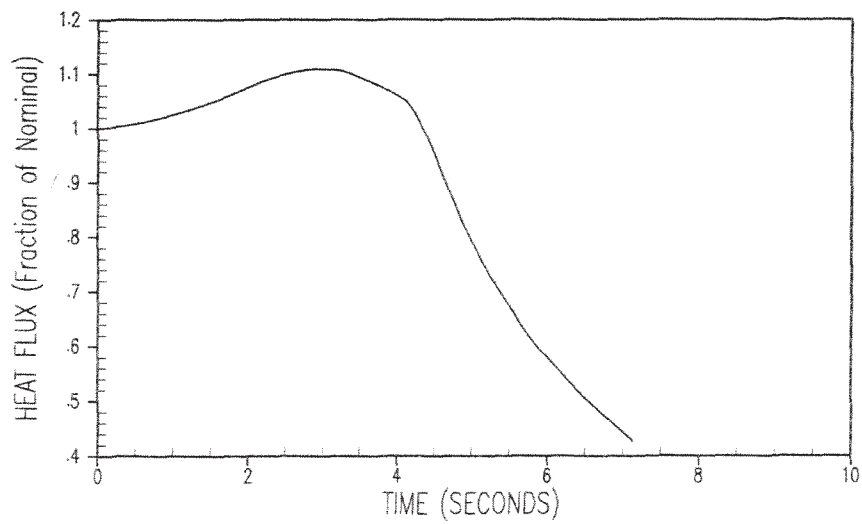
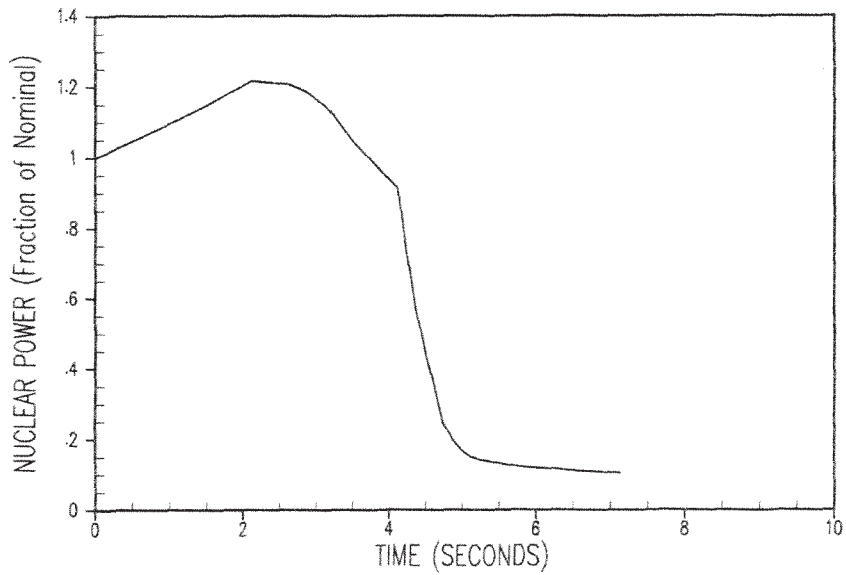


INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA WITHDRAWAL FROM  
A SUBCRITICAL CONDITION CLAD INNER  
TEMPERATURE vs TIME AT HOT SPOT

UFSAR FIGURE 14.1-4

REV. No. 19

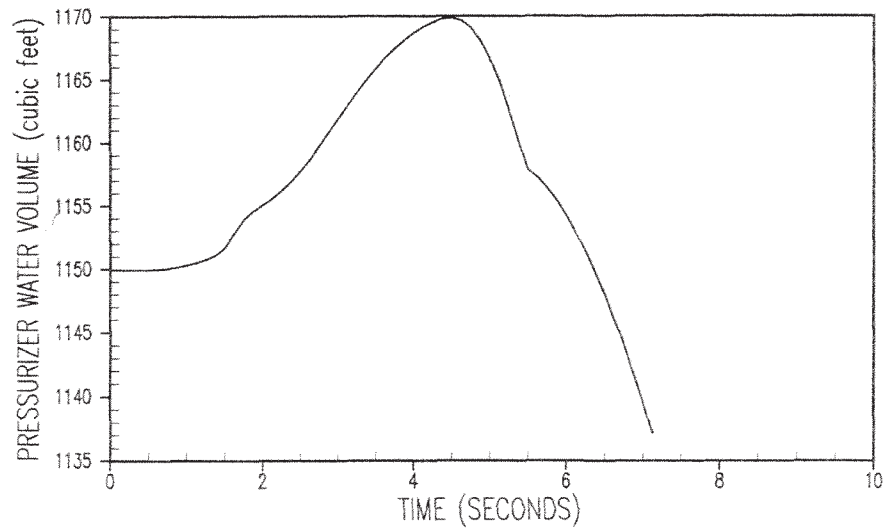
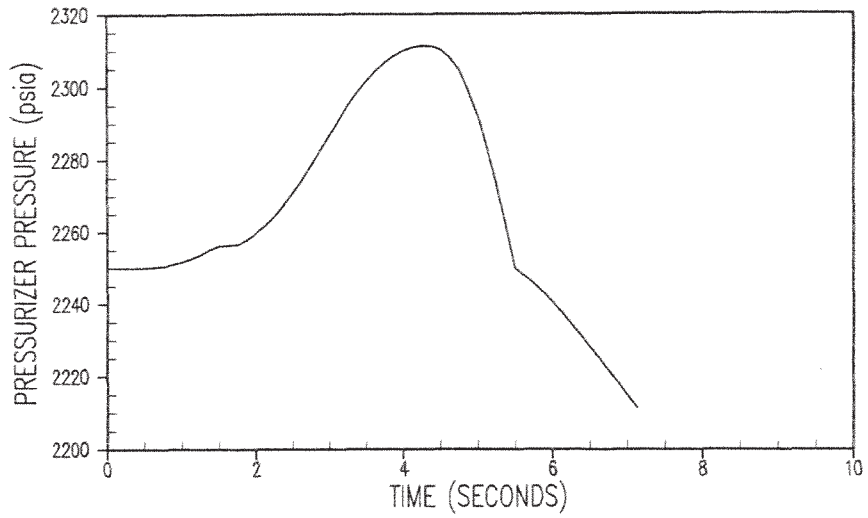


**INDIAN POINT UNIT No. 2**

**UNCONTROLLED RCCA BANK WITHDRAWAL  
FROM FULL POWER WITH MINIMUM REACTIVITY  
FEEDBACK (70 pcm/sec WITHDRAWAL RATE),  
NUCLEAR POWER AND CORE HEAT FLUX vs TIME**

**UFSAR FIGURE 14.1-5**

**REV. No. 19**

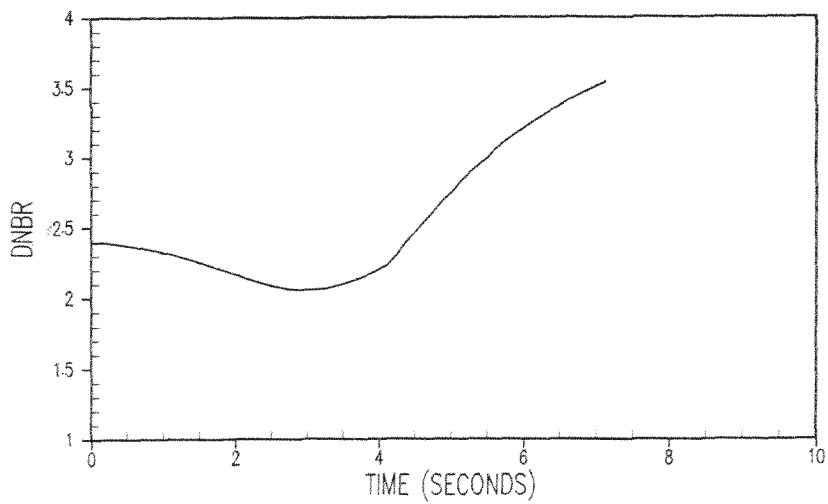
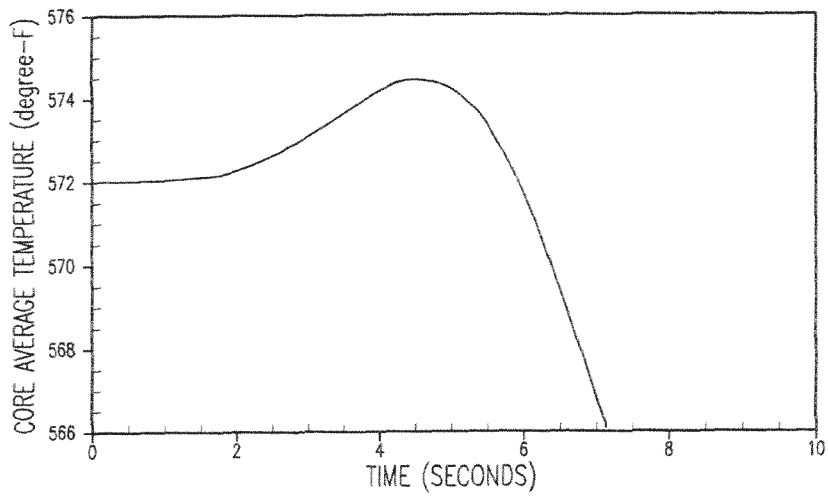


**INDIAN POINT UNIT No. 2**

**UNCONTROLLED RCCA BANK WITHDRAWAL  
FROM FULL POWER WITH MINIMUM REACTIVITY  
FEEDBACK (70 pcm/sec WITHDRAWAL RATE),  
PRESSURIZER PRESSURE AND WATER VOLUME vs TIME**

**UFSAR FIGURE 14.1-6**

**REV. No. 19**



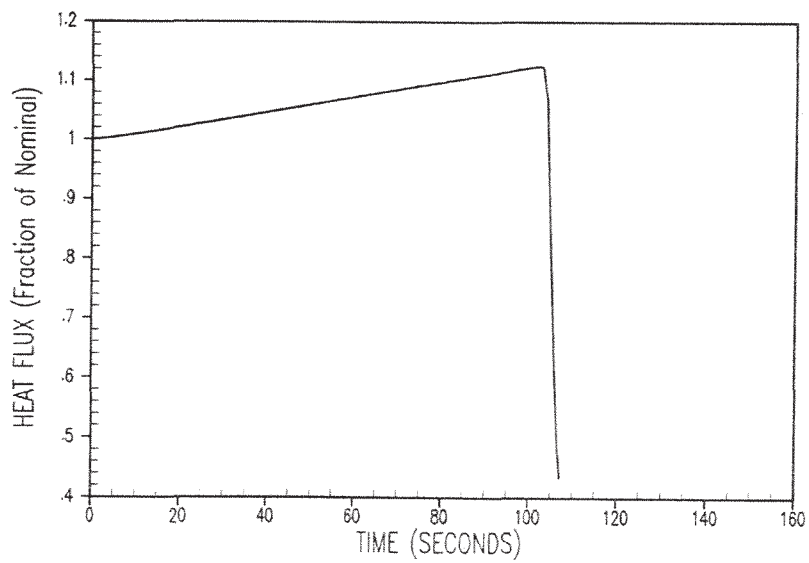
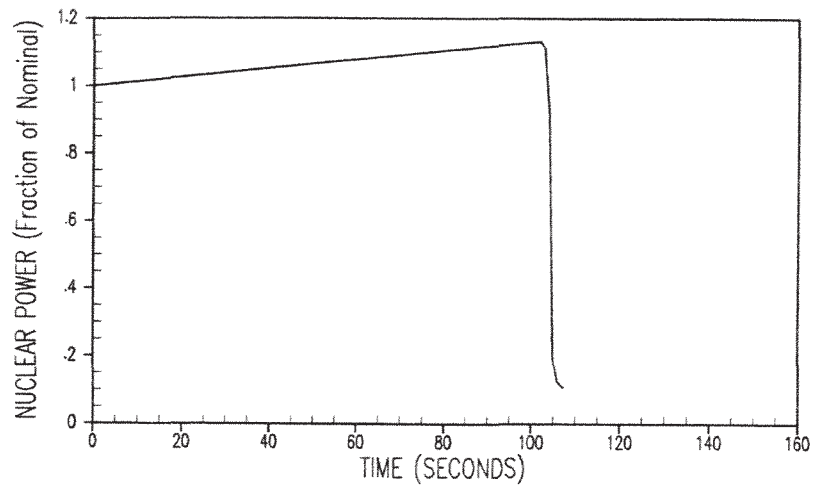
**INDIAN POINT UNIT No. 2**

**UNCONTROLLED RCCA BANK WITHDRAWAL  
FROM FULL POWER WITH MINIMUM REACTIVITY  
FEEDBACK (70 pcm/sec WITHDRAWAL RATE),  
CORE WATER AVERAGE TEMPERATURE AND DNBR vs TIME**

**UFSAR FIGURE 14.1-7**

**REV. No. 19**



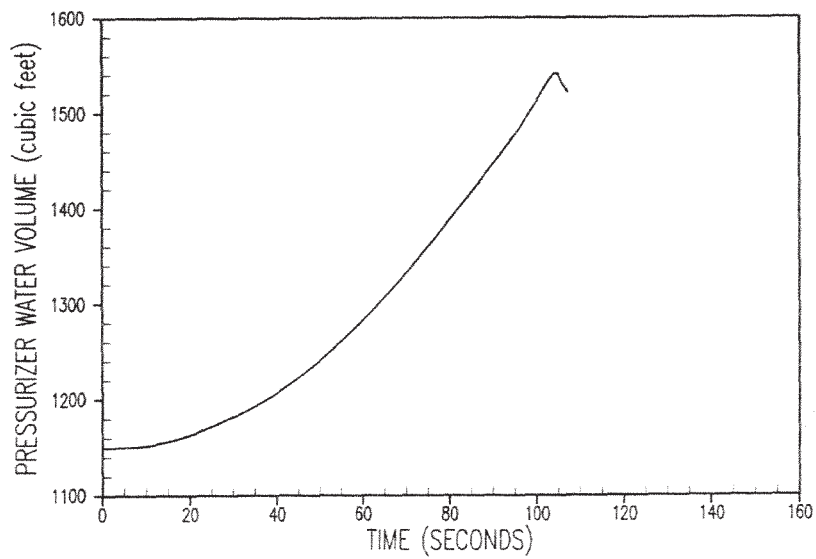
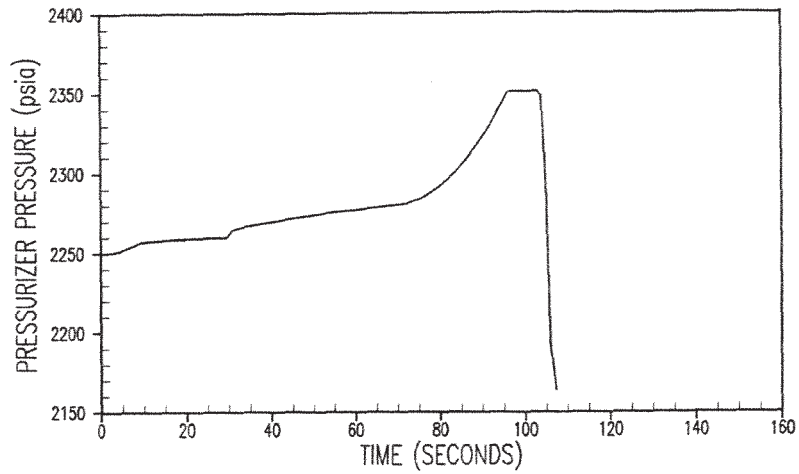


## INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA BANK WITHDRAWAL  
 FROM FULL POWER WITH MINIMUM REACTIVITY  
 FEEDBACK (1 pcm/sec WITHDRAWAL RATE),  
 NUCLEAR POWER AND CORE HEAT FLUX vs TIME

UFSAR FIGURE 14.1-8

REV. No. 19

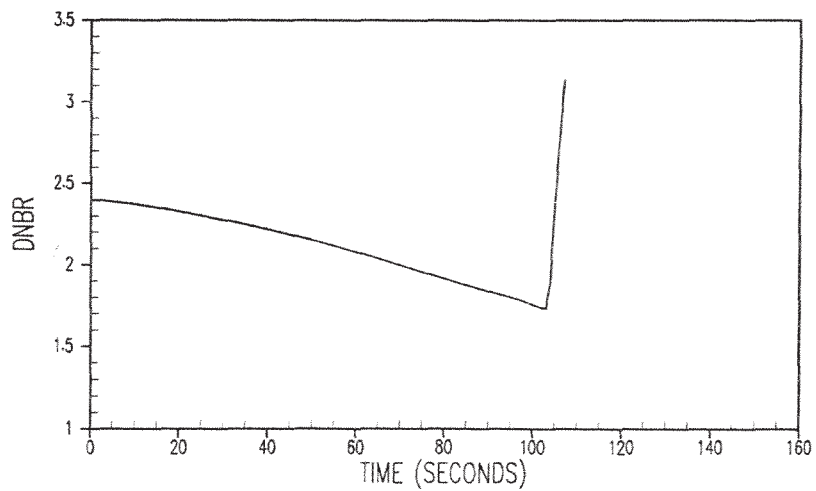
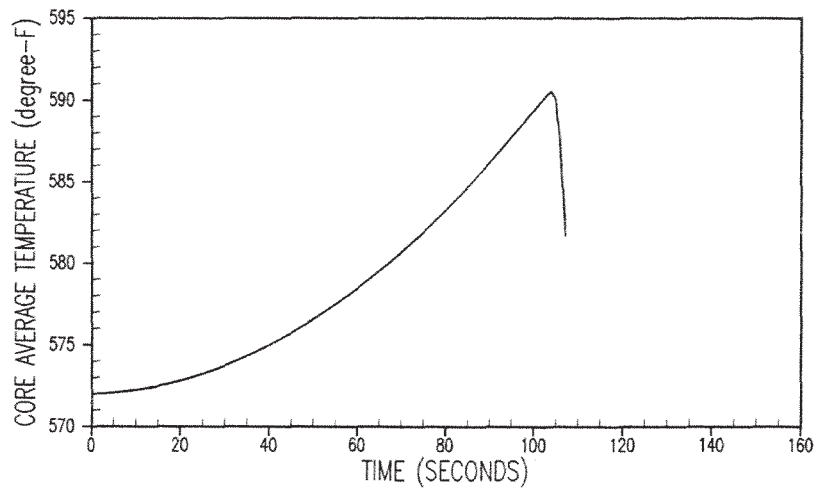


**INDIAN POINT UNIT No. 2**

**UNCONTROLLED RCCA BANK WITHDRAWAL  
FROM FULL POWER WITH MINIMUM REACTIVITY  
FEEDBACK (1 pcm/sec WITHDRAWAL RATE),  
PRESSURIZER PRESSURE AND WATER VOLUME vs TIME**

**UFSAR FIGURE 14.1-9**

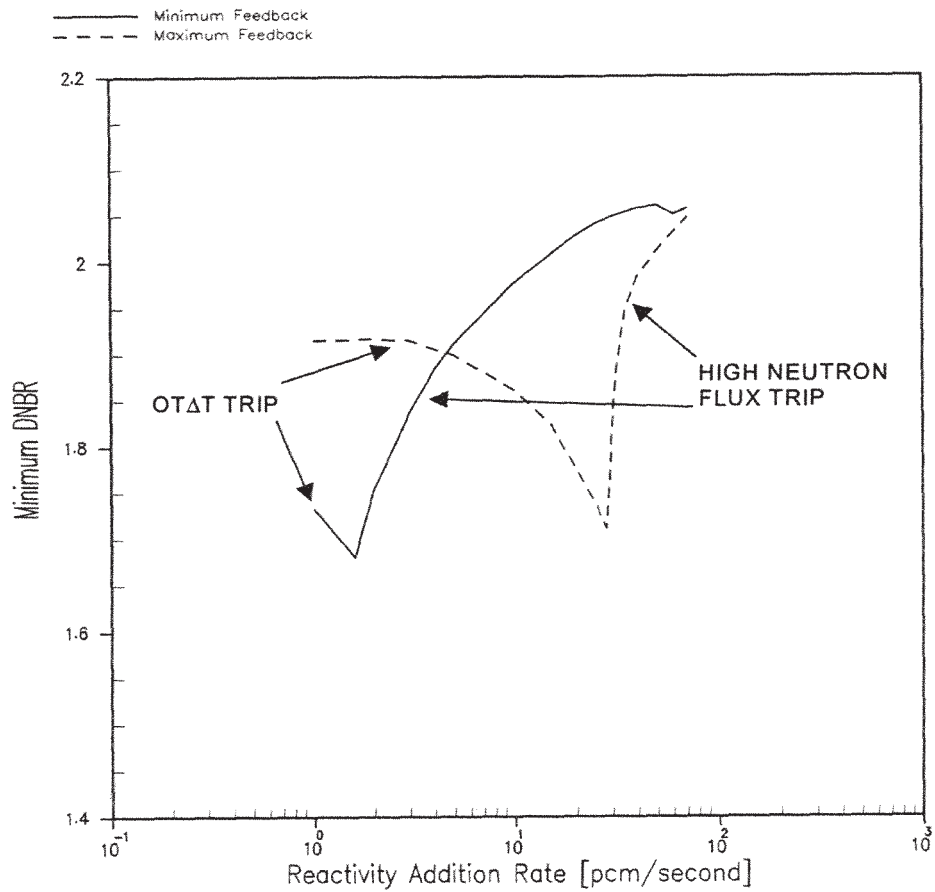
**REV. No. 19**



**INDIAN POINT UNIT No. 2**

**UNCONTROLLED RCCA BANK WITHDRAWAL  
FROM FULL POWER WITH MINIMUM REACTIVITY  
FEEDBACK (1 pcm/sec WITHDRAWAL RATE),  
CORE WATER AVERAGE TEMPERATURE AND DNBR vs TIME**

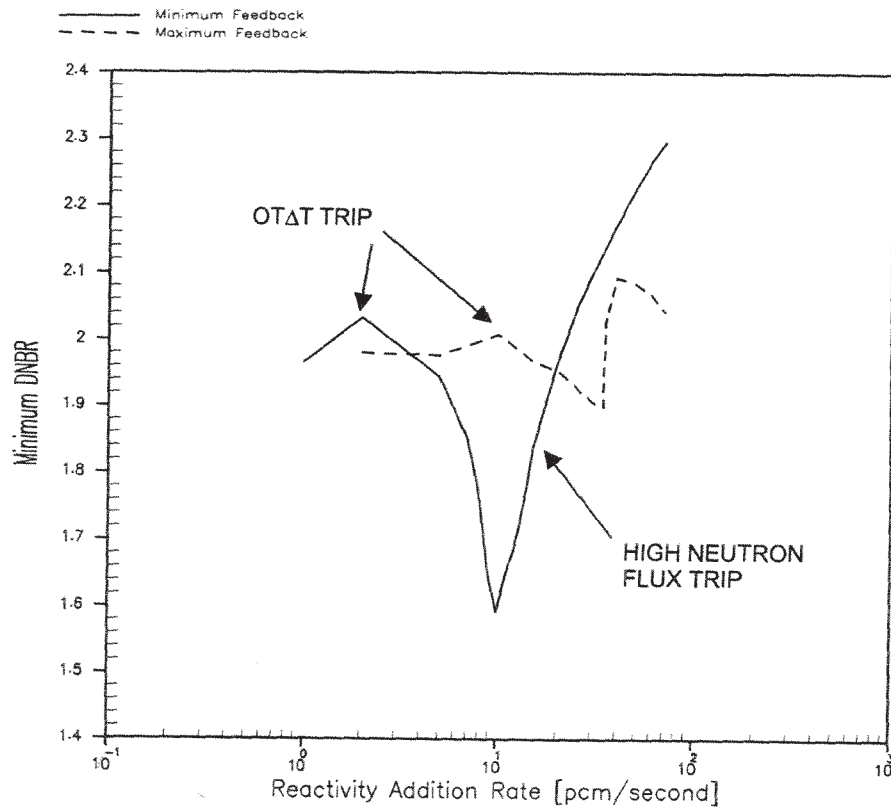
**UFSAR FIGURE 14.1-10 | REV. No. 19**



INDIAN POINT UNIT No. 2

MINIMUM DNBR VERSUS REACTIVITY  
INSERTION RATE, ROD WITHDRAWAL  
FROM 100 PERCENT POWER

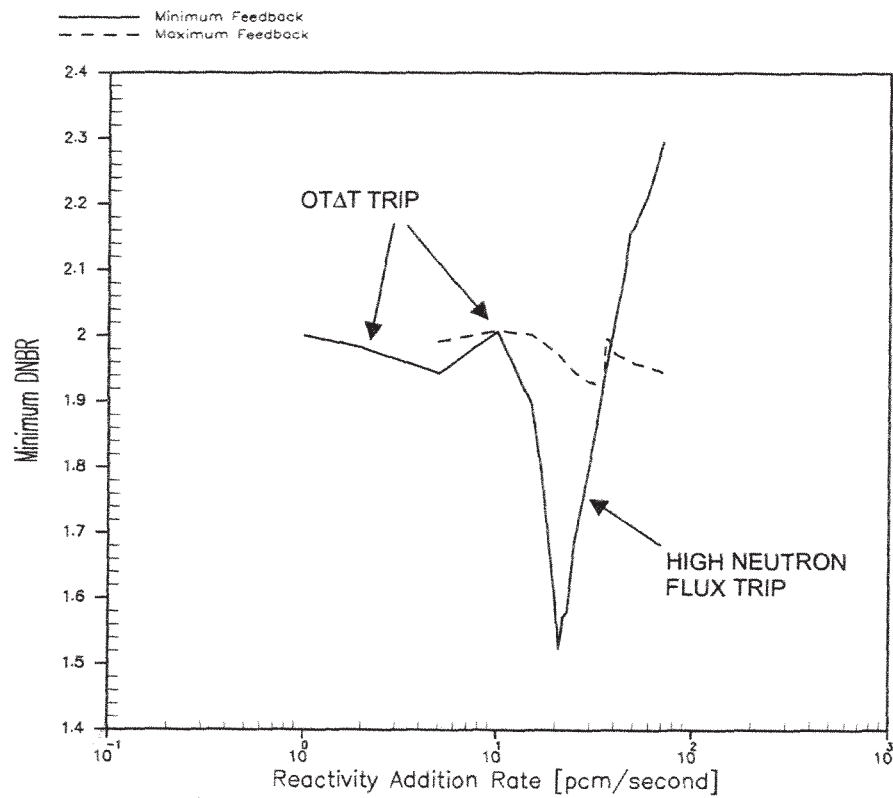
UFSAR FIGURE 14.1-11 | REV. No. 19



INDIAN POINT UNIT No. 2

MINIMUM DNBR VERSUS REACTIVITY  
INSERTION RATE, ROD WITHDRAWAL  
FROM 60 PERCENT POWER

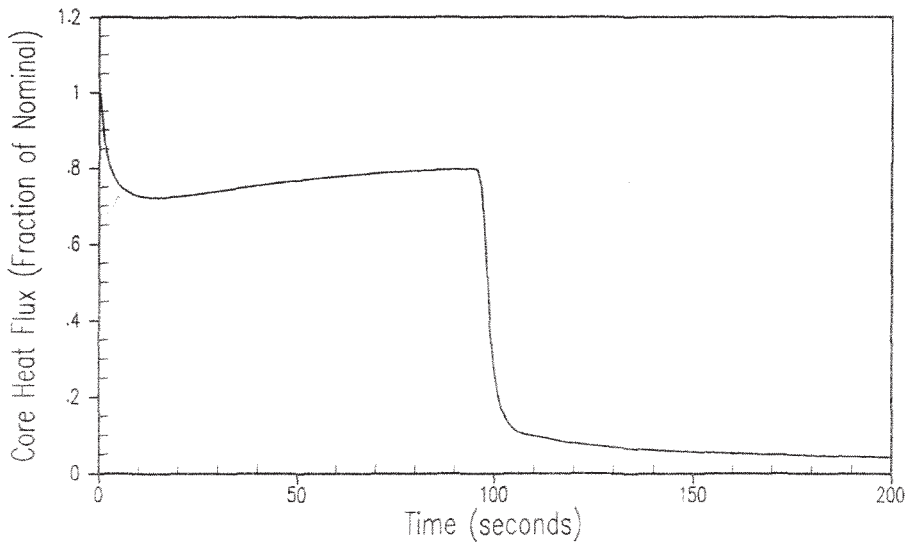
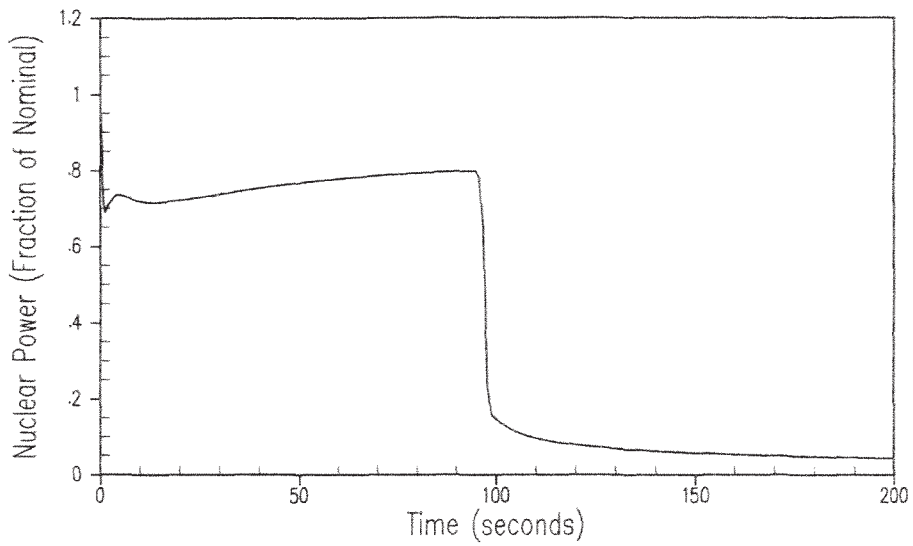
UFSAR FIGURE 14.1-12 | REV. No. 19



INDIAN POINT UNIT No. 2

MINIMUM DNBR VERSUS REACTIVITY  
INSERTION RATE, ROD WITHDRAWAL  
FROM 10 PERCENT POWER

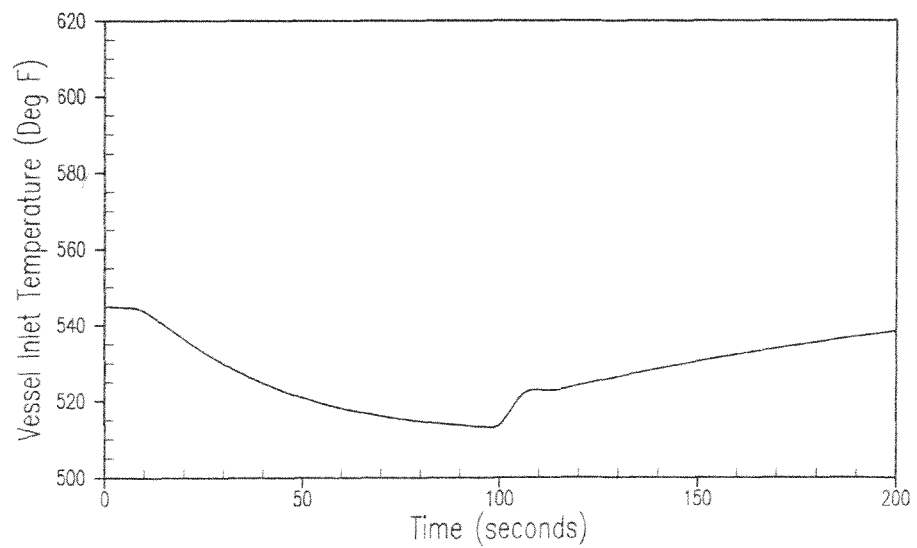
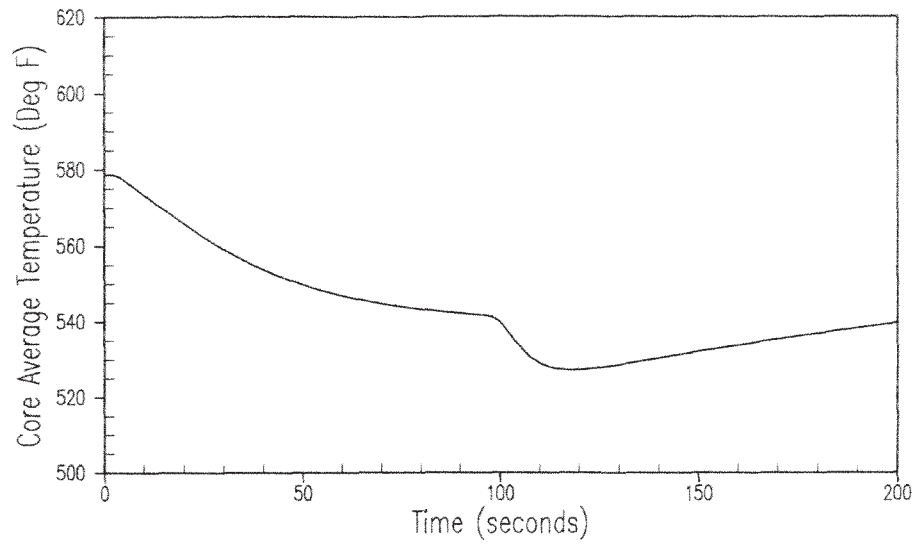
UFSAR FIGURE 14.1-13 | REV. No. 19



**INDIAN POINT UNIT No. 2**

**DROPPED ROD INCIDENT MANUAL ROD CONTROL  
NUCLEAR POWER AND CORE HEAT FLUX  
AT BOL (SMALL NEGATIVE MTC) FOR  
DROPPED RCCA OF WORTH - 400 PCM**

**UFSAR FIGURE 14.1-14 | REV. No. 19**

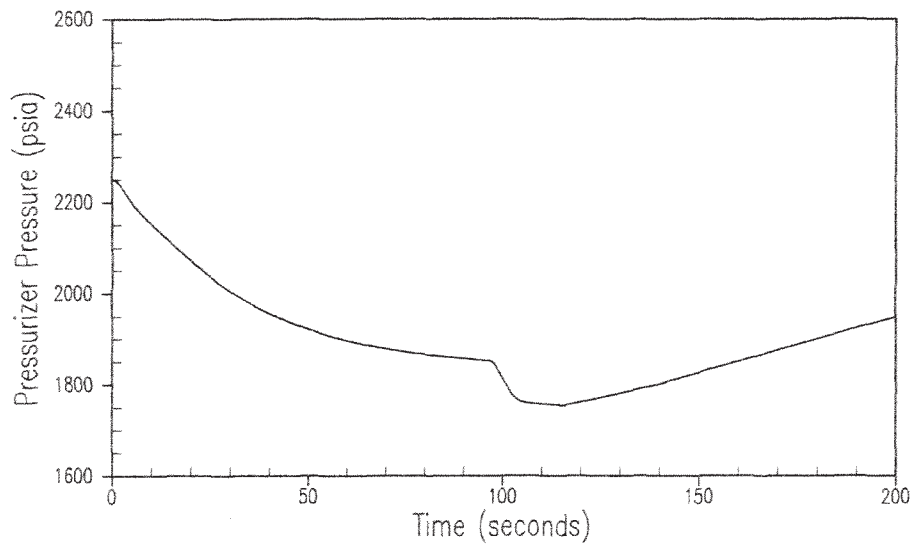


**INDIAN POINT UNIT No. 2**

**DROPPED ROD INCIDENT MANUAL ROD CONTROL  
CORE AVERAGE AND VESSEL INLET TEMPERATURE  
AT BOL (SMALL NEGATIVE MTC) FOR  
DROPPED RCCA OF WORTH - 400 PCM**

**UFSAR FIGURE 14.1-15 | REV. No. 19**

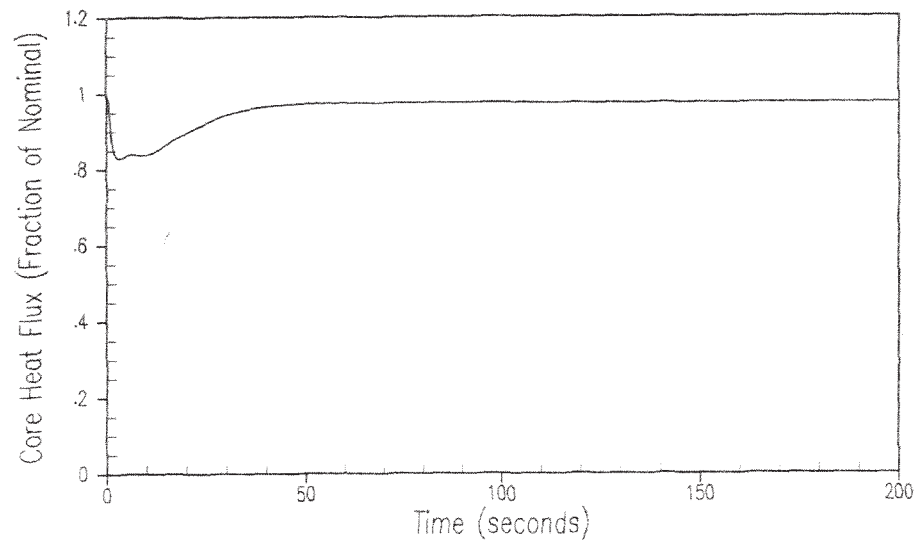
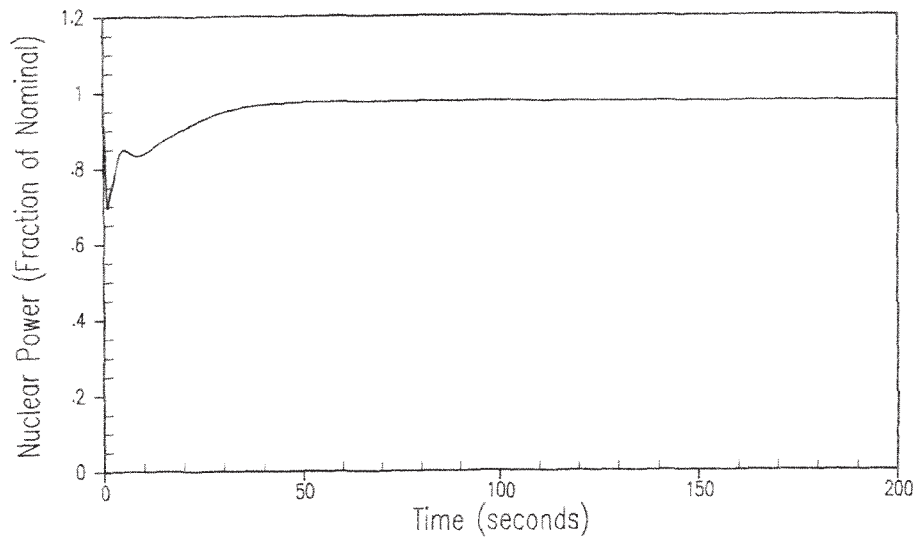




INDIAN POINT UNIT No. 2

DROPPED ROD INCIDENT MANUAL ROD CONTROL  
 PRESSURIZER PRESSURE  
 AT BOL (SMALL NEGATIVE MTC) FOR  
 DROPPED RCCA OF WORTH - 400 PCM

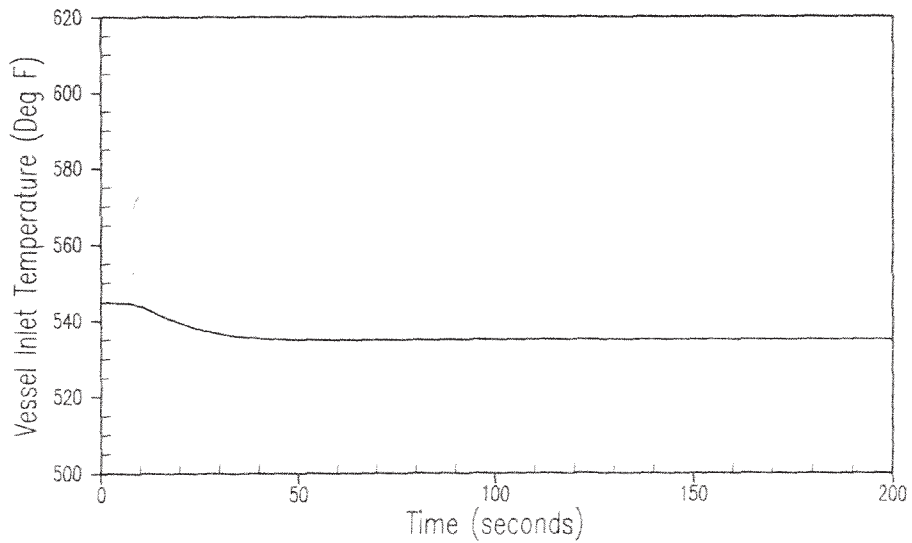
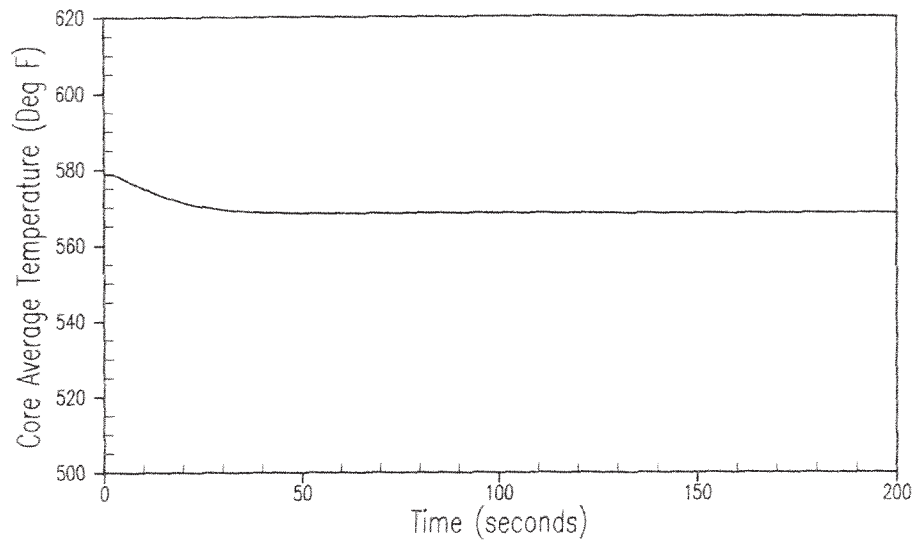
UFSAR FIGURE 14.1-16 | REV. No. 19



INDIAN POINT UNIT No. 2

DROPPED ROD INCIDENT MANUAL ROD CONTROL  
 NUCLEAR POWER AND CORE HEAT FLUX  
 AT EOL (LARGE NEGATIVE MTC) FOR  
 DROPPED RCCA OF WORTH - 400 PCM

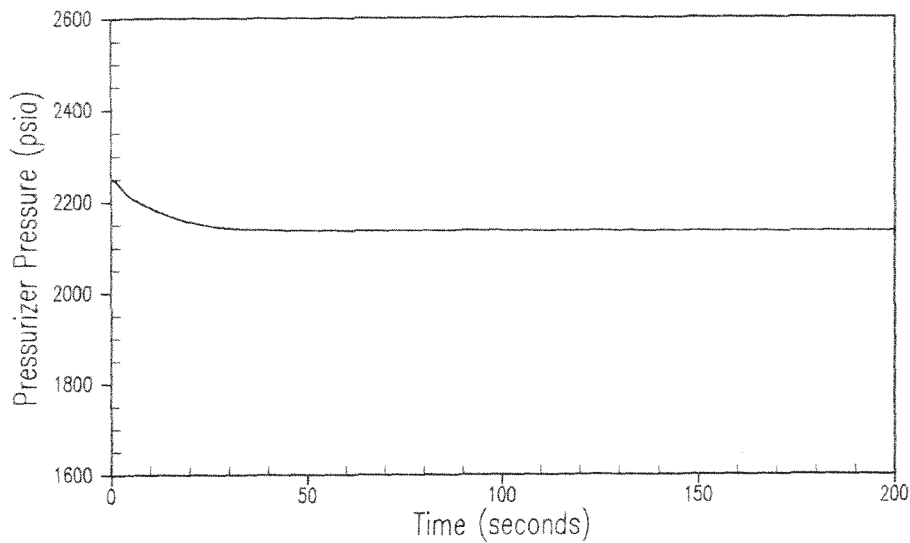
UFSAR FIGURE 14.1-17 | REV. No. 19



INDIAN POINT UNIT No. 2

DROPPED ROD INCIDENT MANUAL ROD CONTROL  
 CORE AVERAGE AND VESSEL INLET TEMPERATURE  
 AT EOL (LARGE NEGATIVE MTC) FOR  
 DROPPED RCCA OF WORTH - 400 PCM

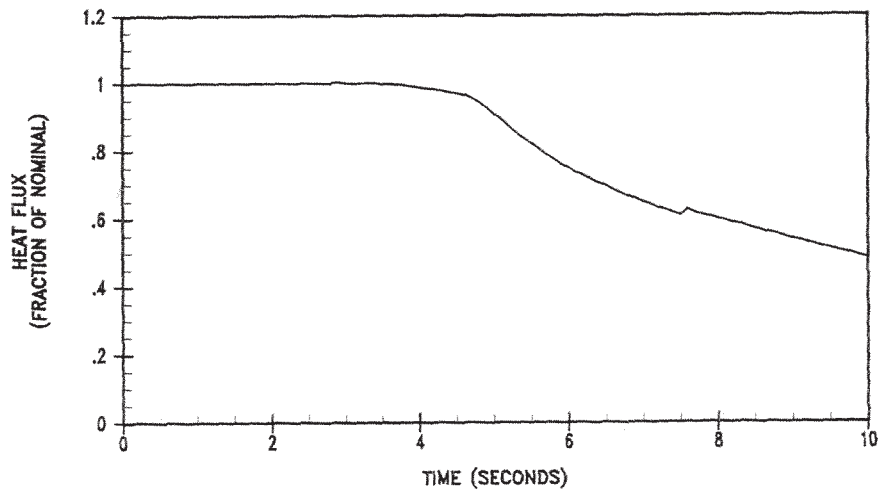
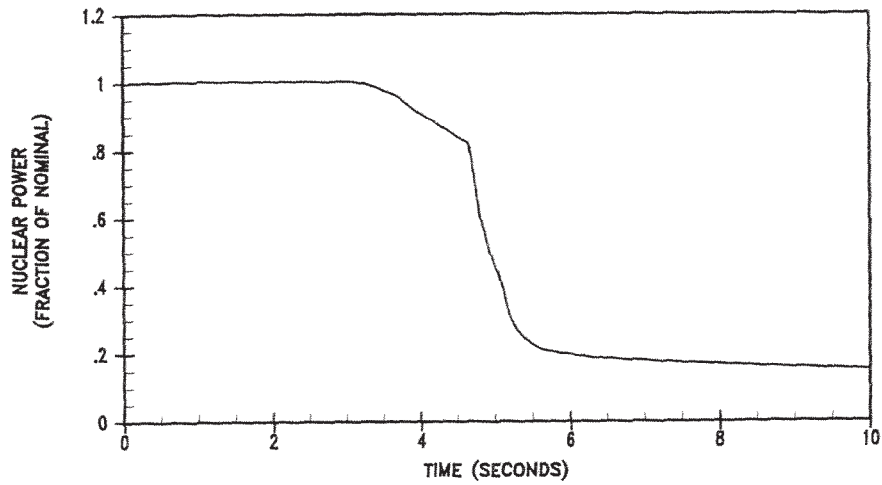
UFSAR FIGURE 14.1-18 | REV. No. 19



INDIAN POINT UNIT No. 2

DROPPED ROD INCIDENT MANUAL ROD CONTROL  
PRESSURIZER PRESSURE  
AT EOL (LARGE NEGATIVE MTC) FOR  
DROPPED RCCA OF WORTH - 400 PCM

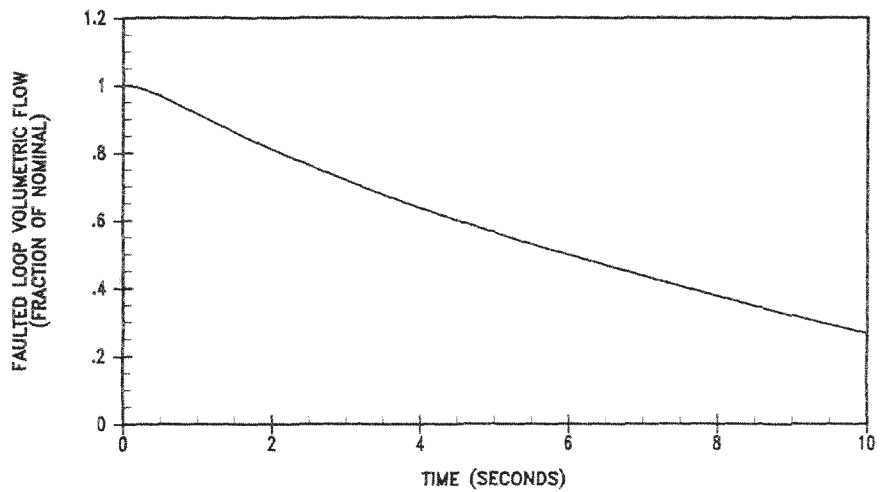
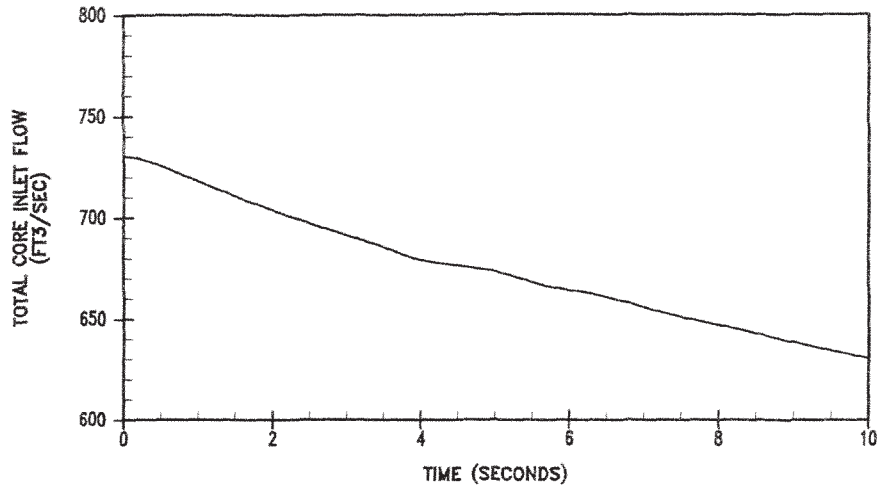
UFSAR FIGURE 14.1-19 | REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ONE PUMP OUT OF FOUR  
NUCLEAR POWER AND CORE HEAT  
FLUX vs TIME

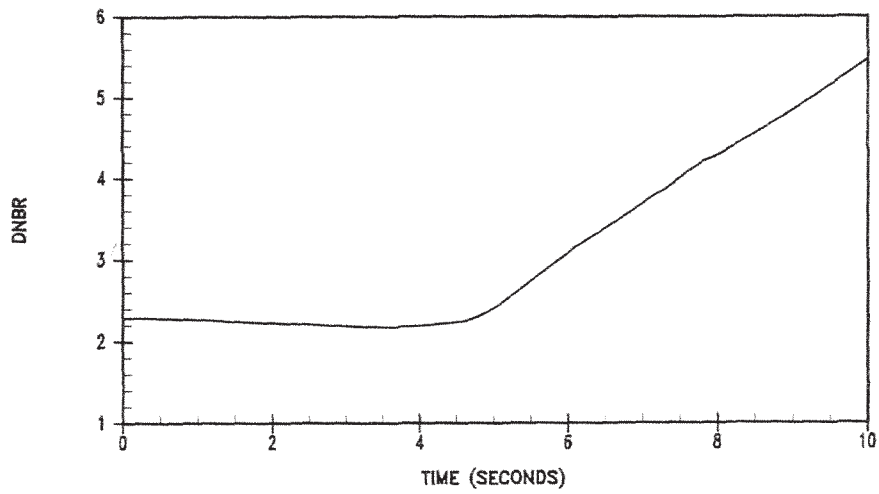
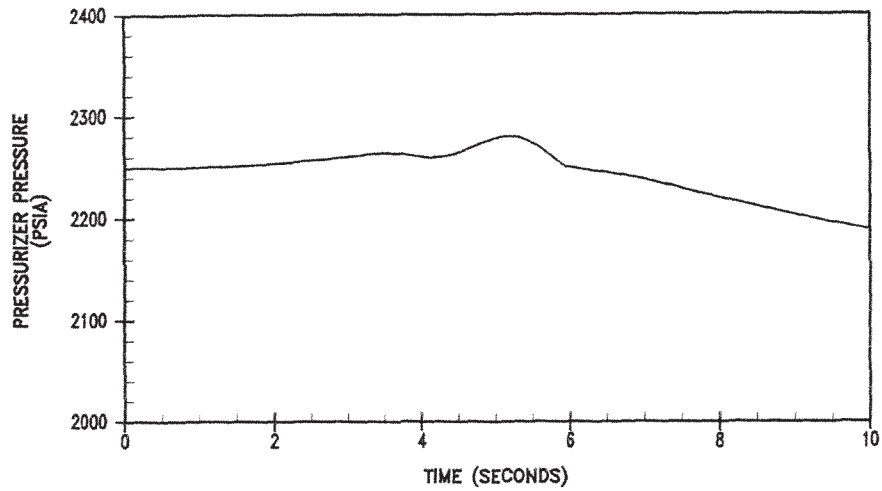
UFSAR FIGURE 14.1-20 REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ONE PUMP OUT OF FOUR  
TOTAL CORE FLOW AND FAULTED  
LOOP FLOW vs TIME

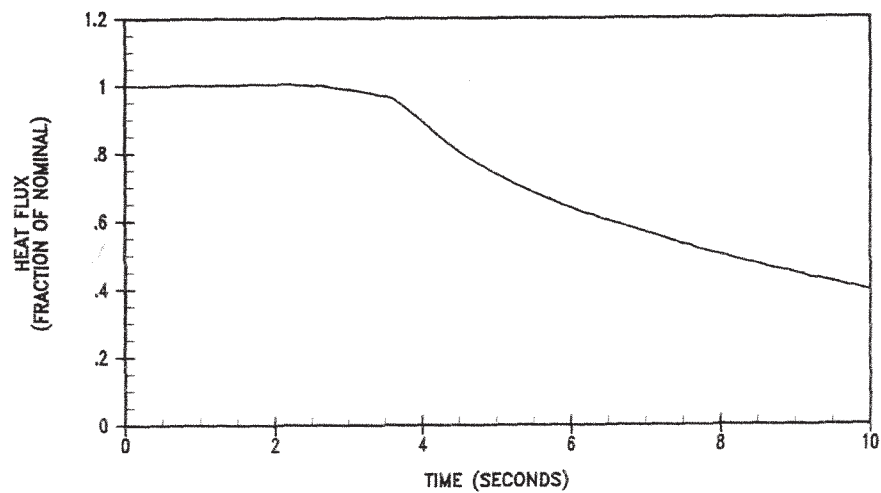
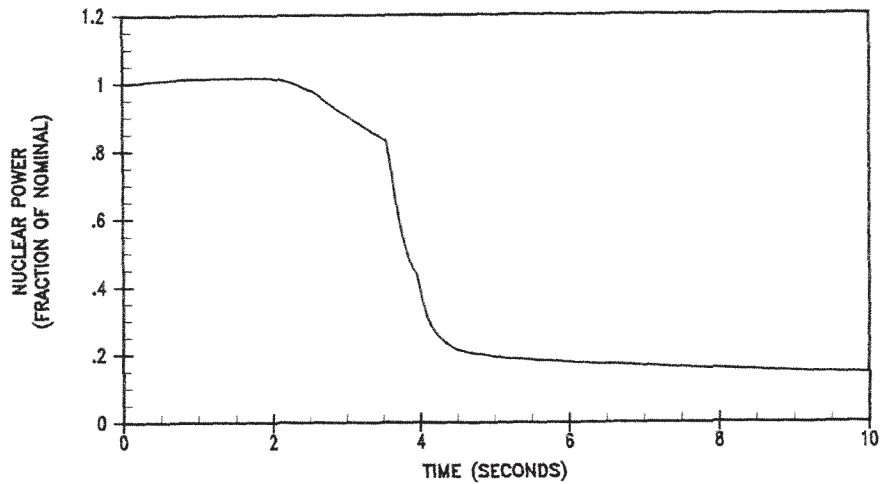
UFSAR FIGURE 14.1-21 | REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ONE PUMP OUT OF FOUR  
PRESSURIZER PRESSURE AND  
DNBR vs TIME

UFSAR FIGURE 14.1-22 | REV. No. 19

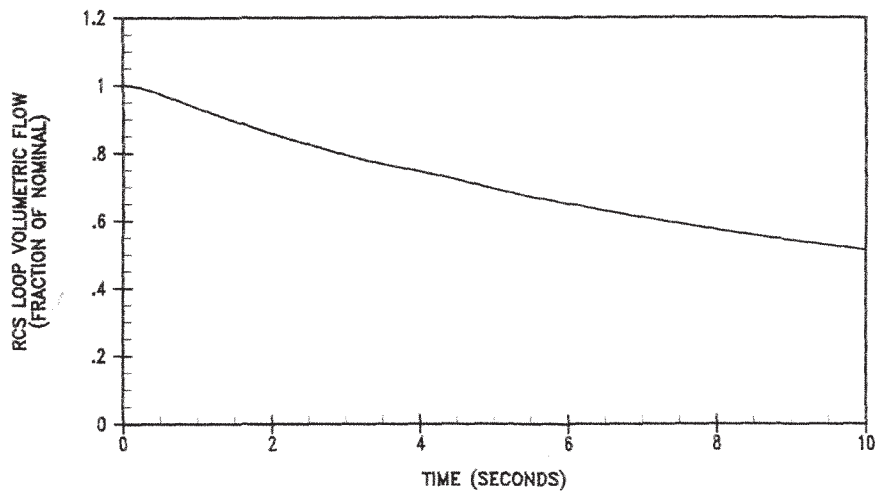
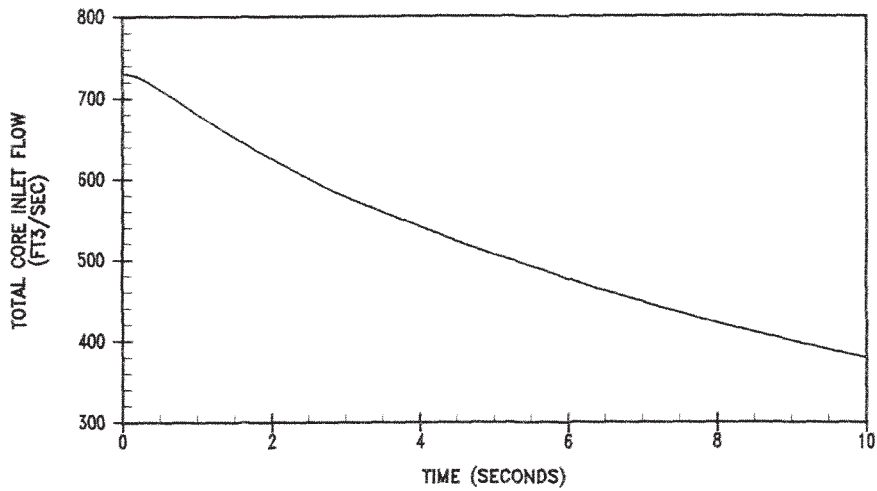


INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
 UNDERVOLTAGE NUCLEAR POWER AND  
 CORE HEAT FLUX vs TIME

UFSAR FIGURE 14.1-23 | REV. No. 19

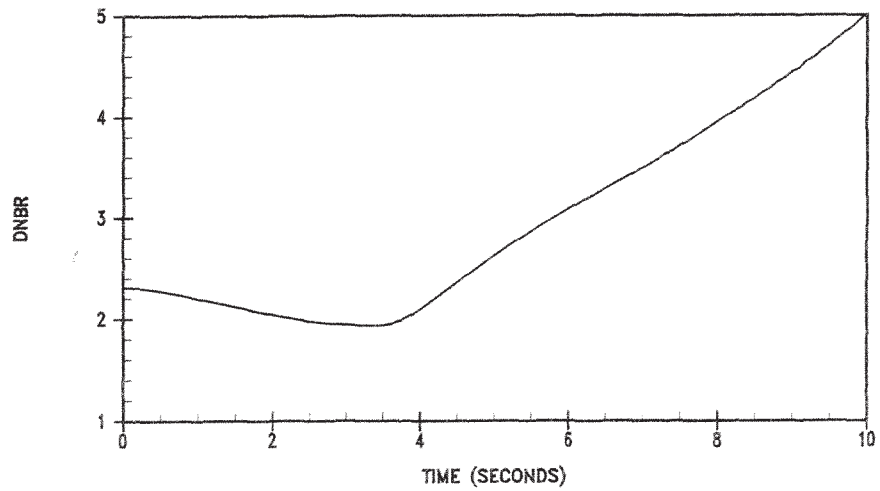
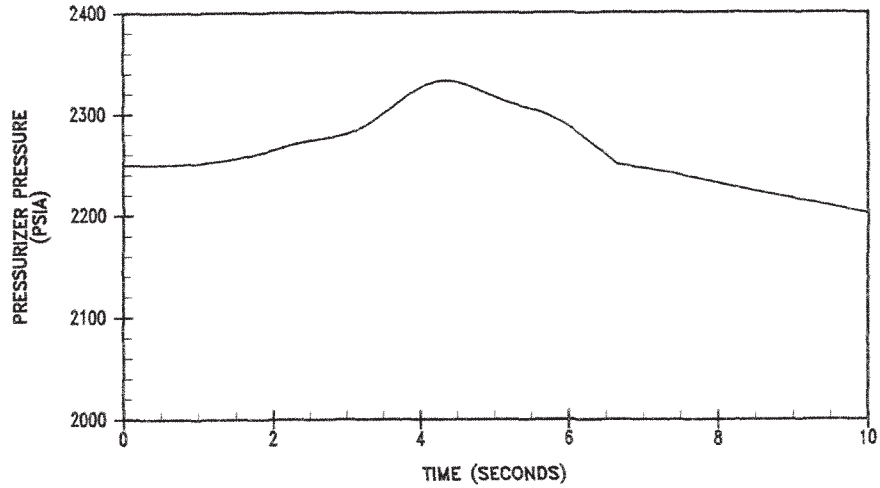




INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
 UNDERVOLTAGE TOTAL CORE FLOW AND  
 RCS LOOP FLOW vs TIME

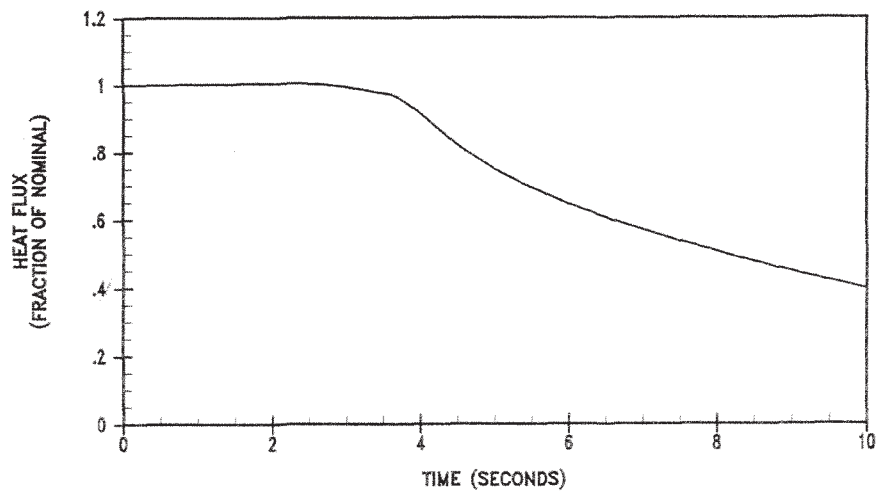
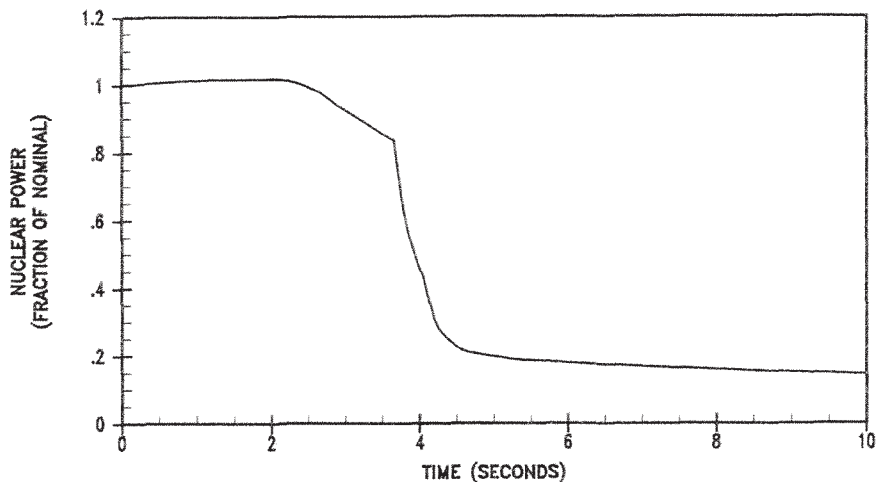
UFSAR FIGURE 14.1-24 | REV. No. 19



INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
 UNDERVOLTAGE PRESSURIZER PRESSURE  
 AND DNBR vs TIME

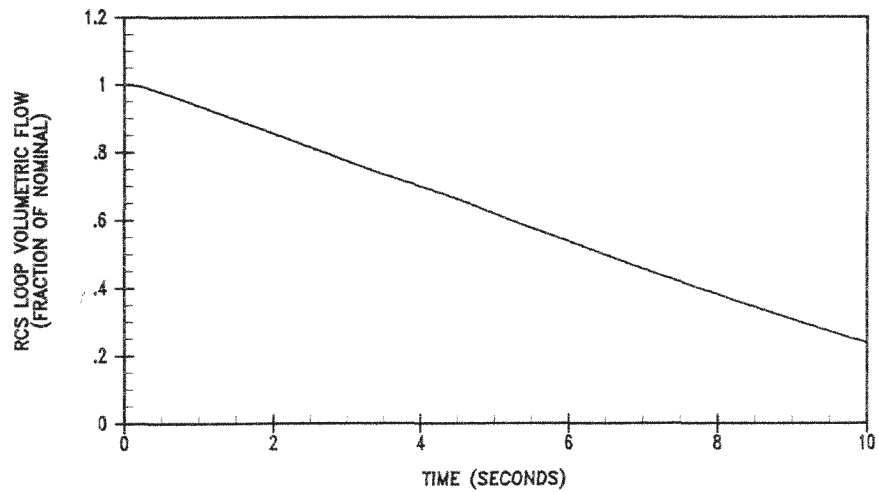
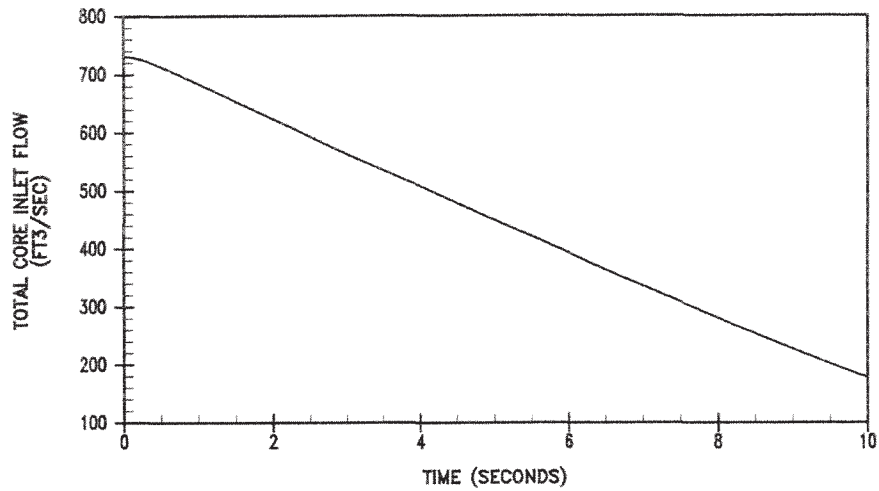
UFSAR FIGURE 14.1-25 | REV. No. 19



INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
 UNDERFREQUENCY NUCLEAR POWER AND  
 HEAT FLUX vs TIME

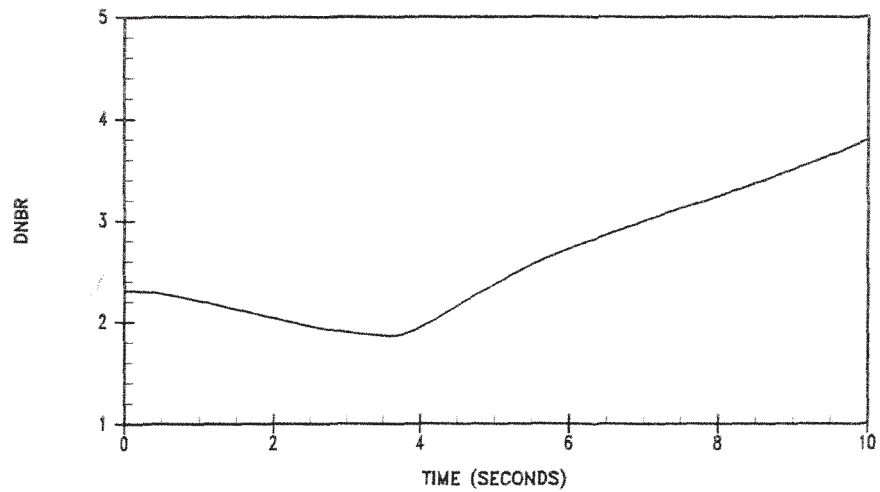
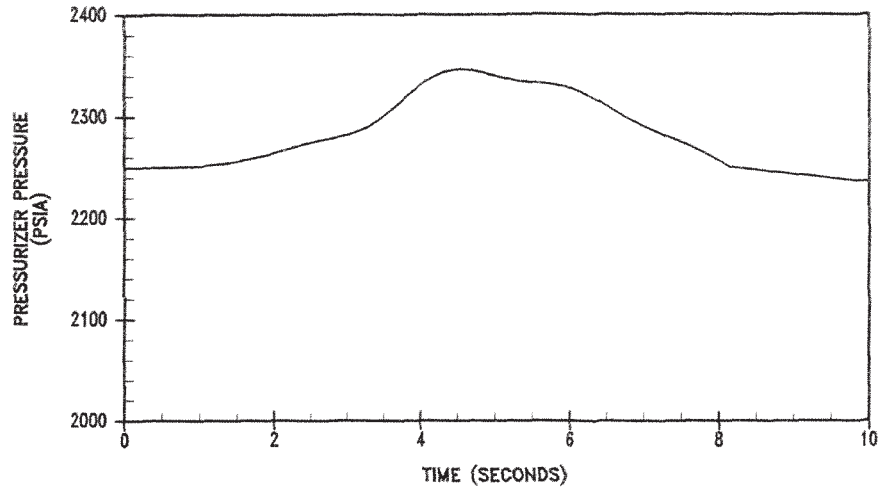
UFSAR FIGURE 14.1-26 | REV. No. 19



INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
UNDERFREQUENCY TOTAL CORE FLOW AND  
RCS LOOP FLOW vs TIME

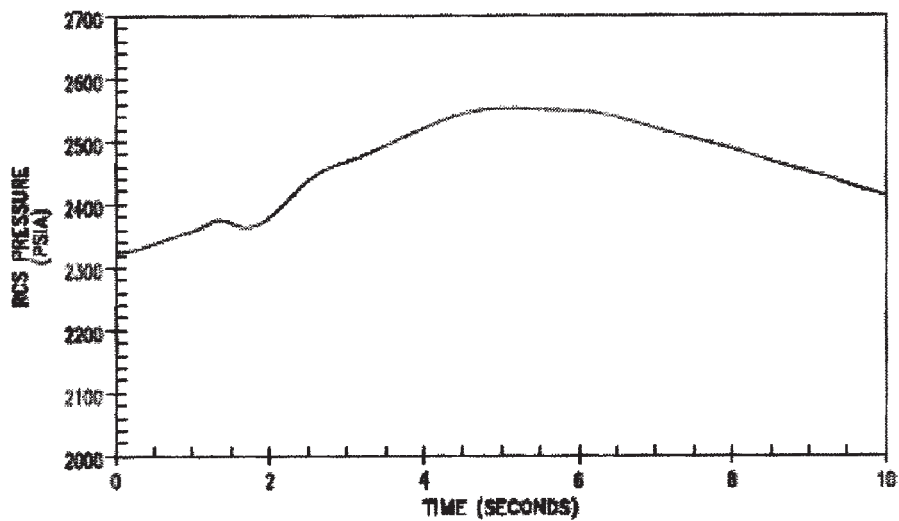
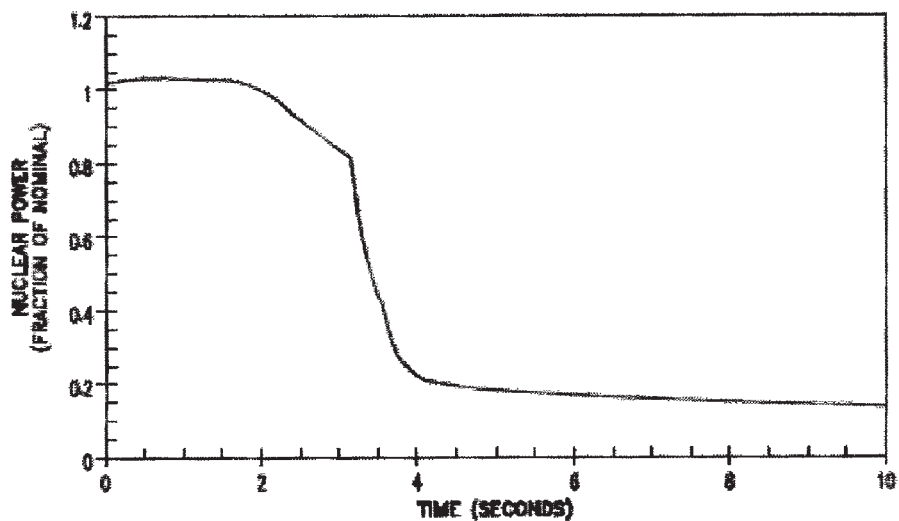
UFSAR FIGURE 14.1-27 | REV. No. 19



INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW -  
 UNDERFREQUENCY PRESSURIZER PRESSURE  
 AND DNBR vs TIME

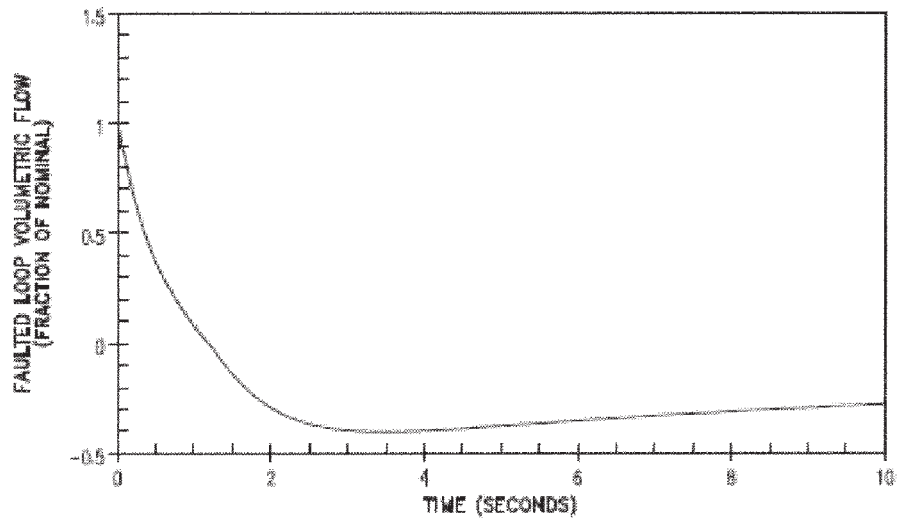
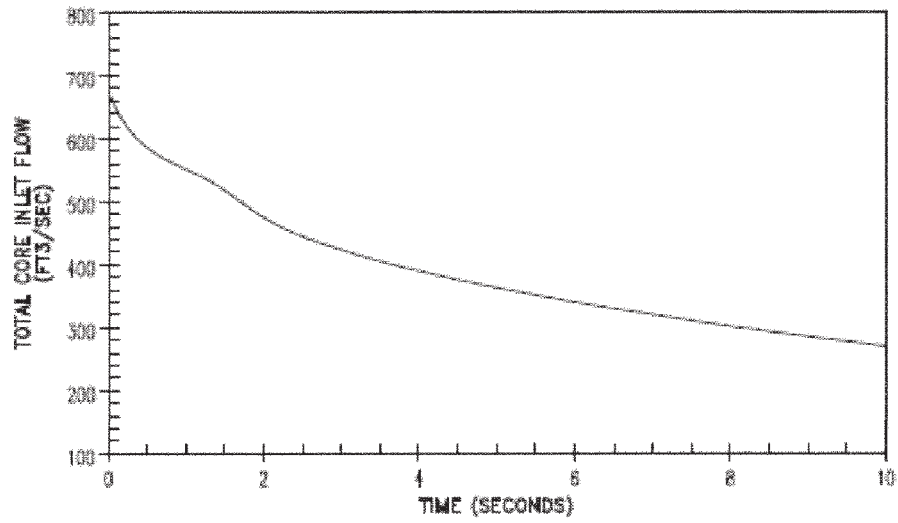
UFSAR FIGURE 14.1-28 | REV. No. 19



INDIAN POINT UNIT No. 2

LOCKED ROTOR NUCLEAR POWER AND  
RCS PRESSURE vs TIME

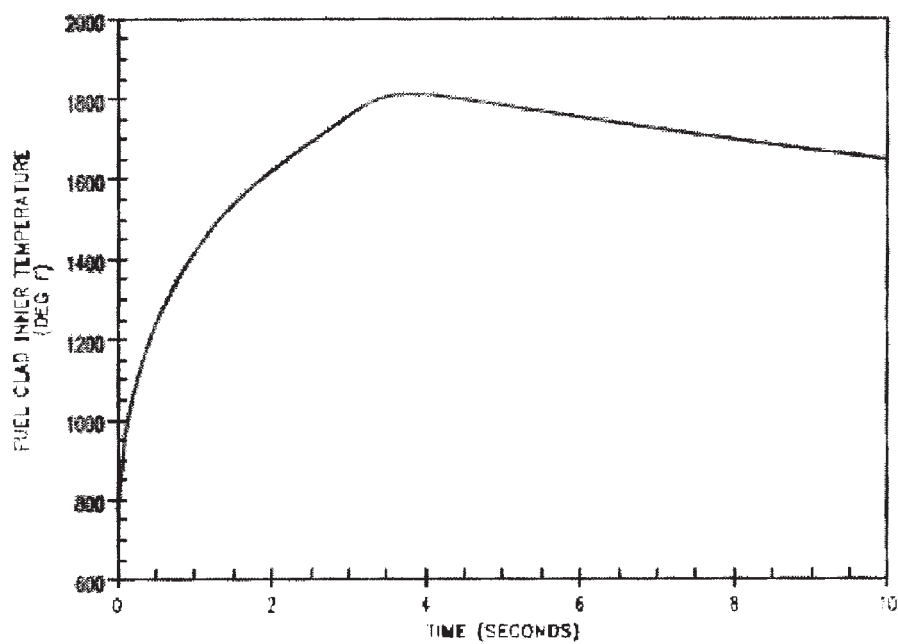
UFSAR FIGURE 14.1-29 | REV. No. 22



INDIAN POINT UNIT No. 2

LOCKED ROTOR TOTAL CORE FLOW AND  
FAULTED LOOP FLOW vs TIME

UFSAR FIGURE 14.1-30 | REV. No. 22

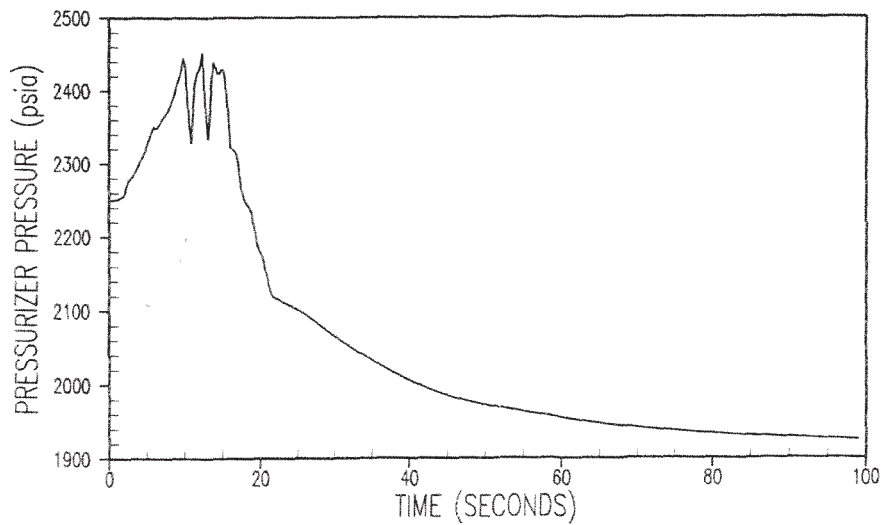
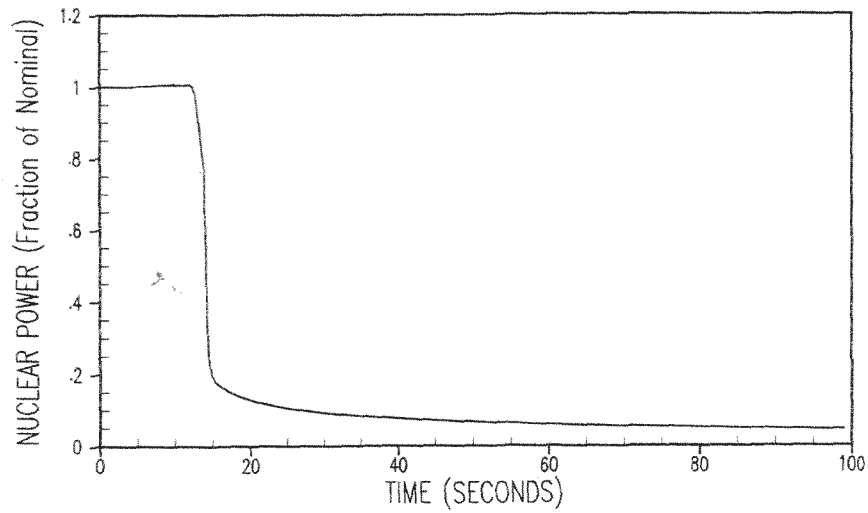


INDIAN POINT UNIT No. 2

LOCKED ROTOR FUEL CLAD  
INNER TEMPERATURE vs TIME

UFSAR FIGURE 14.1-30A | REV. No. 22

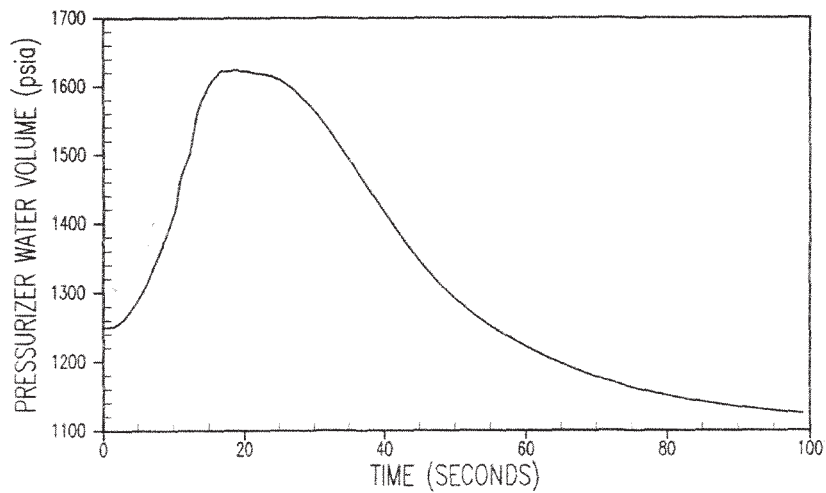
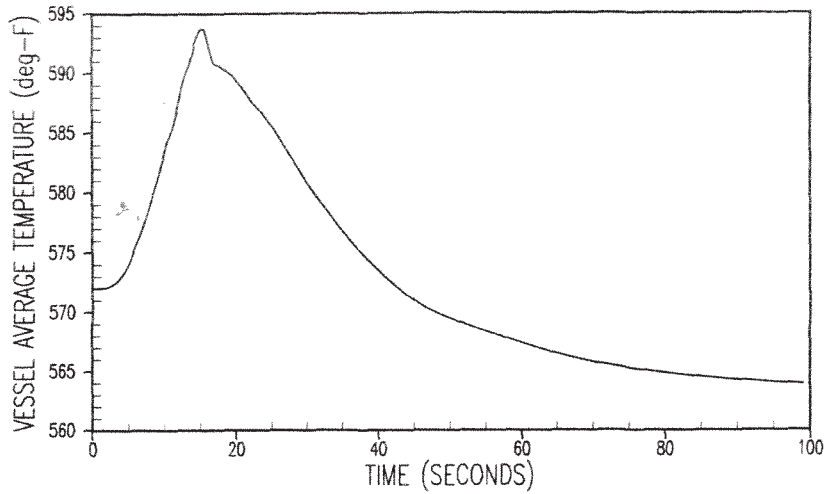




INDIAN POINT UNIT No. 2

LOSS OF LOAD WITH PRESSURIZER  
 SPRAY AND PORV, NUCLEAR POWER  
 AND PRESSURIZER PRESSURE vs TIME

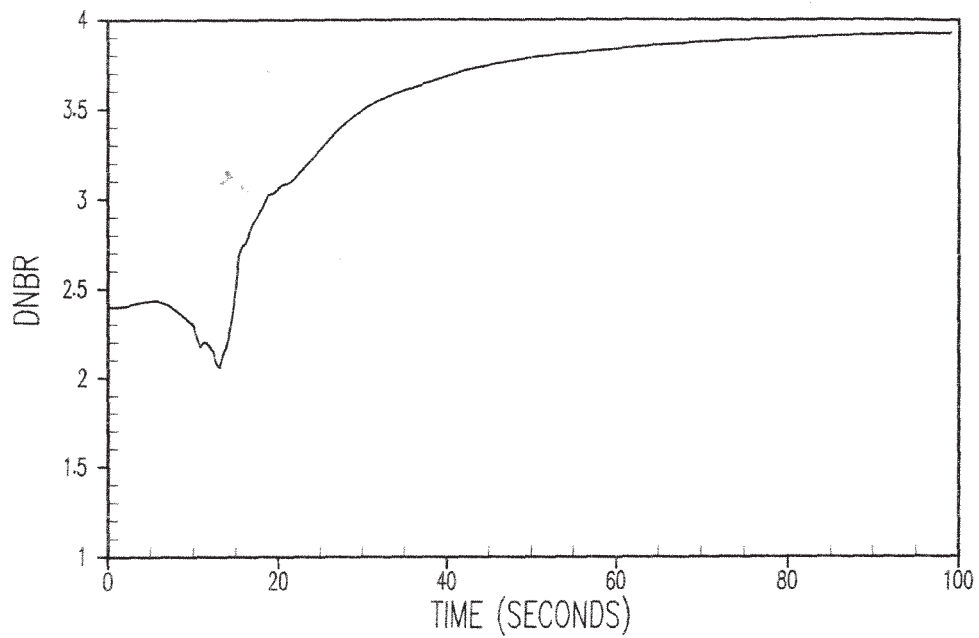
UFSAR FIGURE 14.1-31 | REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF LOAD WITH PRESSURIZER SPRAY AND  
 PORV, AVERAGE COOLANT TEMPERATURE  
 AND PRESSURIZER WATER VOLUME vs TIME

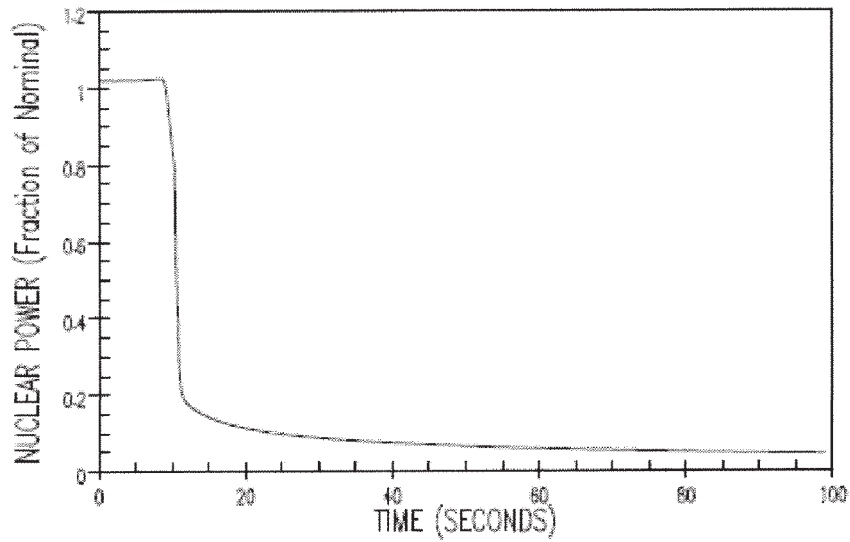
UFSAR FIGURE 14.1-32 | REV. No. 19



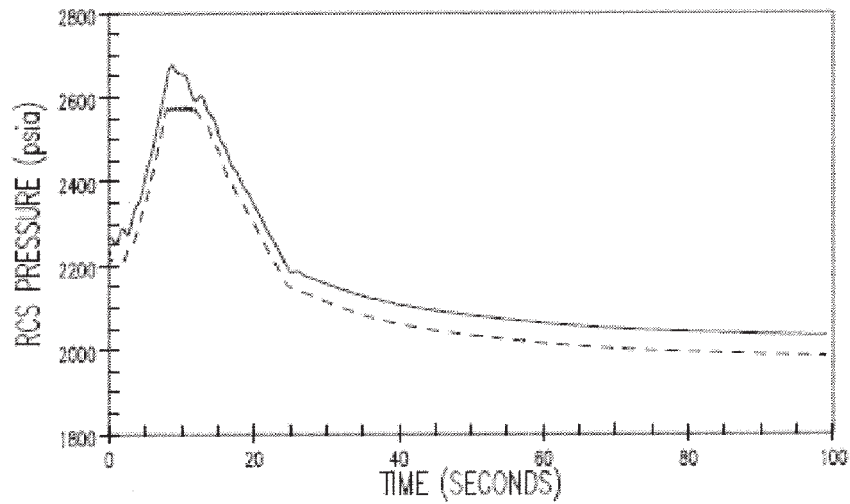
INDIAN POINT UNIT No. 2

LOSS OF LOAD WITH PRESSURIZER SPRAY  
AND POWER OPERATED RELIEF VALVES  
DNBR vs TIME

UFSAR FIGURE 14.1-33 | REV. No. 19



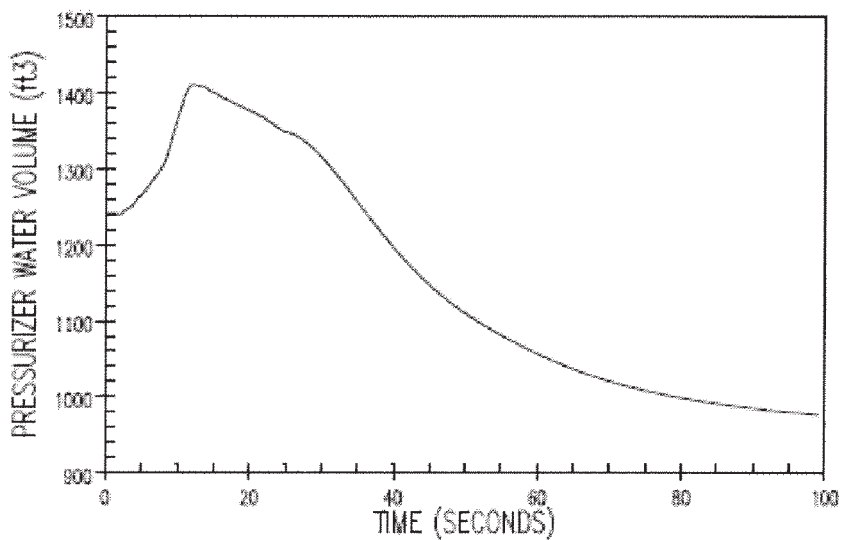
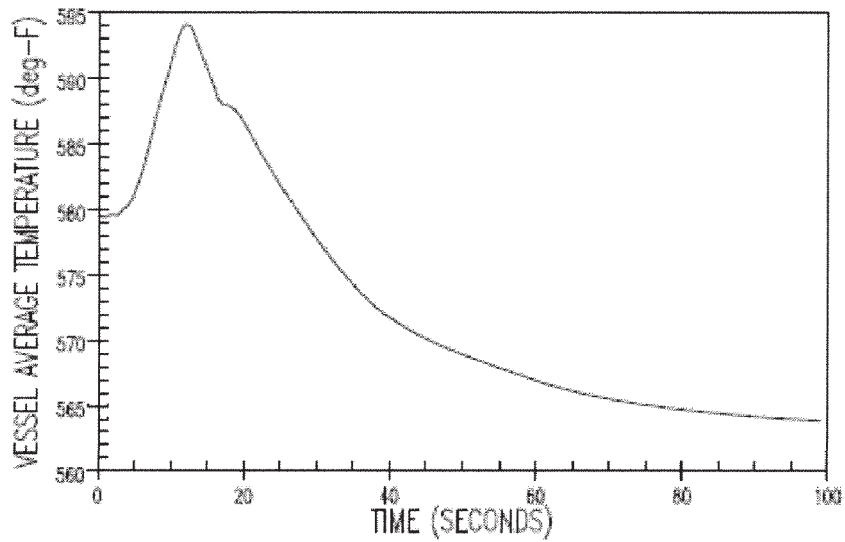
— RV Lower Plenum Pressure  
 - - - Pressurizer Pressure



INDIAN POINT UNIT No. 2

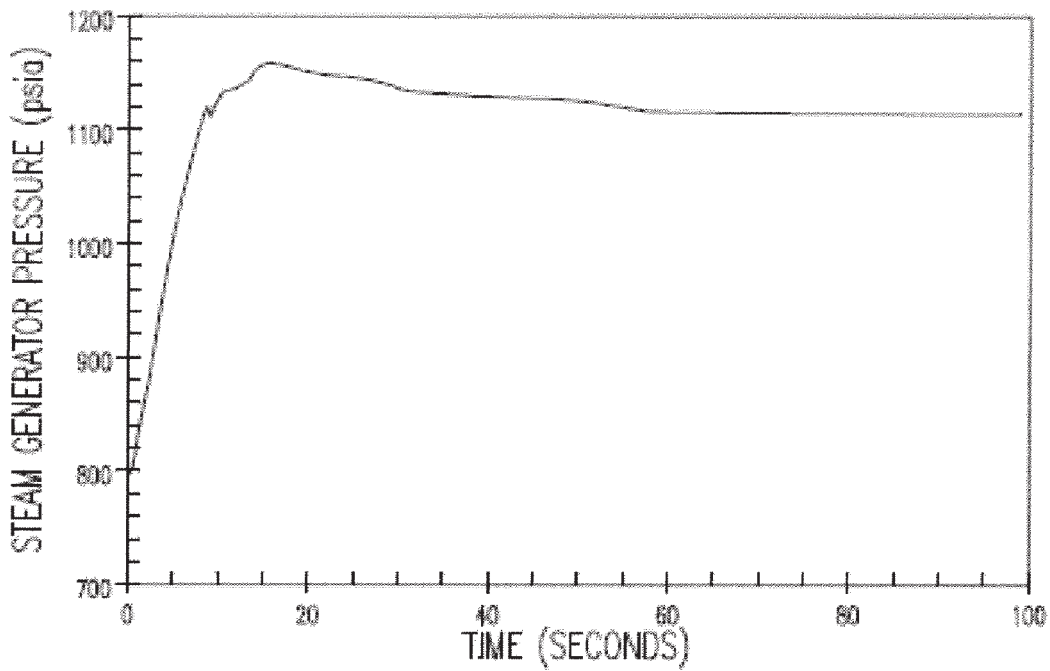
LOSS OF LOAD WITHOUT PRESSURIZER SPRAY  
 AND PORV, NUCLEAR POWER AND  
 PRESSURIZER PRESSURE vs TIME

UFSAR FIGURE 14.1-37 | REV. No. 22



INDIAN POINT UNIT No. 2

LOSS OF LOAD WITHOUT PRESSURIZER SPRAY AND POWER OPERATED RELIEF VALVES, AVERAGE COOLANT TEMPERATURE AND PRESSURIZER WATER VOLUME vs TIME

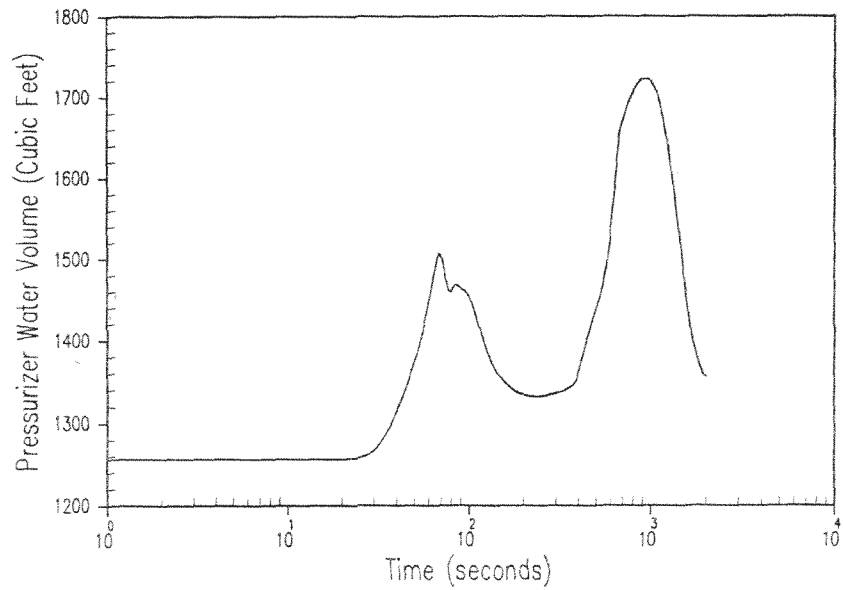
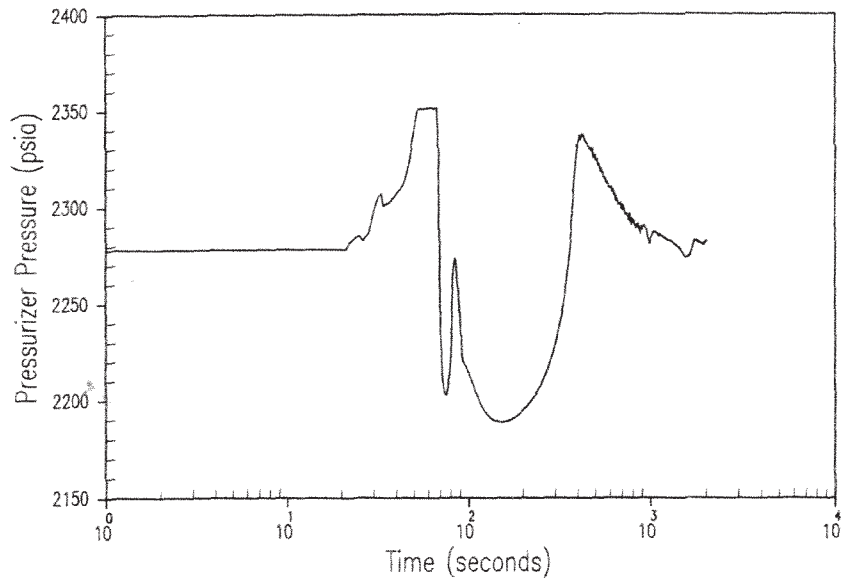


INDIAN POINT UNIT No. 2

LOSS OF LOAD WITHOUT PRESSURIZER SPRAY  
AND POWER OPERATED RELIEF VALVES,  
STEAM PRESSURE, vs TIME

UFSAR FIGURE 14.1-39

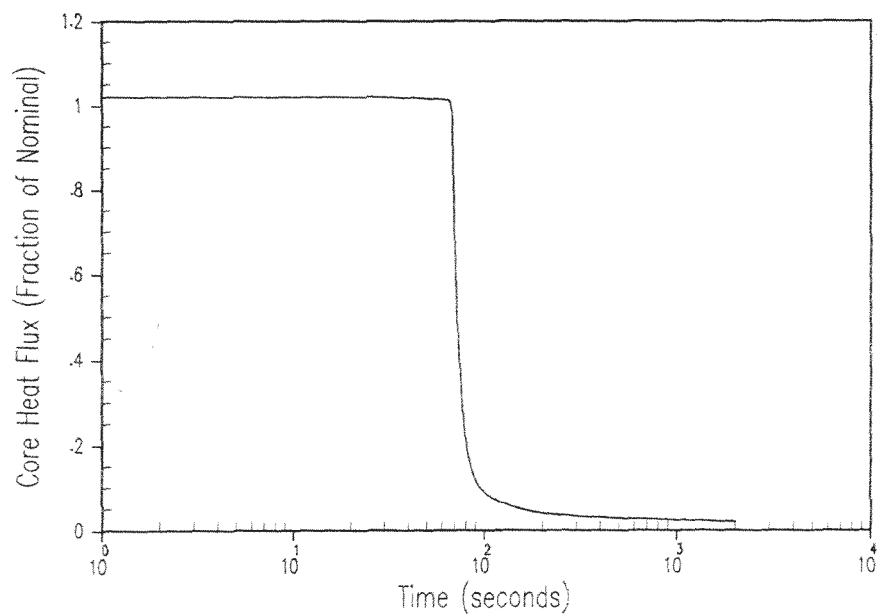
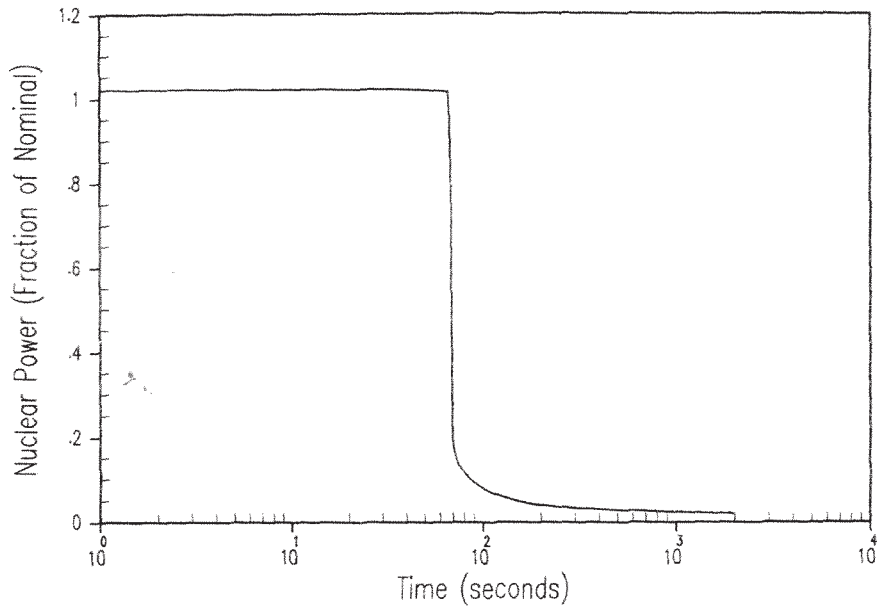
REV. No. 22



INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE  
POWER AVAILABLE, HIGH T<sub>avg</sub> PROGRAM,  
PRESSURIZER PRESSURE AND  
PRESSURIZER WATER VOLUME vs TIME

UFSAR FIGURE 14.1-43, sht.1 | REV. No. 19

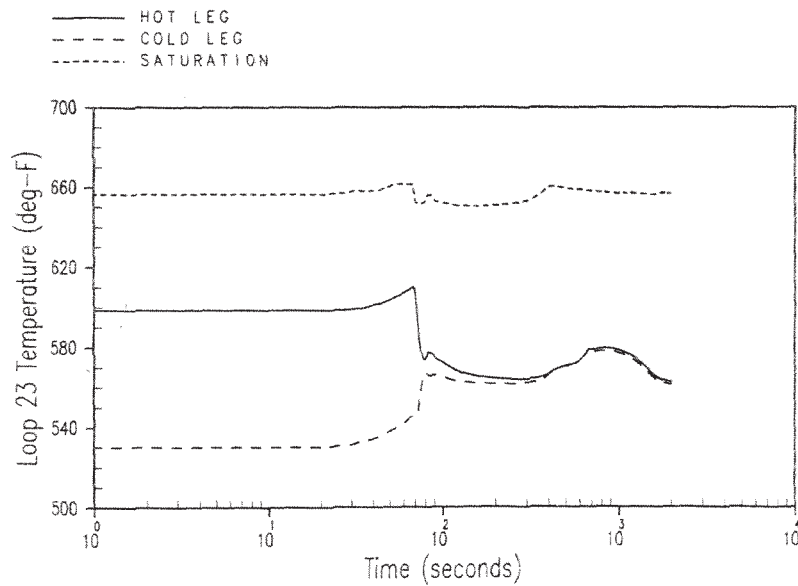
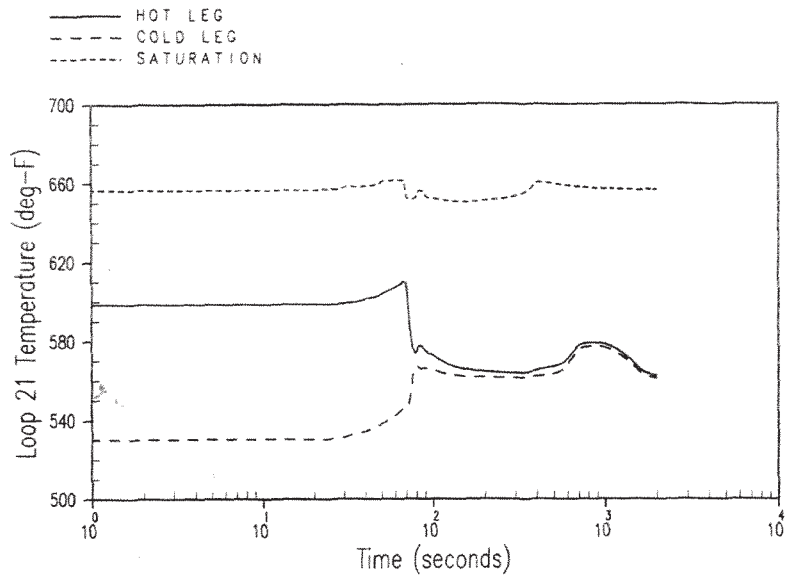


INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE  
POWER AVAILABLE, HIGH  $T_{avg}$  PROGRAM,  
NUCLEAR POWER AND  
CORE HEAT FLUX vs TIME

UFSAR FIGURE 14.1-43, sht.2 | REV. No. 19

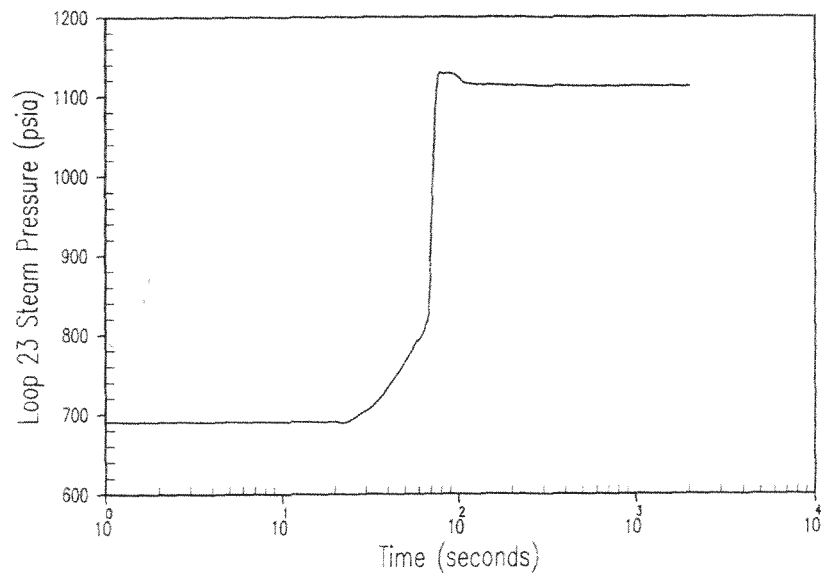
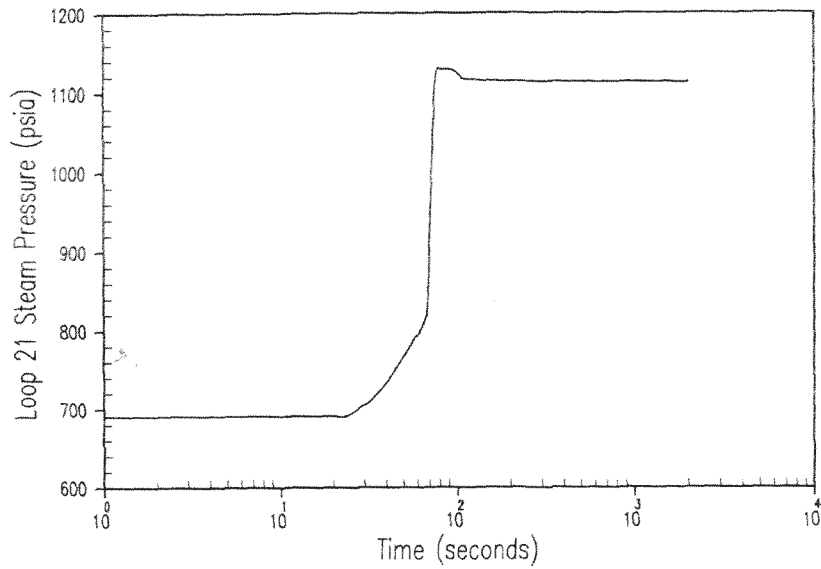




INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE  
 POWER AVAILABLE, HIGH Tavg PROGRAM,  
 LOOP 21 AND LOOP 23  
 TEMPERATURE vs TIME

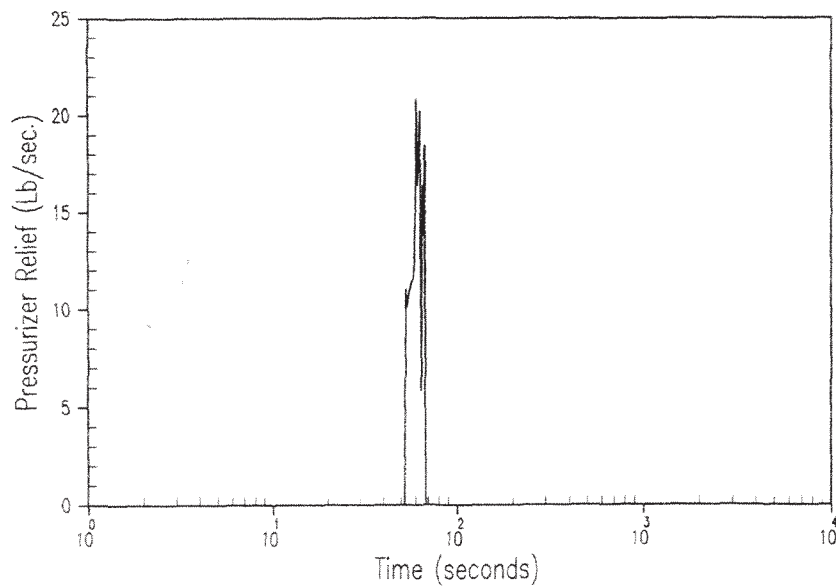
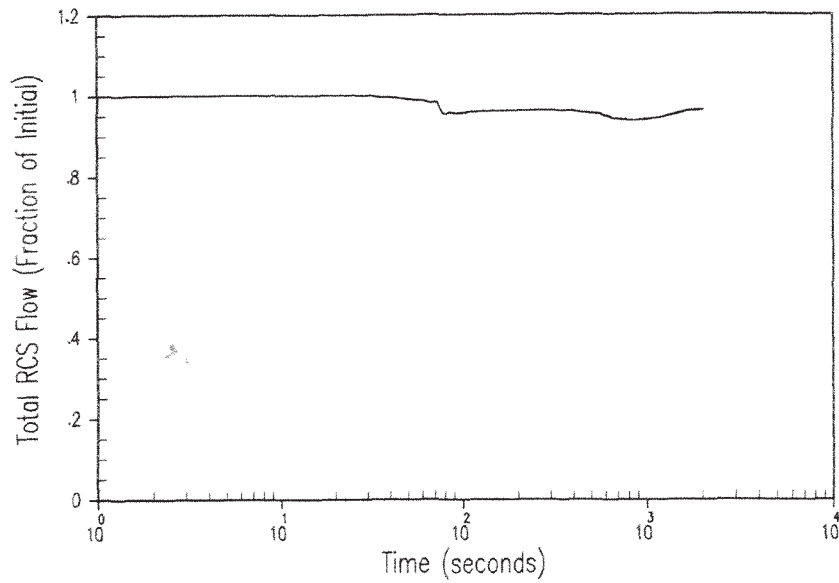
UFSAR FIGURE 14.1-43, sht.3 | REV. No. 19



**INDIAN POINT UNIT No. 2**

**LOSS OF NORMAL FEEDWATER, OFFSITE  
POWER AVAILABLE, HIGH T<sub>avg</sub> PROGRAM,  
STEAM GENERATOR 21 AND STEAM GENERATOR 23  
PRESSURE vs TIME**

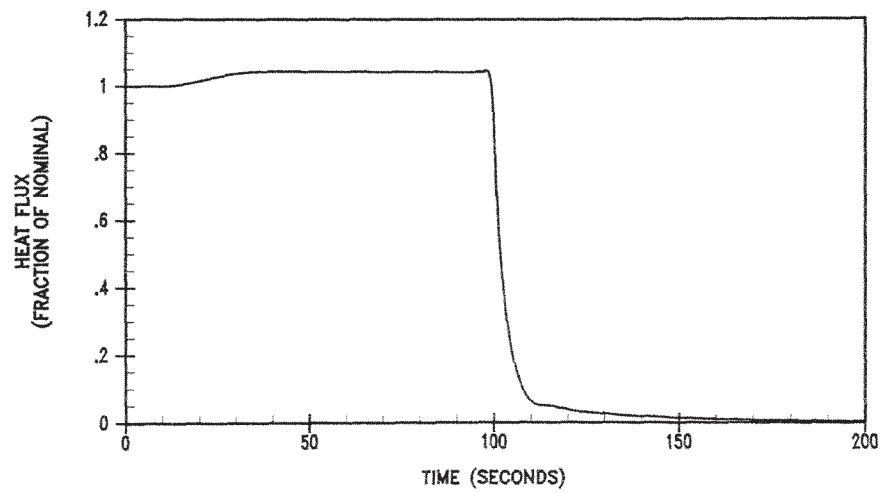
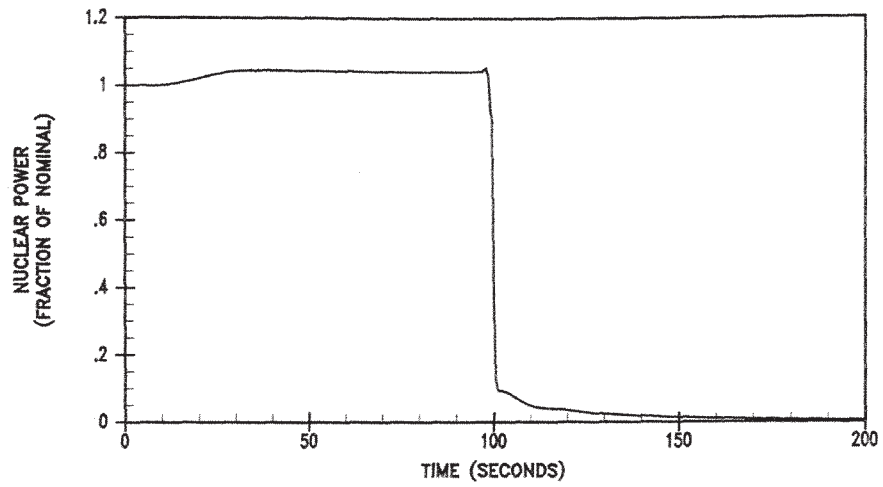
**UFSAR FIGURE 14.1-43, sht.4 REV. No. 19**



INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE  
POWER AVAILABLE, HIGH  $T_{avg}$   
PROGRAM, TOTAL RCS FLOW AND  
PRESSURIZER RELIEF vs TIME

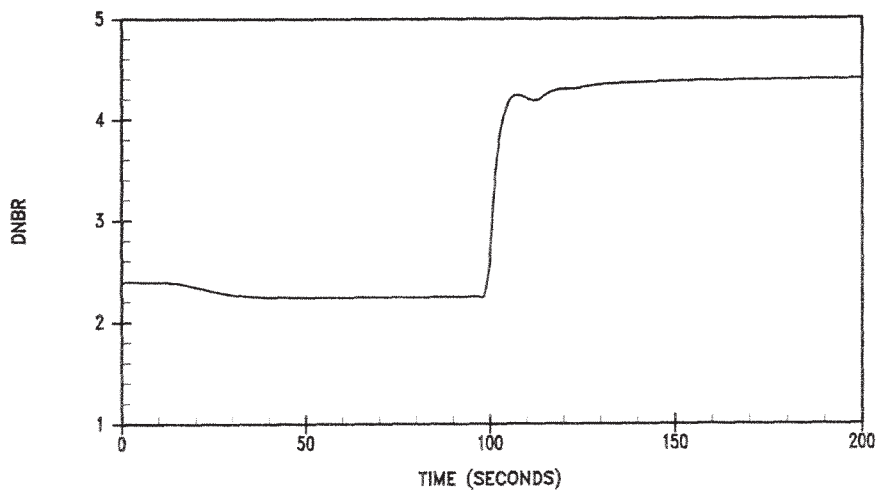
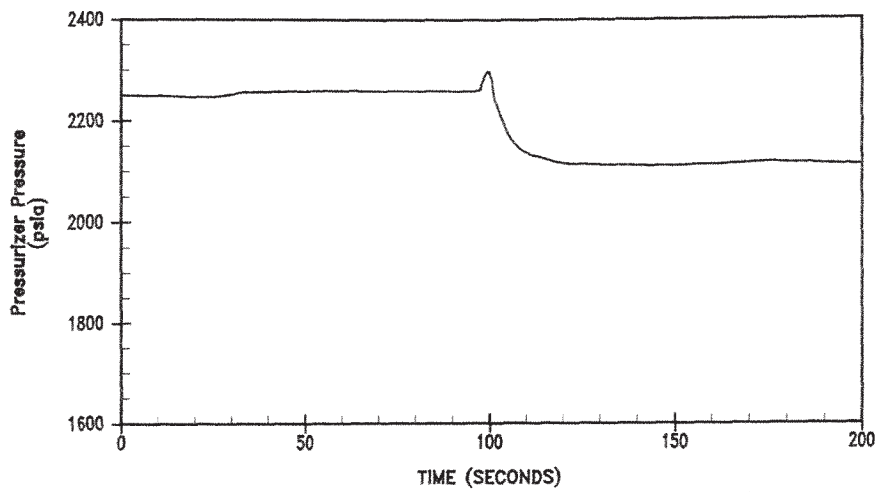
UFSAR FIGURE 14.1-43, sht.5 | REV. No. 19



INDIAN POINT UNIT No. 2

FEEDWATER SYSTEM MALFUNCTION EXCESSIVE FEEDWATER  
 FLOW - HFP CONDITIONS MANUAL ROD CONTROL  
 NUCLEAR POWER AND CORE HEAT FLUX vs TIME

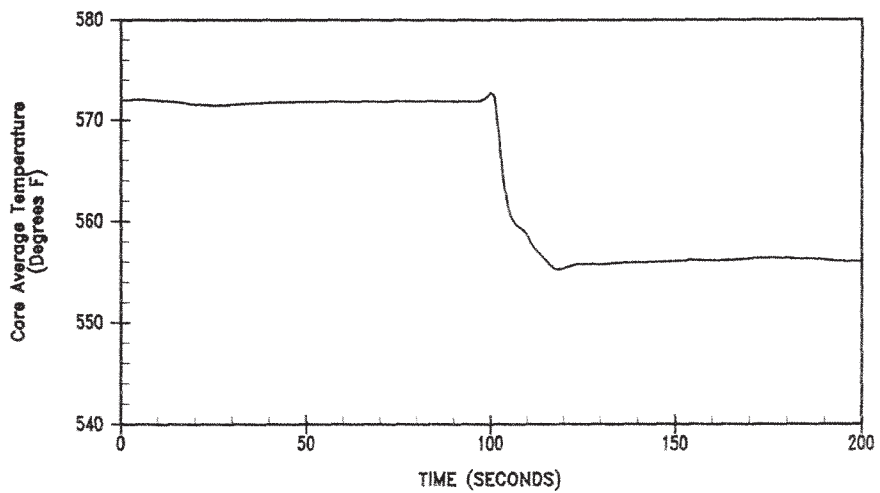
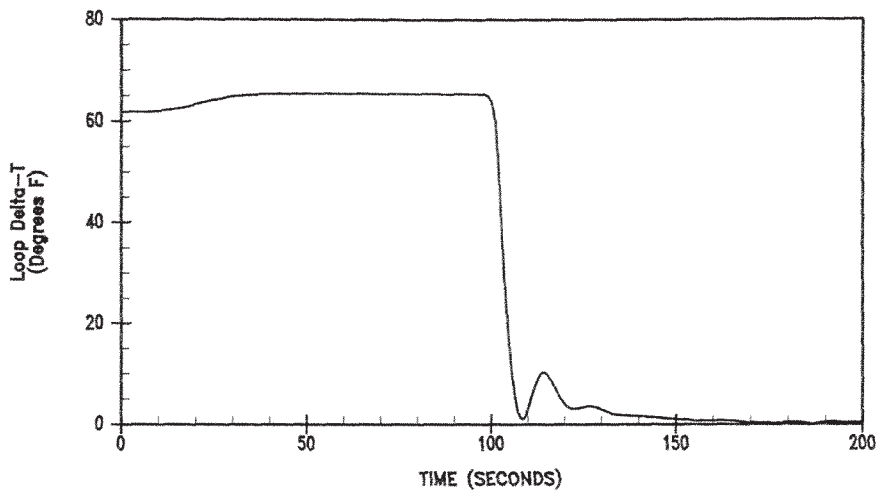
UFSAR FIGURE 14.1-45, sht.1 | REV. No. 19



## INDIAN POINT UNIT No. 2

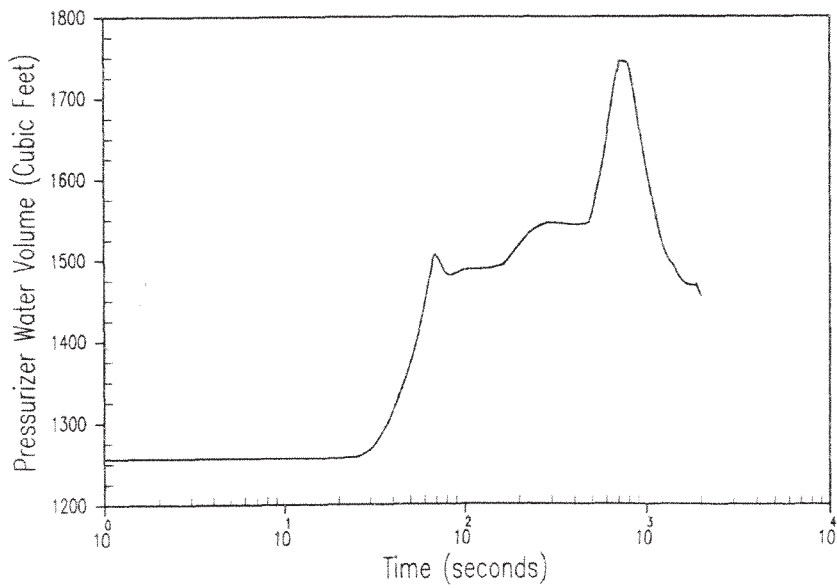
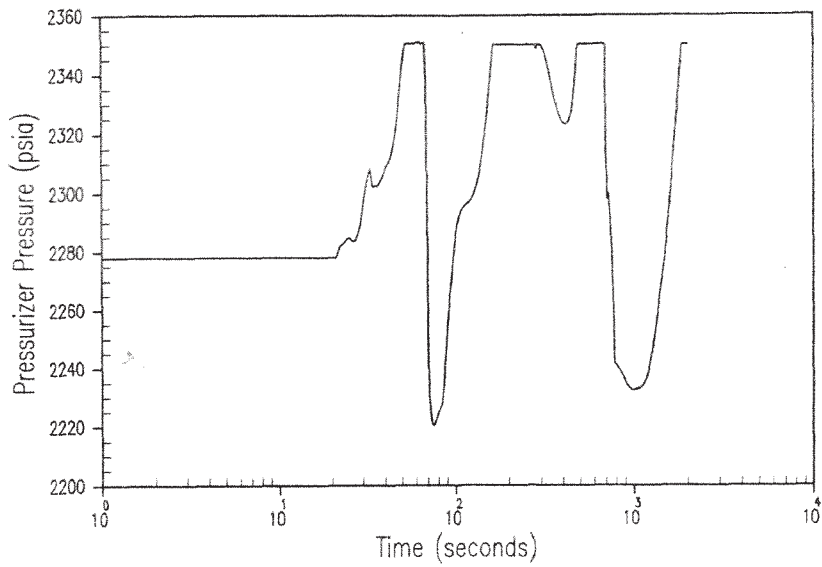
FEEDWATER SYSTEM MALFUNCTION EXCESSIVE FEEDWATER  
FLOW - HFP CONDITIONS MANUAL ROD CONTROL  
PRESSURIZER PRESSURE AND DNBR vs TIME

UFSAR FIGURE 14.1-45, sht.2 | REV. No. 19



INDIAN POINT UNIT No. 2

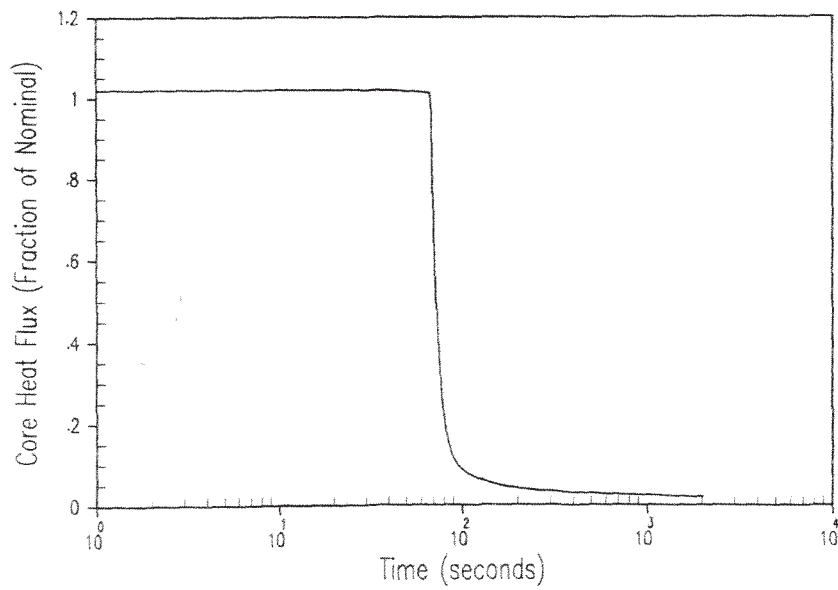
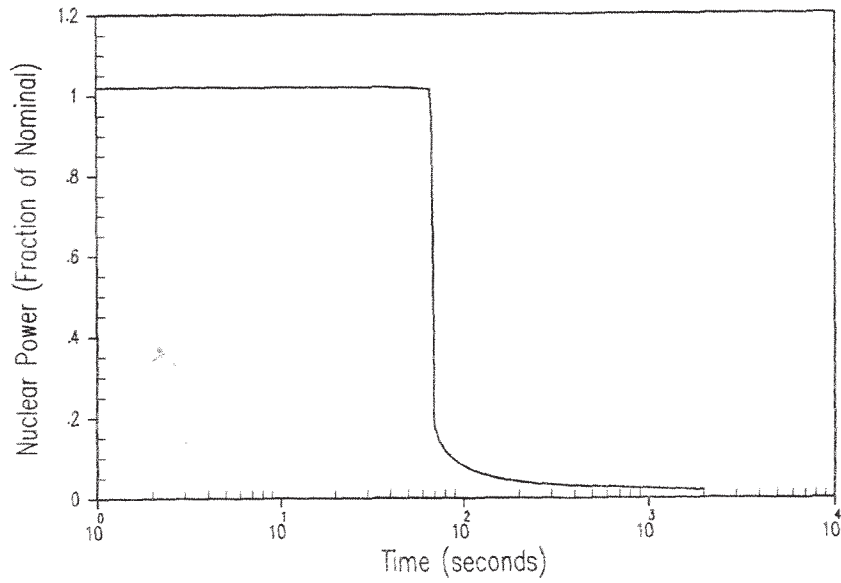
FEEDWATER SYSTEM MALFUNCTION EXCESSIVE FEEDWATER  
 FLOW - HFP CONDITIONS MANUAL ROD CONTROL  
 LOOP DELTA -T, AND CORE Tavg vs TIME



**INDIAN POINT UNIT No. 2**

**LOSS OF ALL AC POWER, HIGH Tavg  
PROGRAM, PRESSURIZER PRESSURE AND  
PRESSURIZER WATER VOLUME vs TIME**

**UFSAR FIGURE 14.1-50, sht.1 | REV. No. 19**

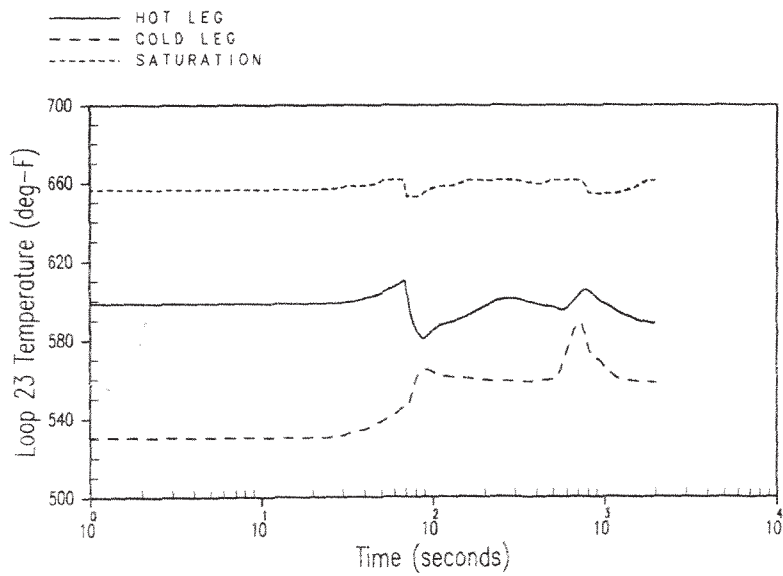
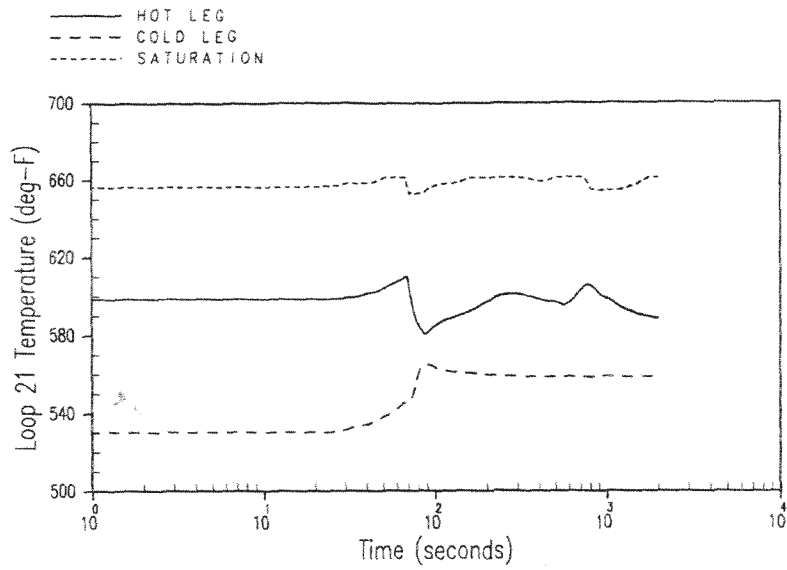


INDIAN POINT UNIT No. 2

LOSS OF ALL AC POWER, HIGH T<sub>avg</sub>  
PROGRAM, NUCLEAR POWER AND  
CORE HEAT FLUX vs TIME

UFSAR FIGURE 14.1-50, sht.2 | REV. No. 19

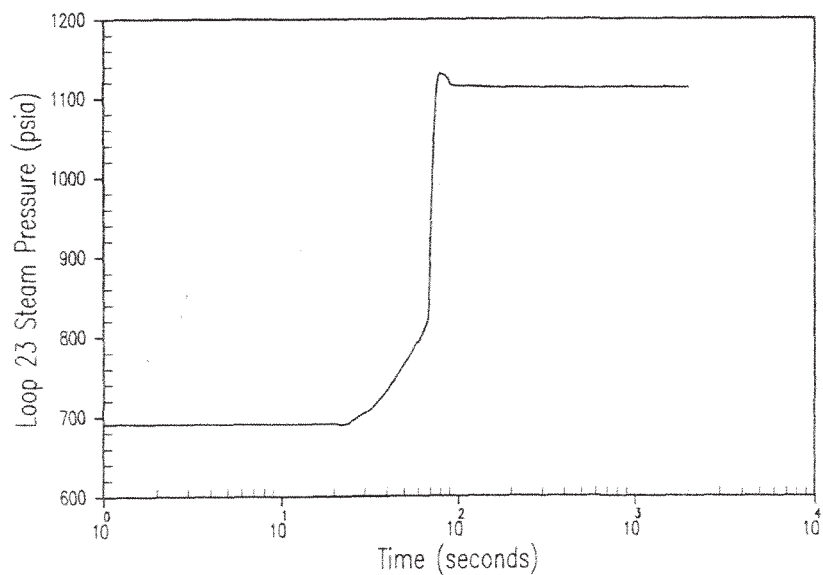
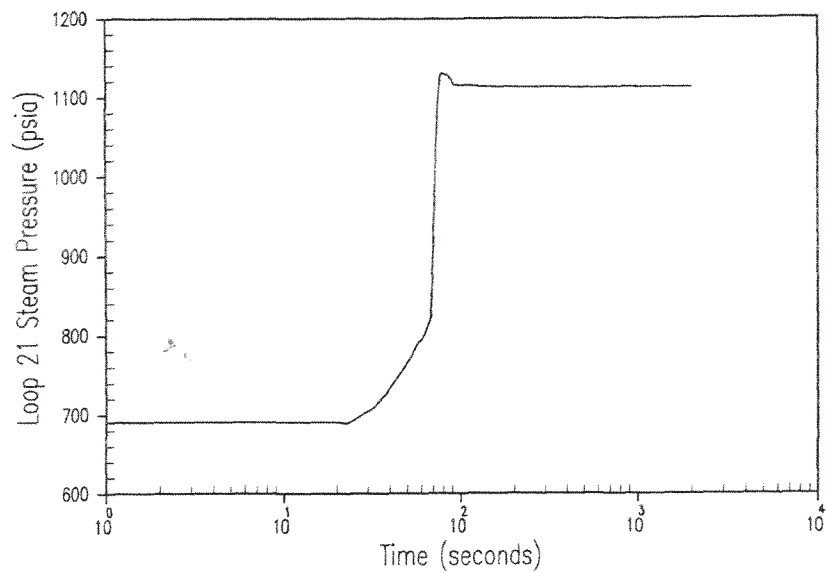




INDIAN POINT UNIT No. 2

LOSS OF ALL AC POWER TO THE  
 STATION AUXILIARIES, HIGH Tavg  
 PROGRAM, LOOP 21 AND LOOP 23  
 TEMPERATURE vs TIME

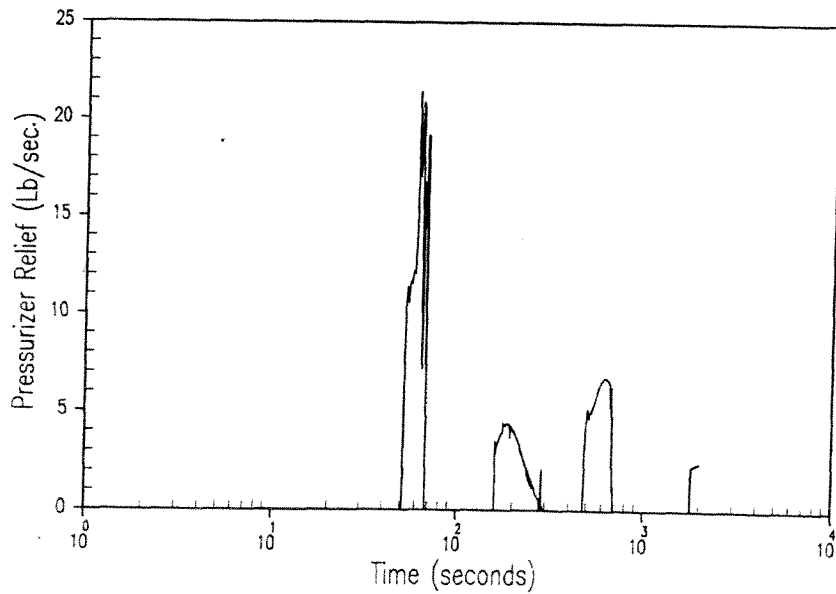
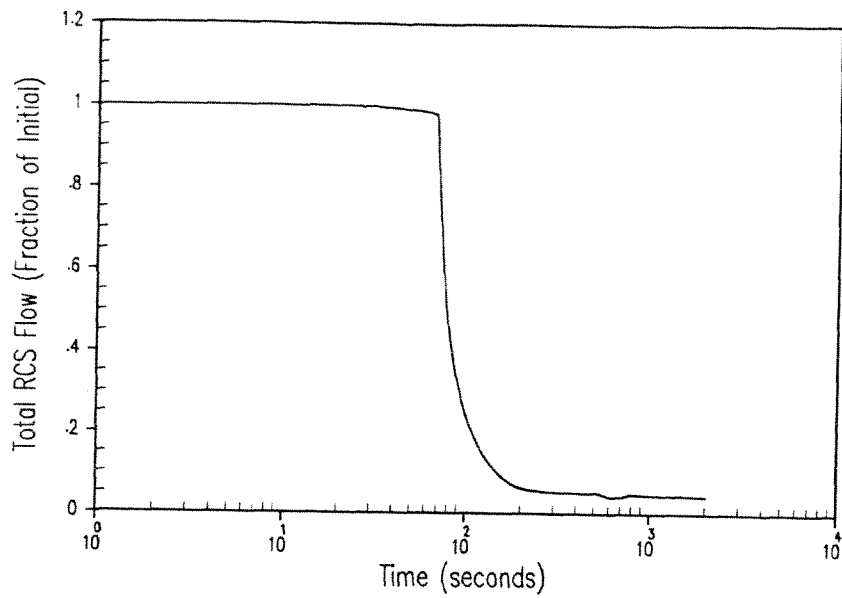
UFSAR FIGURE 14.1-50, sht.3 | REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ALL AC POWER TO THE  
STATION AUXILIARIES, HIGH Tavg  
PROGRAM, LOOP 21 AND LOOP 23  
STEAM PRESSURE vs TIME

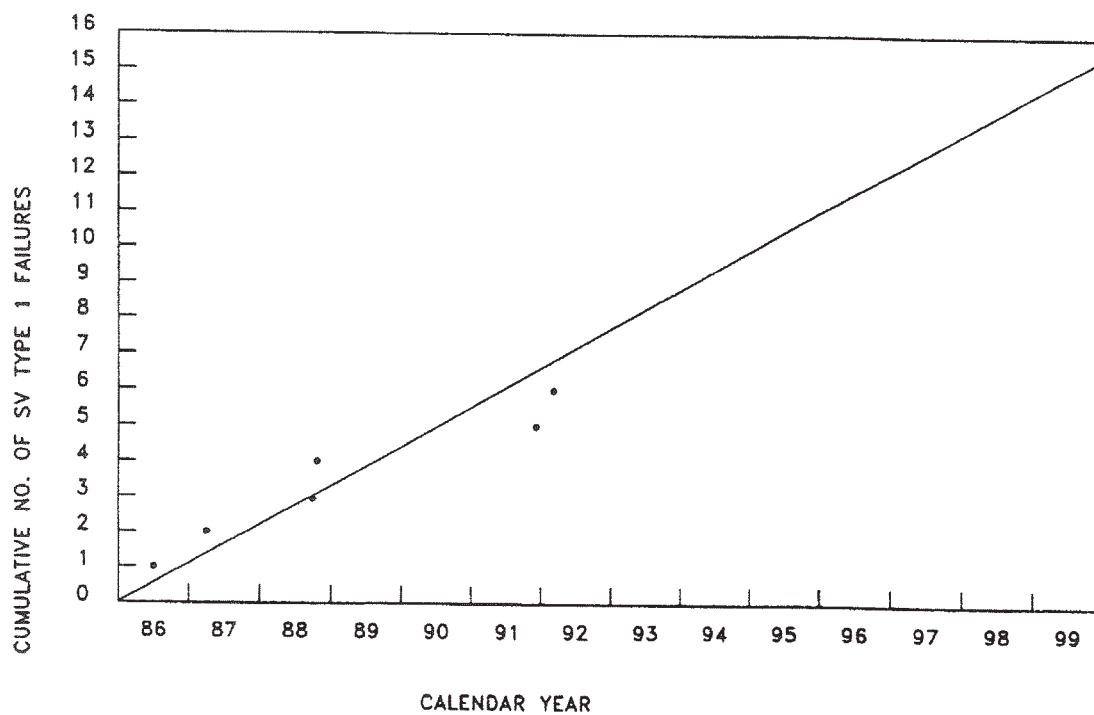
UFSAR FIGURE 14.1-50, sht.4 | REV. No. 19



**INDIAN POINT UNIT No. 2**

**LOSS OF ALL AC POWER TO THE  
STATION AUXILIARIES, INTERMEDIATE T<sub>avg</sub>  
PROGRAM, TOTAL RCS FLOW AND  
PRESSURIZER RELIEF RATE vs TIME**

**UFSAR FIGURE 14.1-50, sht.5 | REV. No. 19**



— ANALYSIS FAILURE LINE                      • ACTUAL DATA

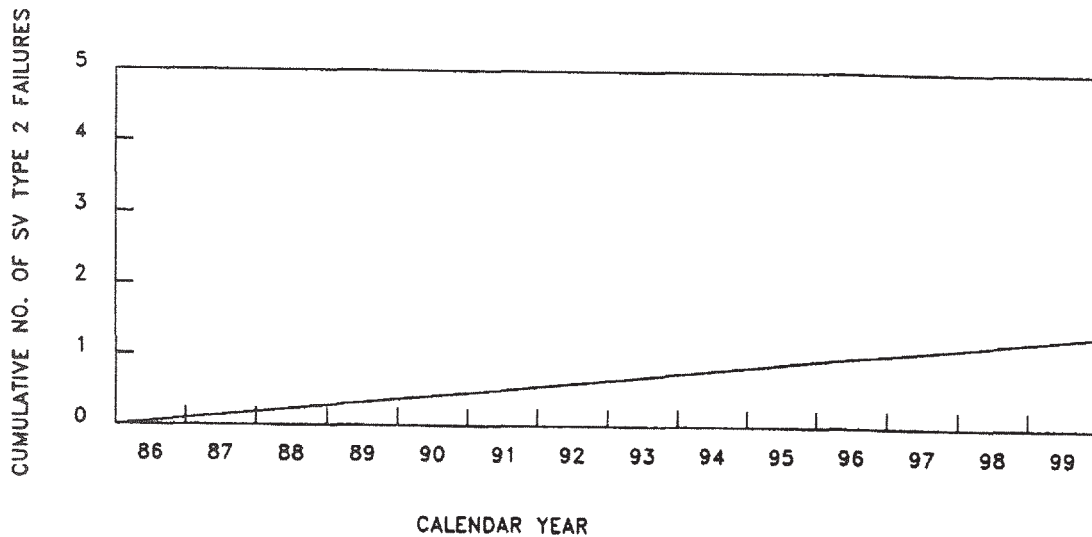
SV TYPE 1 FAILURE RATE =  $2.47 \times 10^{-6} / \text{HR}$   
 SLOPE OF ANALYSIS FAILURE LINE =  $[(\text{SV TYPE 1 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$   
 =  $[(2.47 \times 10^{-6} / \text{HR}) * (2.917 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 1.1 \text{ FAIL./CAL. YR.}$

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-62  
 TRACKING B-95/96 STOP VALVE  
 (SV) TYPE 1 FAILURES  
 STOP VALVE DISC FAILS

MIC. No. 2001MB1537

REV. No. 17A



— ANALYSIS FAILURE LINE

• ACTUAL DATA

SV TYPE 2 FAILURE RATE =  $2.05 \times 10^{-7} / \text{HR}$

SLOPE OF ANALYSIS FAILURE LINE =  $[(\text{SV TYPE 2 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$

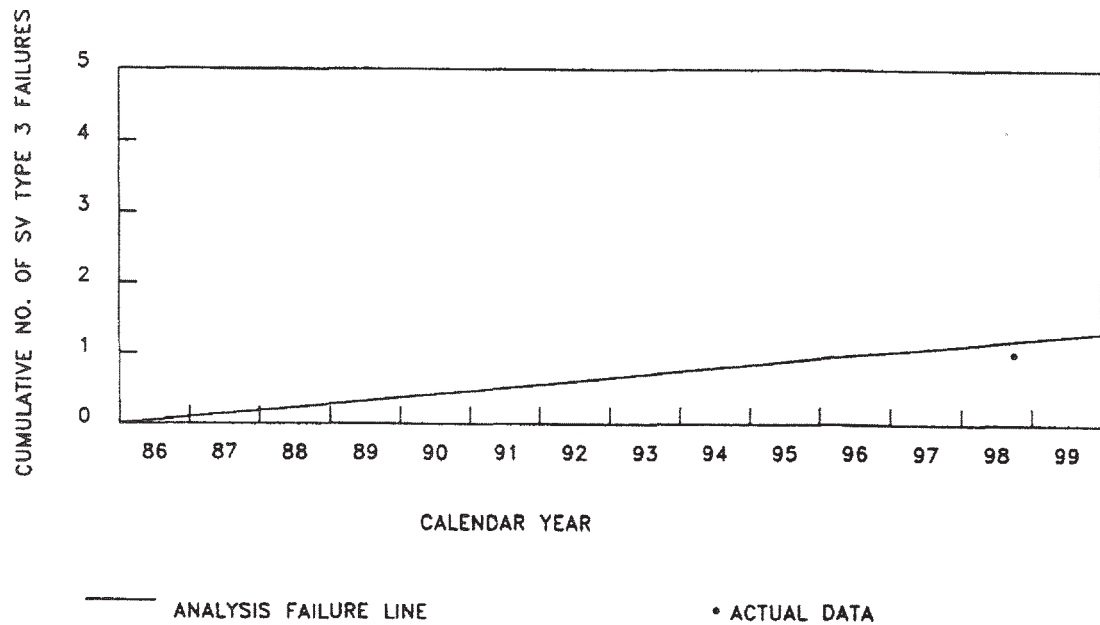
=  $[(2.05 \times 10^{-7} / \text{HR}) * (2.917 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.093 \text{ FAIL./CAL. YR.}$

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-63  
 TRACKING B-95/96 STOP VALVE  
 (SV) TYPE 2 FAILURES  
 STOP VALVE SPRING FAILS

MIC. No. 2001MB1538

REV. No. 17A



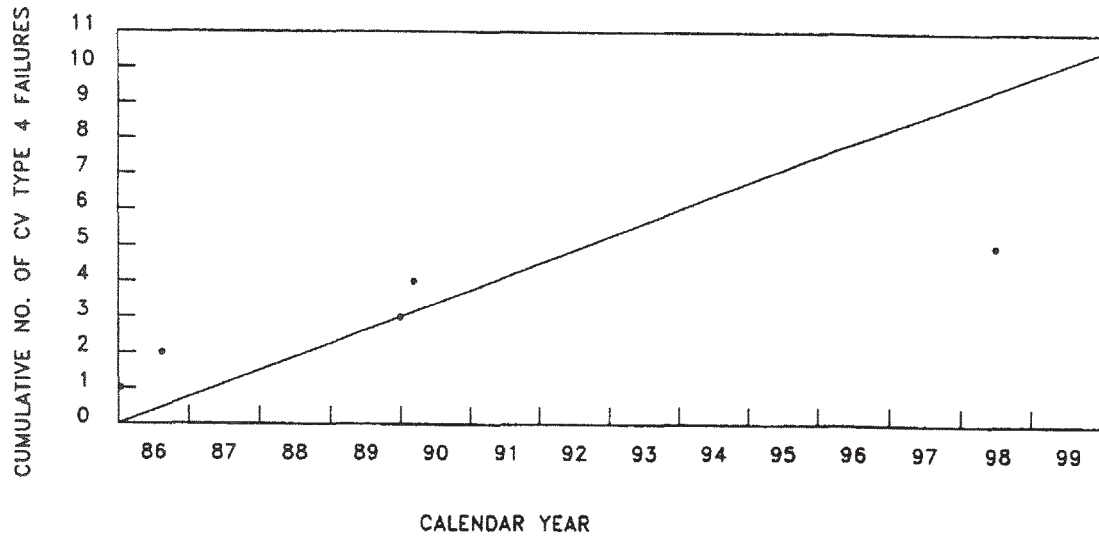
SV TYPE 3 FAILURE RATE = 2.05E-07/HR  
SLOPE OF ANALYSIS FAILURE LINE = [(SV TYPE 3 F.R.) \* (OPERATING HOURS)] / (CALENDAR YEARS)  
= [(2.05E-07/HR) \* (2.917E+06 HRS)] / (6.42 CAL. YRS.) = 0.093 FAIL./CAL. YR.

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-64  
TRACKING B-95/96 STOP VALVE  
(SV) TYPE 3 FAILURES  
STOP VALVE STICKS OPEN

MIC. No. 2001MB1539

REV. No. 17A



— ANALYSIS FAILURE LINE

• ACTUAL DATA

CV TYPE 4 FAILURE RATE =  $1.22 \cdot 10^{-6} / \text{HR}$

SLOPE OF ANALYSIS FAILURE LINE =  $[(\text{CV TYPE 4 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$

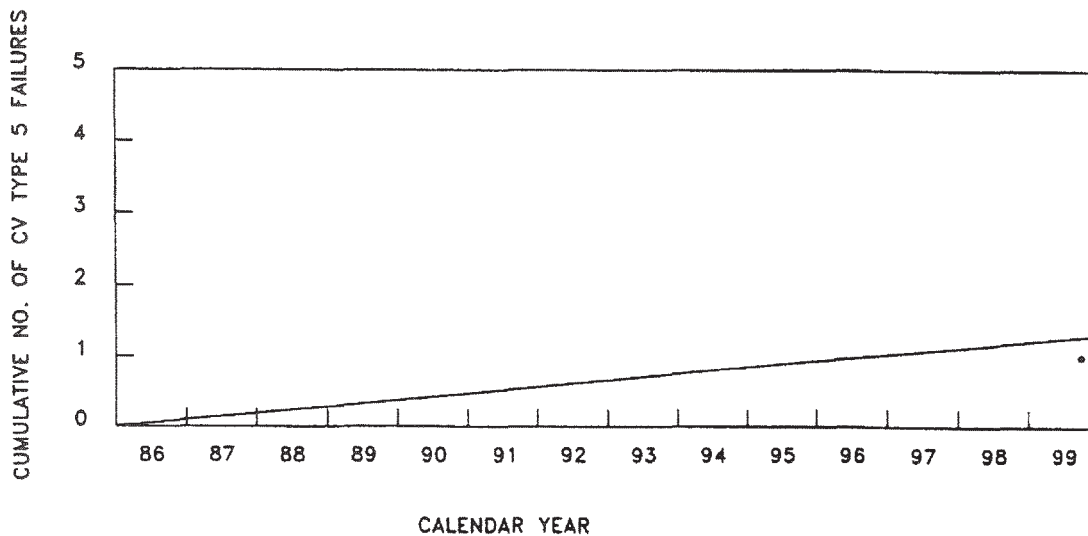
=  $[(1.22 \cdot 10^{-6} / \text{HR}) * (3.925 \cdot 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.75 \text{ FAIL./CAL. YR.}$

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-65  
 TRACKING B-95/96 CONTROL VALVE  
 (CV) TYPE 4 FAILURES  
 CONTROL VALVE SPRING BOLT FAILS

MIC. No. 2001MB1540

REV. No. 17A



— ANALYSIS FAILURE LINE

• ACTUAL DATA

CV TYPE 5 FAILURE RATE =  $1.53 \times 10^{-7} / \text{HR}$

SLOPE OF ANALYSIS FAILURE LINE =  $[(\text{CV TYPE 5 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$

=  $[(1.53 \times 10^{-7} / \text{HR}) * (3.925 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.094 \text{ FAIL./CAL. YR.}$

INDIAN POINT UNIT No. 2

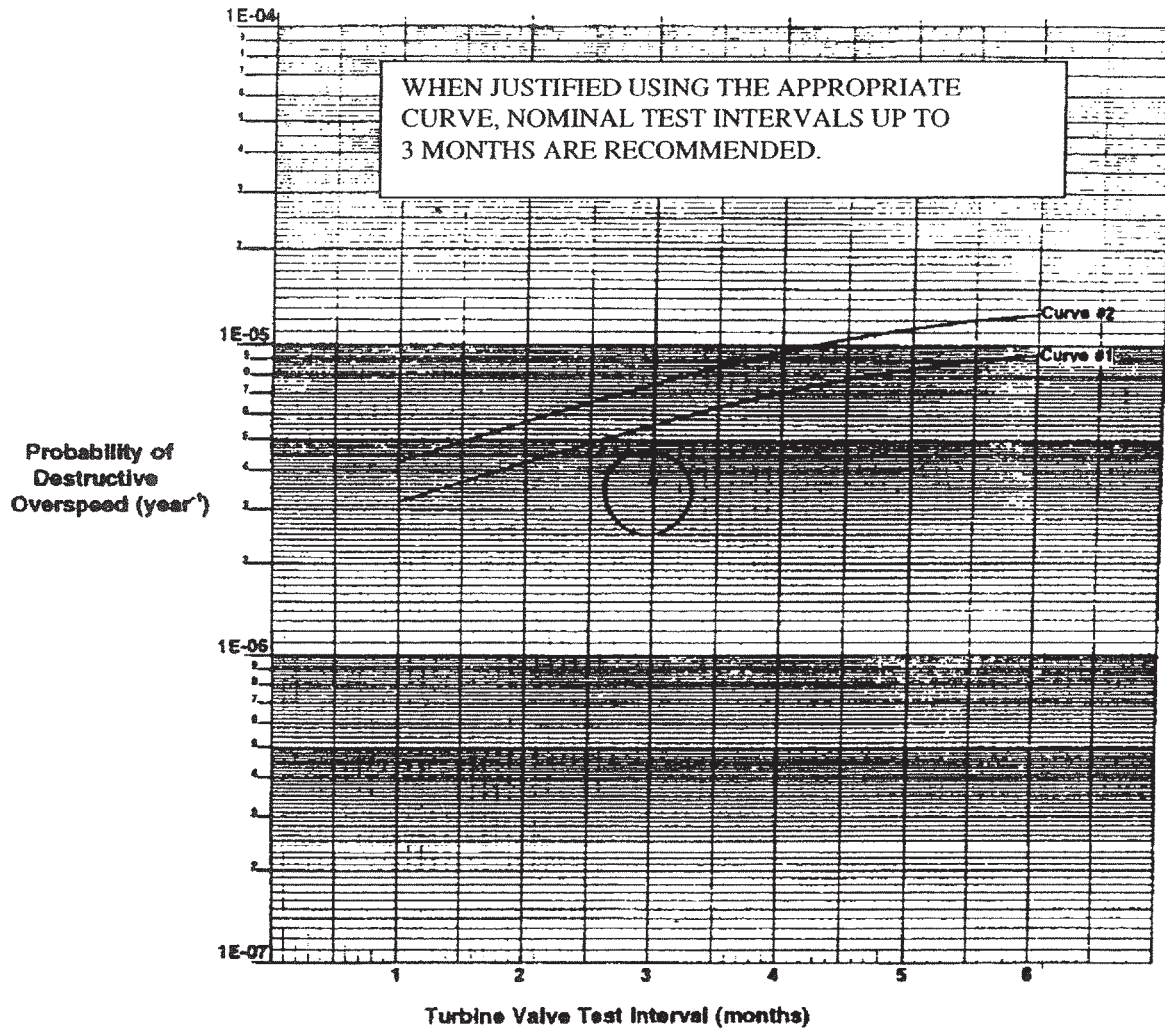
UFSAR FIGURE 14.1-66  
 TRACKING B-95/96 CONTROL VALVE  
 (CV) TYPE 5 FAILURES  
 CONTROL VALVE STICKS OPEN

MIC. No. 2001MB1541

REV. No. 17A



Initial Case



Curve #1: Surveillance of stop valve discs occurs every 18 months. Testing of valve freedom of movement occurs at intervals of 1 to 6 months (horizontal axis).

Curve #2: Surveillance of stop valve discs occurs every 24 months. Testing of valve freedom of movement occurs at intervals of 1 to 6 months (horizontal axis).

• Estimated 3.7E-06/r for 3 month test interval for Curve #2

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-67

ANNUAL FREQUENCY OF DESTRUCTIVE OVERSPEED FOR  
VARIOUS BB-95/96 TURBINE VALVE TEST INTERVAL  
(1-ON-1 SV-CV TURBINE / 1 OUT OF 4 STEAM PATHS)

MIC. No. 2001MB1542	REV. No. 17A
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