

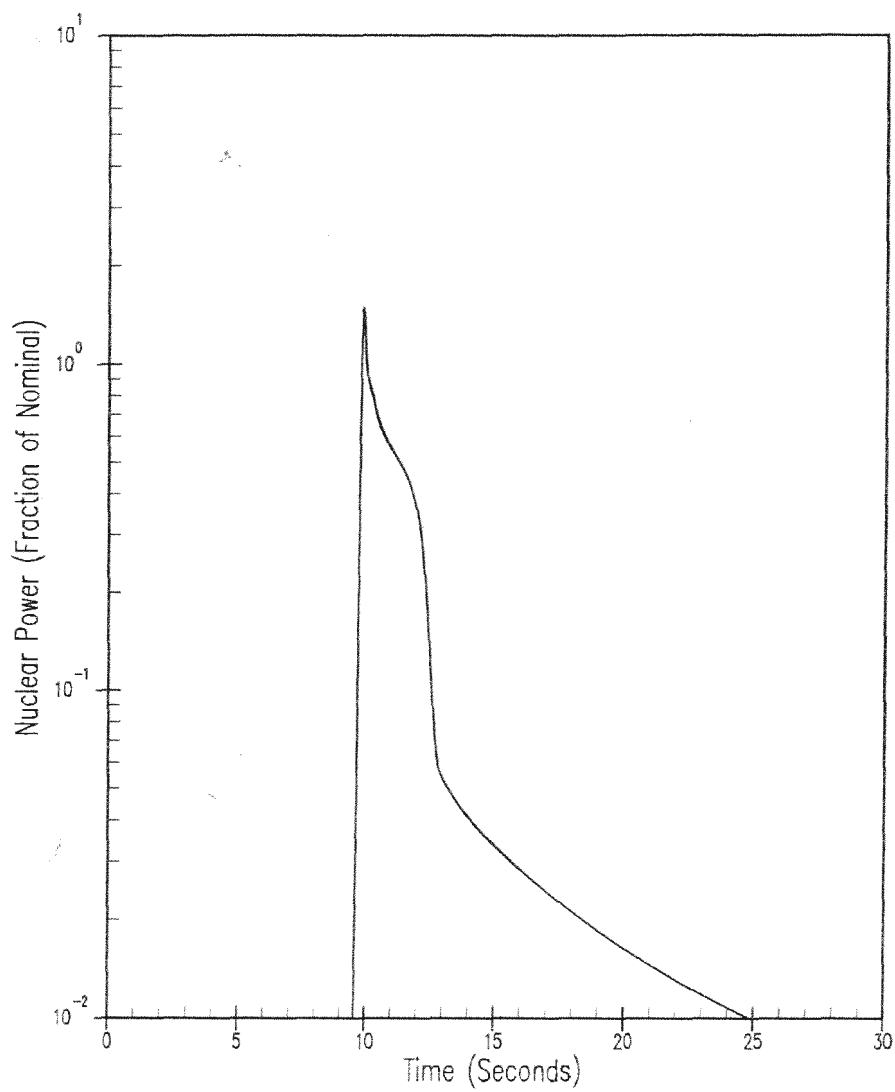
INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.0-1

REACTIVITY INSERTION vs
TIME FOR REACTOR TRIP

MIC. No. 1999MC3969

REV. No. 17A

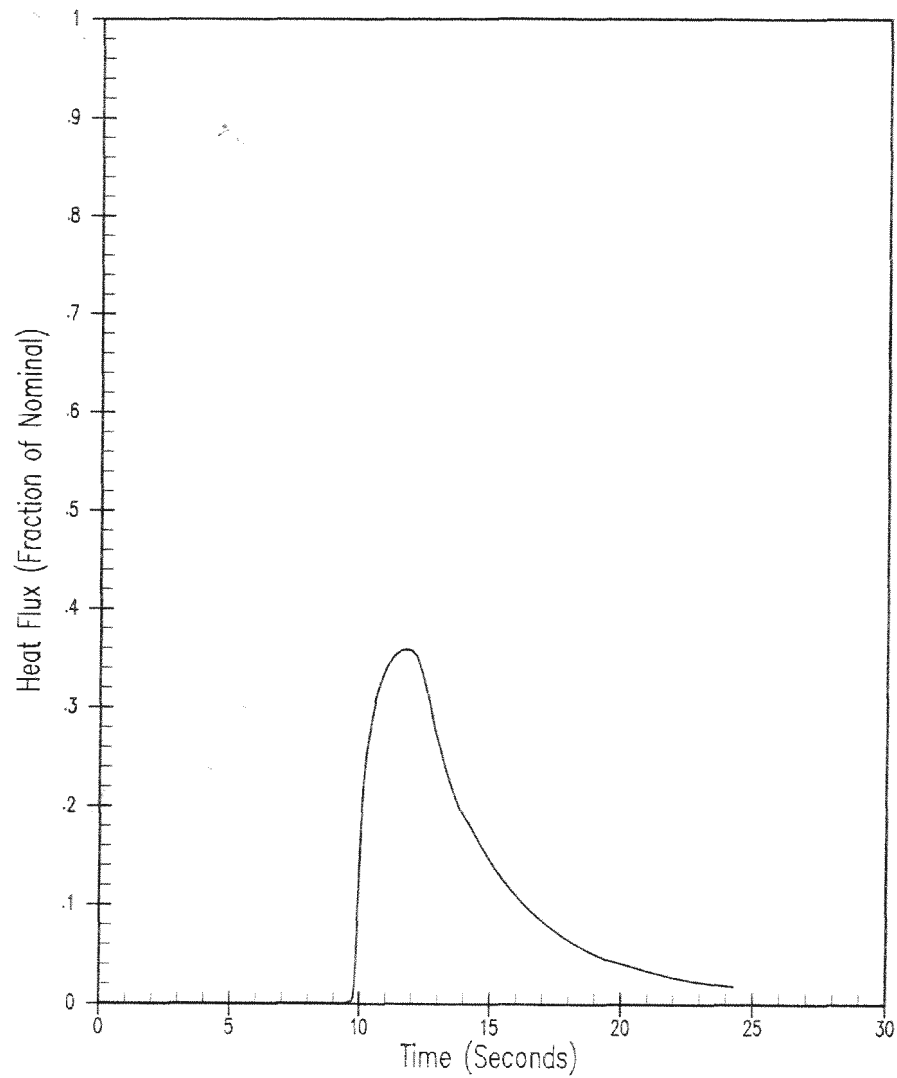


INDIAN POINT UNIT No. 2

UNCONTROLLED RCCA WITHDRAWAL
FROM A SUBCRITICAL CONDITION
NUCLEAR POWER vs TIME

UFSAR FIGURE 14.1-1

REV. No. 19

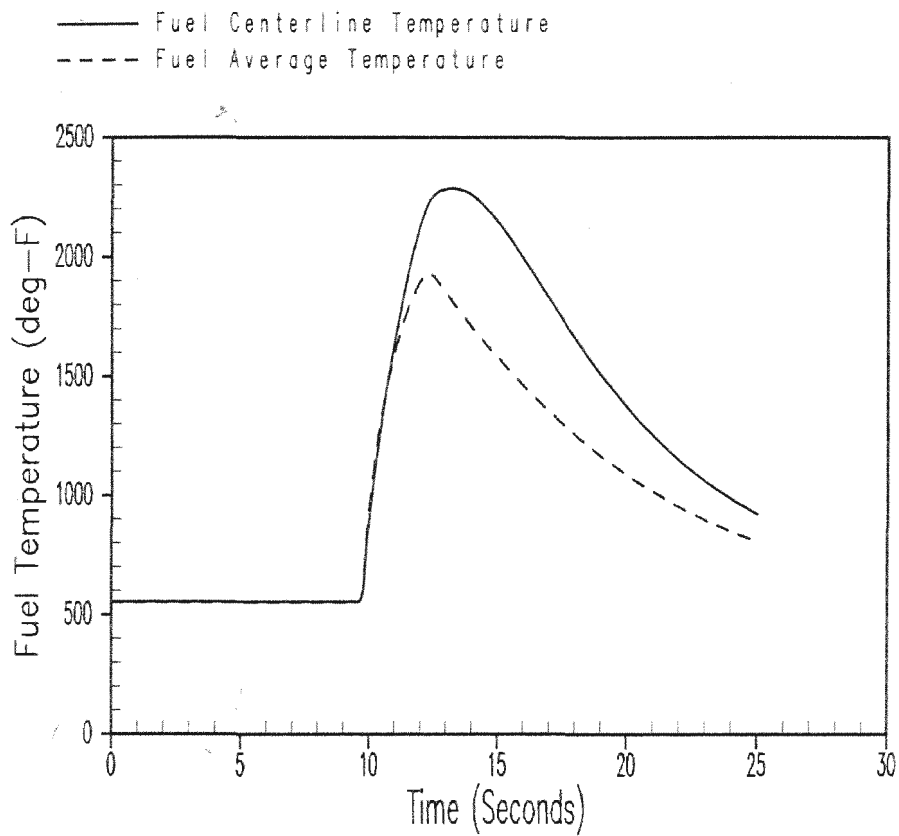


INDIAN POINT UNIT No. 2

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

UFSAR FIGURE 14.1-2

REV. No. 19

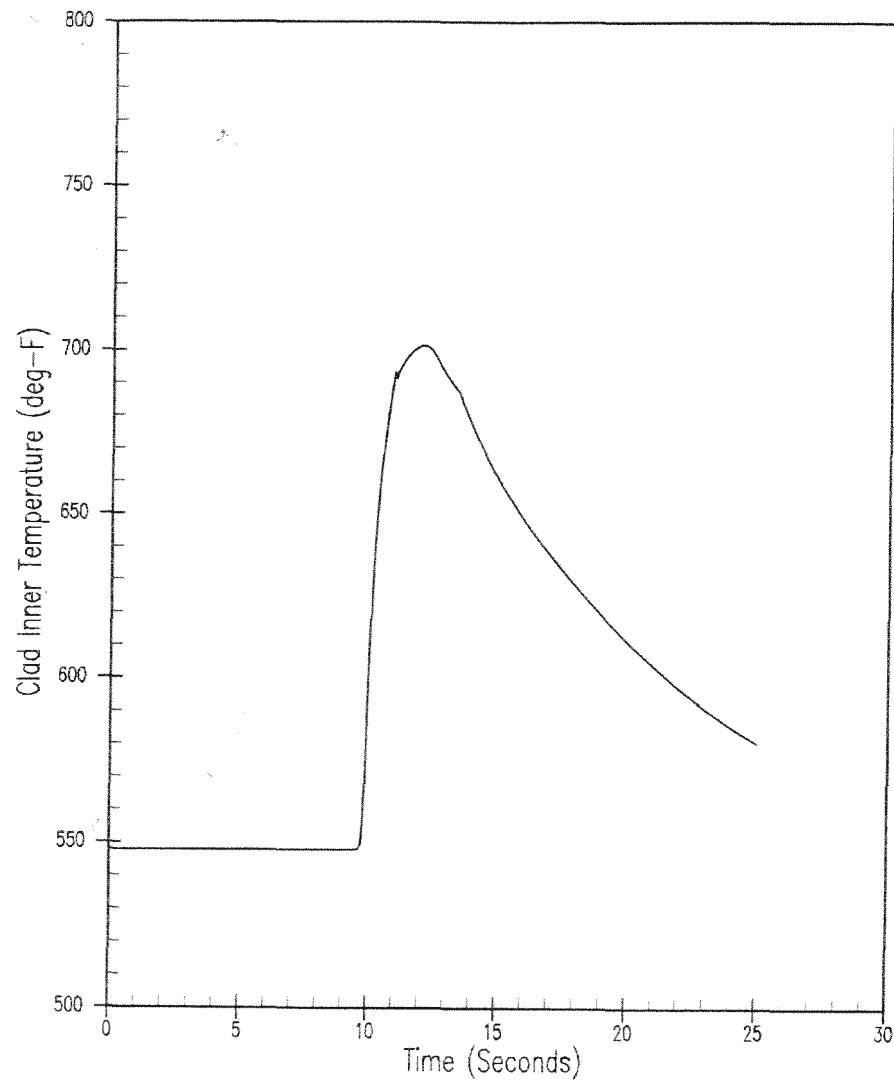


INDIAN POINT UNIT No. 2

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

UFSAR FIGURE 14.1-3

REV. No. 19

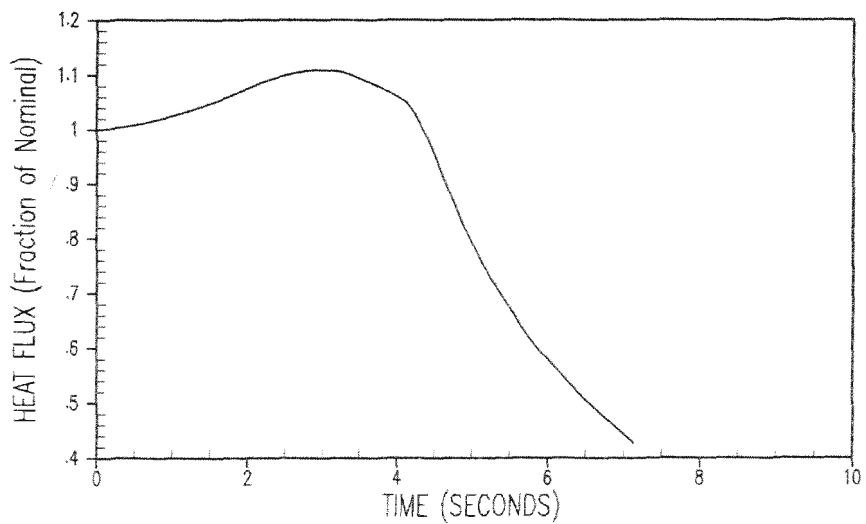
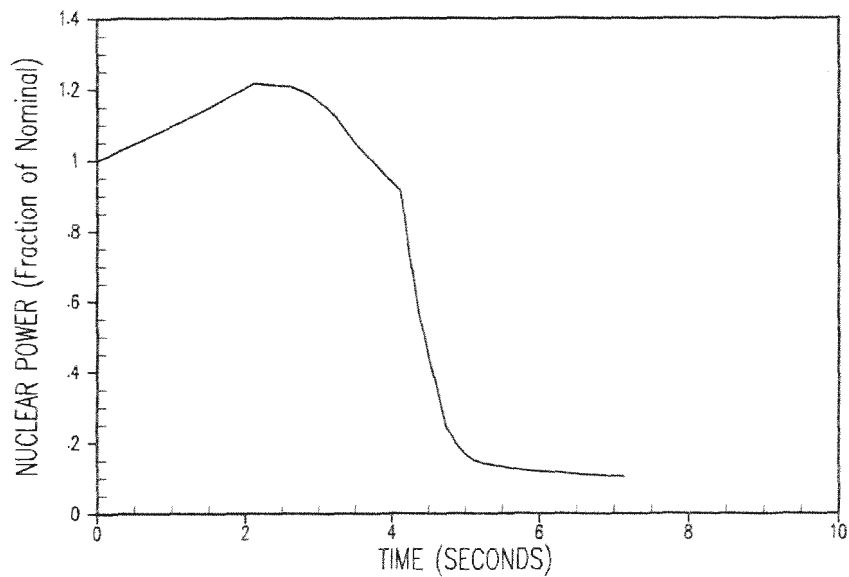


INDIAN POINT UNIT No. 2

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

UFSAR FIGURE 14.1-4

REV. No. 19

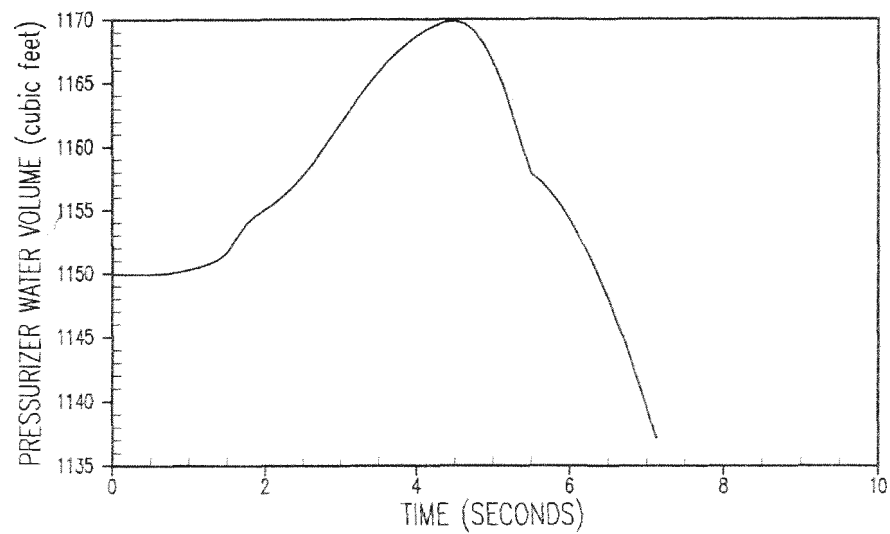
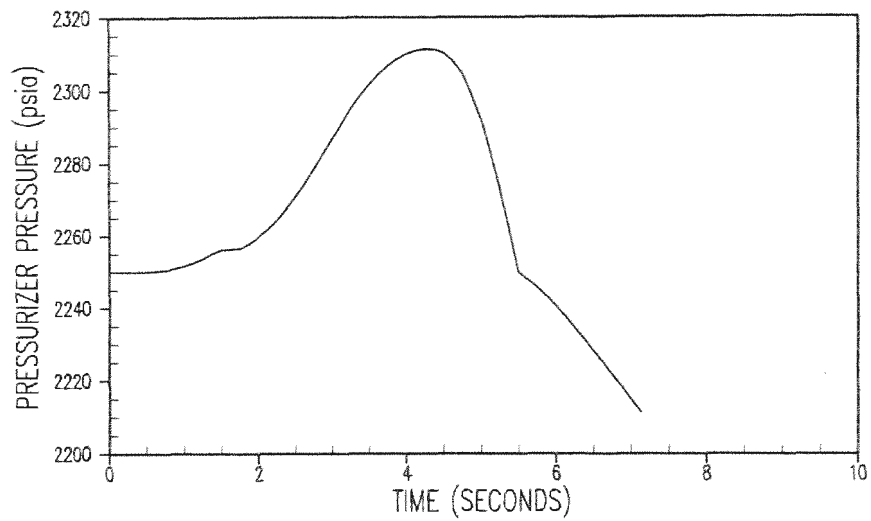


INDIAN POINT UNIT No. 2

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

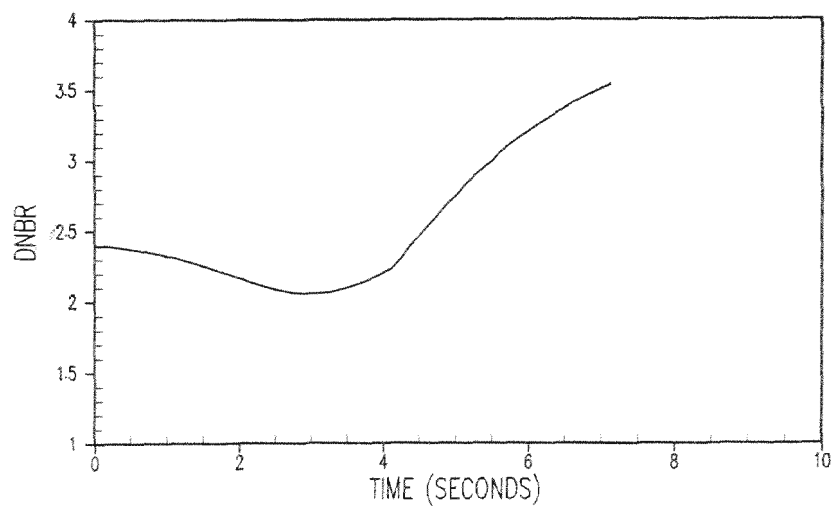
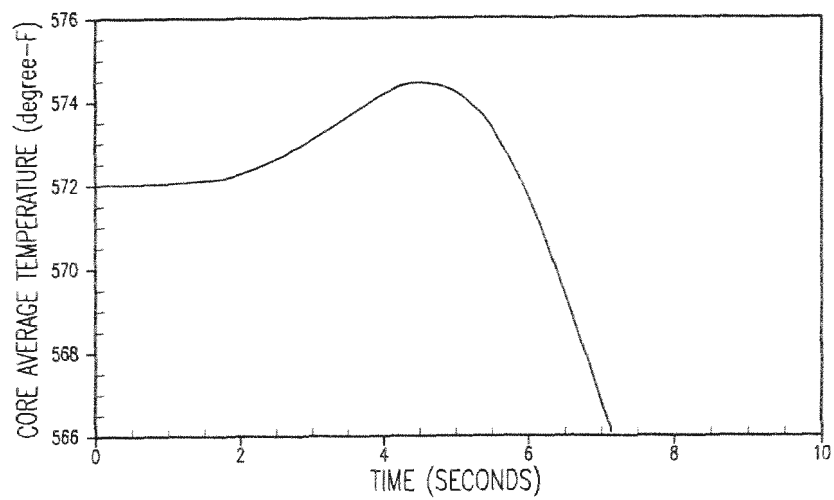


INDIAN POINT UNIT No. 2

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

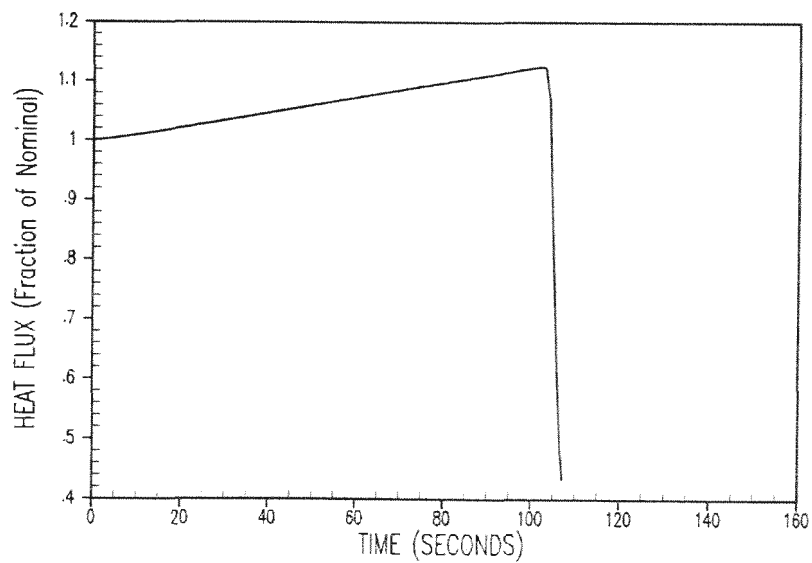
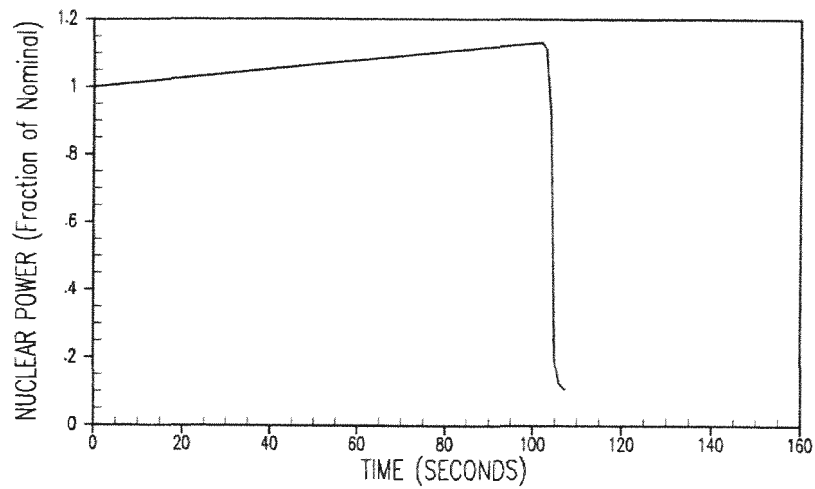


INDIAN POINT UNIT No. 2

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

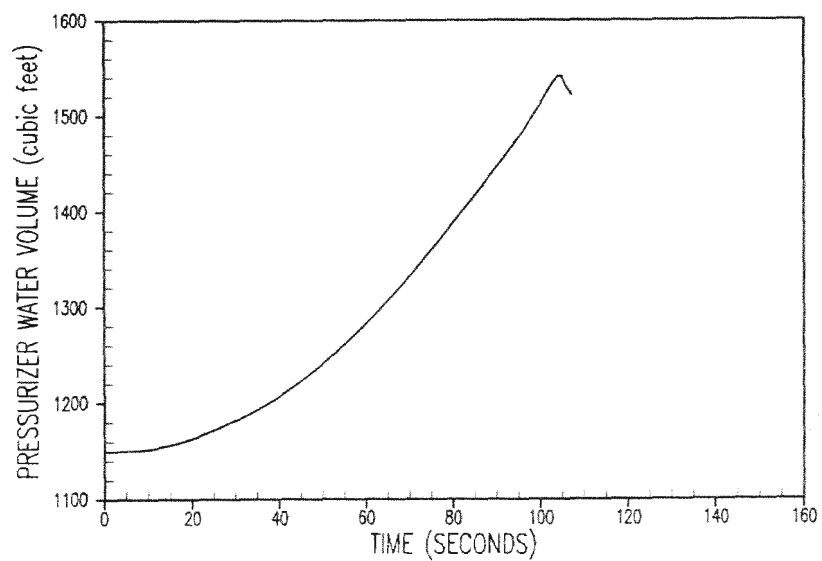
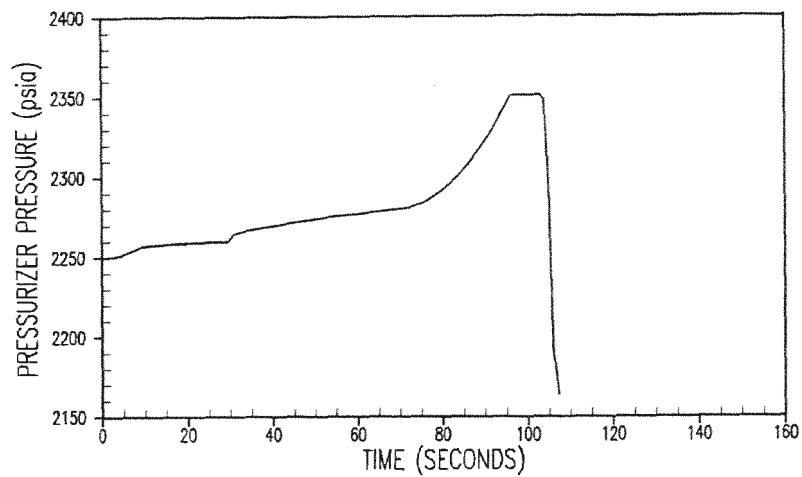


INDIAN POINT UNIT No. 2

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

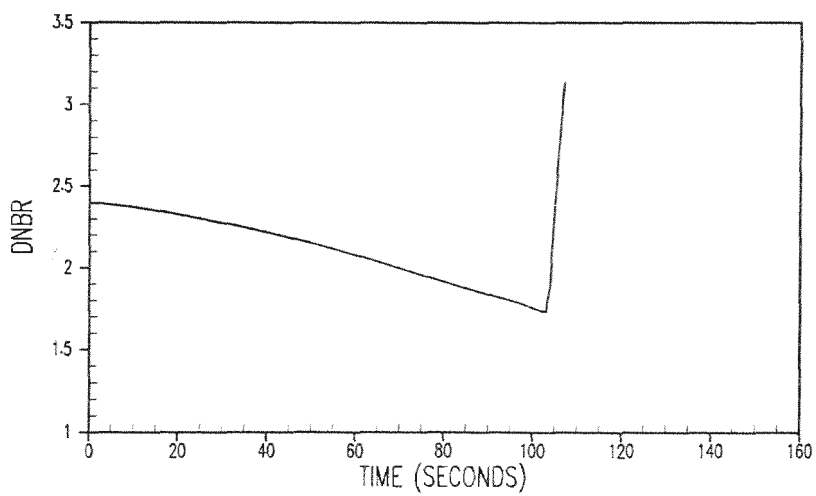
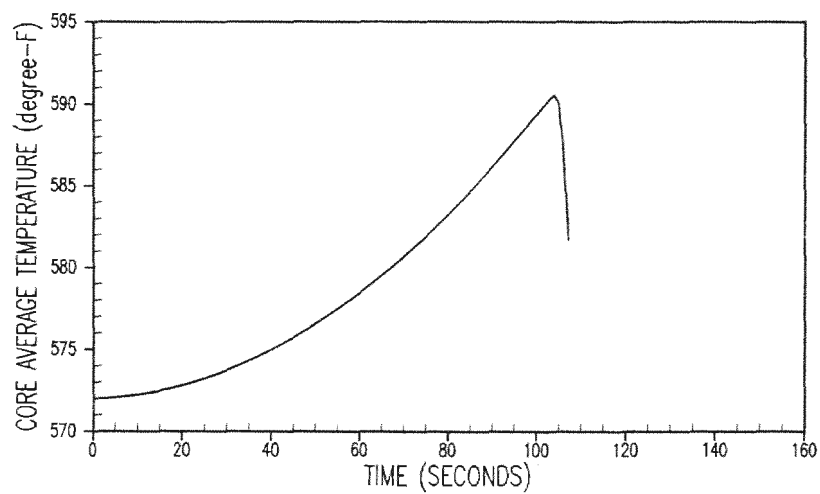


INDIAN POINT UNIT No. 2

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

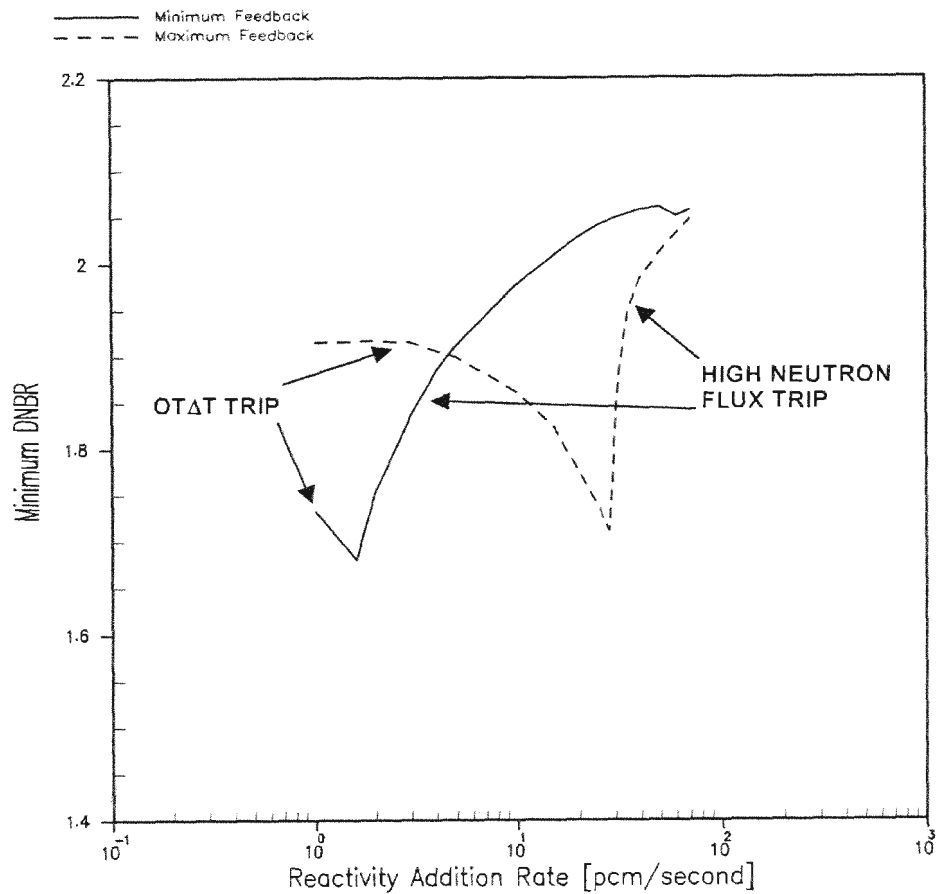
REV. No. 19



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

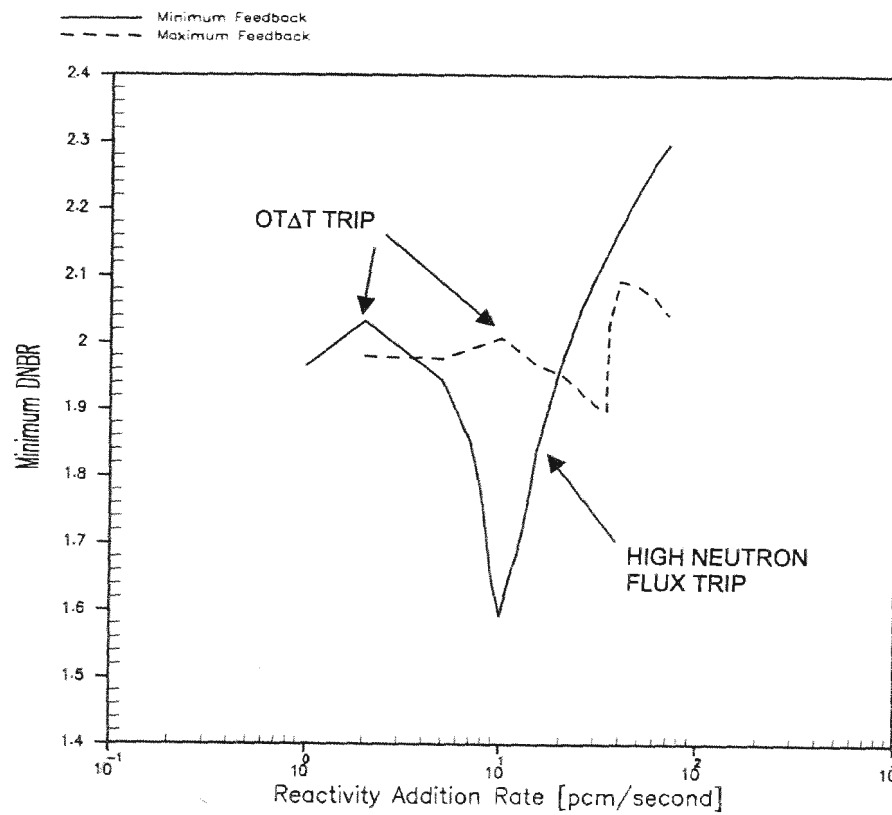
UFSAR FIGURE 14.1-10 | REV. No. 19



INDIAN POINT UNIT No. 2

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

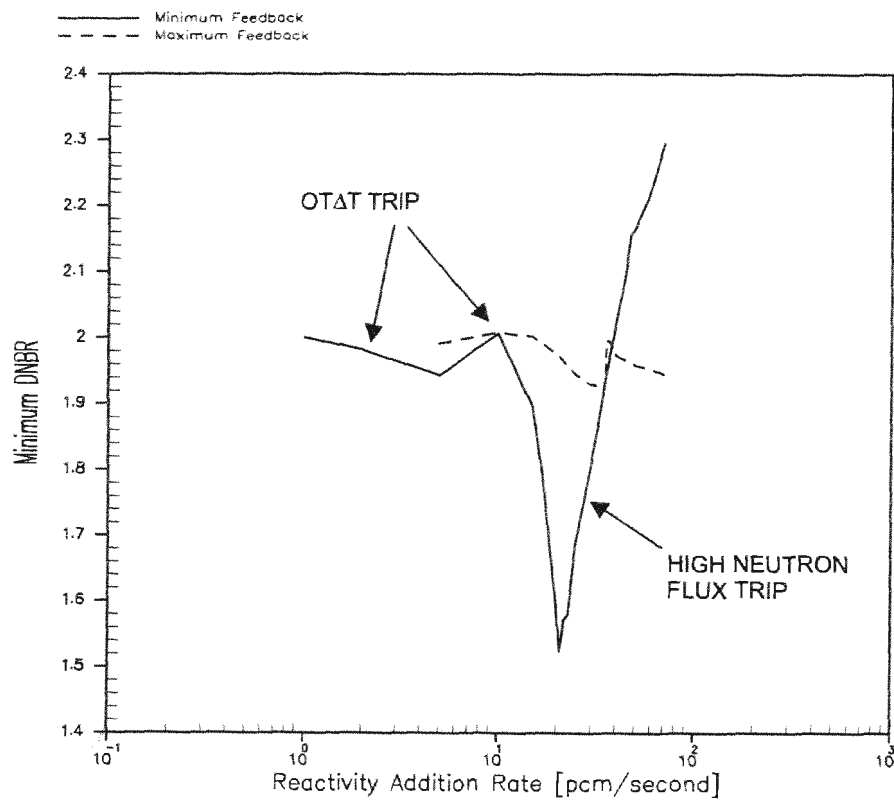
UFSAR FIGURE 14.1-11 | REV. No. 19



INDIAN POINT UNIT No. 2

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

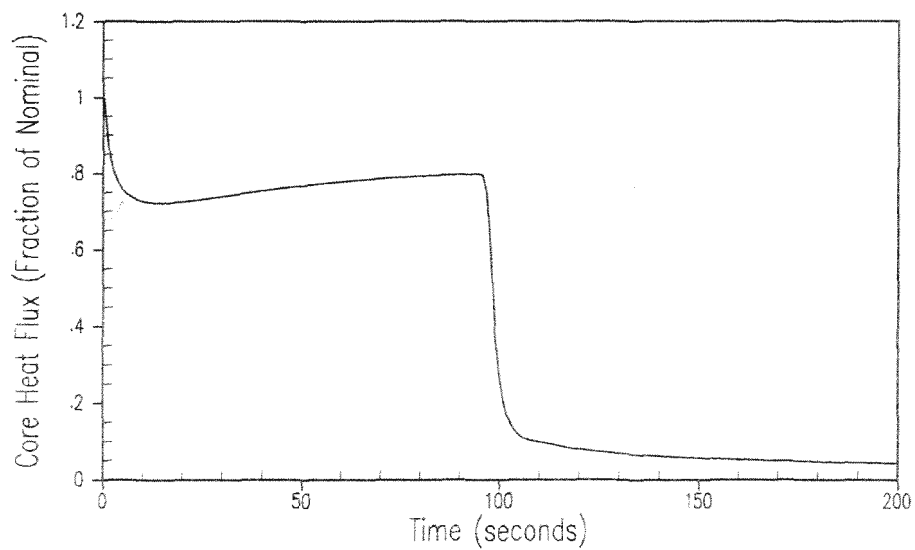
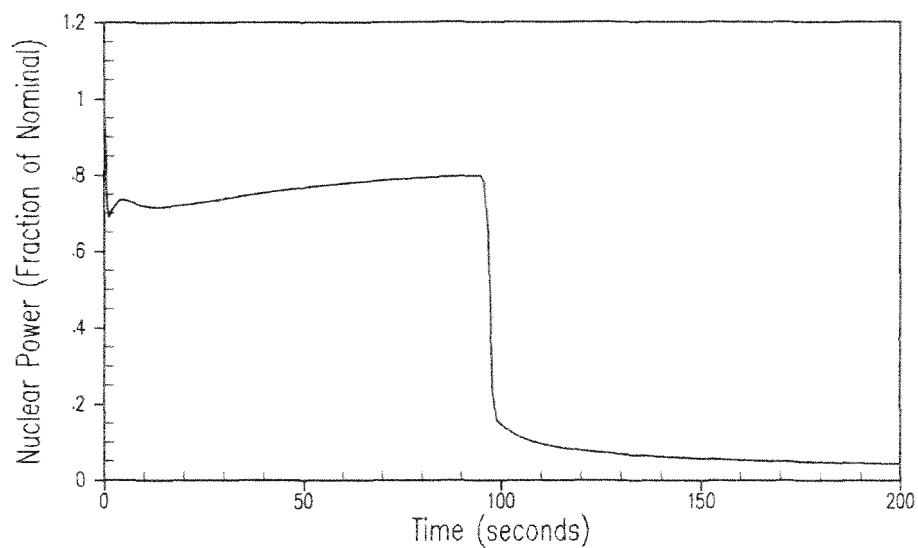
UFSAR FIGURE 14.1-12 REV. No. 19



INDIAN POINT UNIT No. 2

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

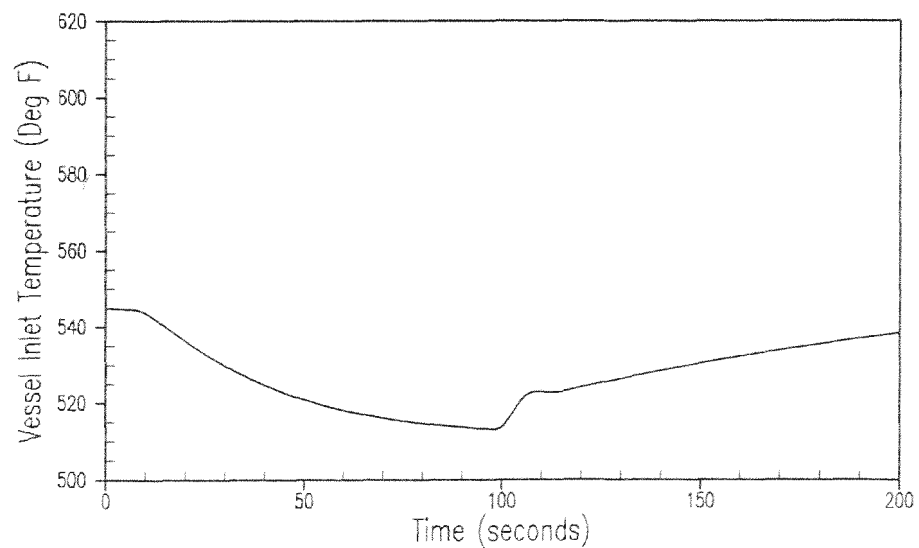
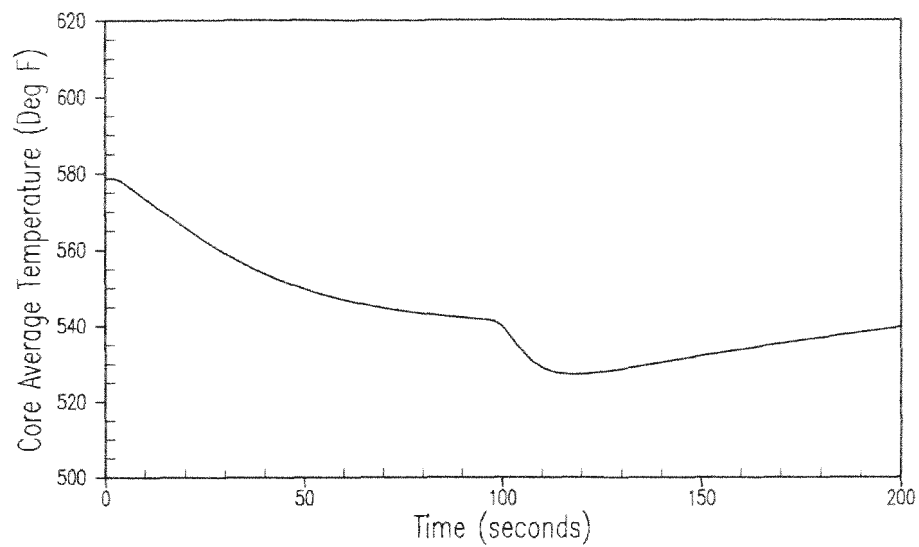
UFSAR FIGURE 14.1-13 REV. No. 19



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

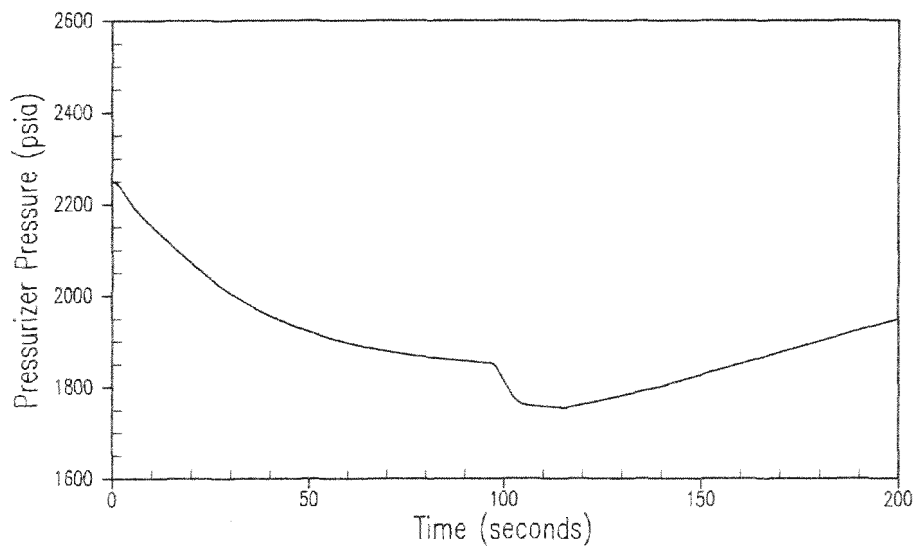
UFSAR FIGURE 14.1-14 | REV. No. 19



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

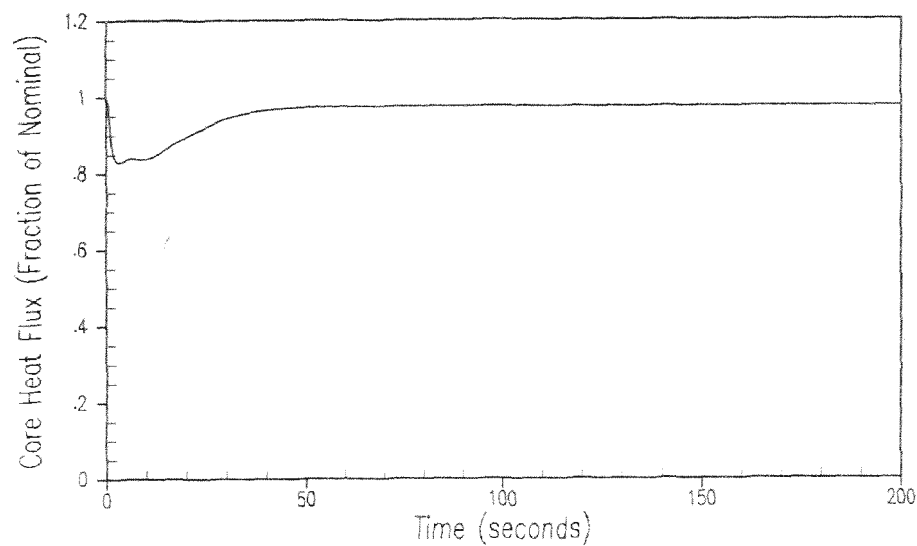
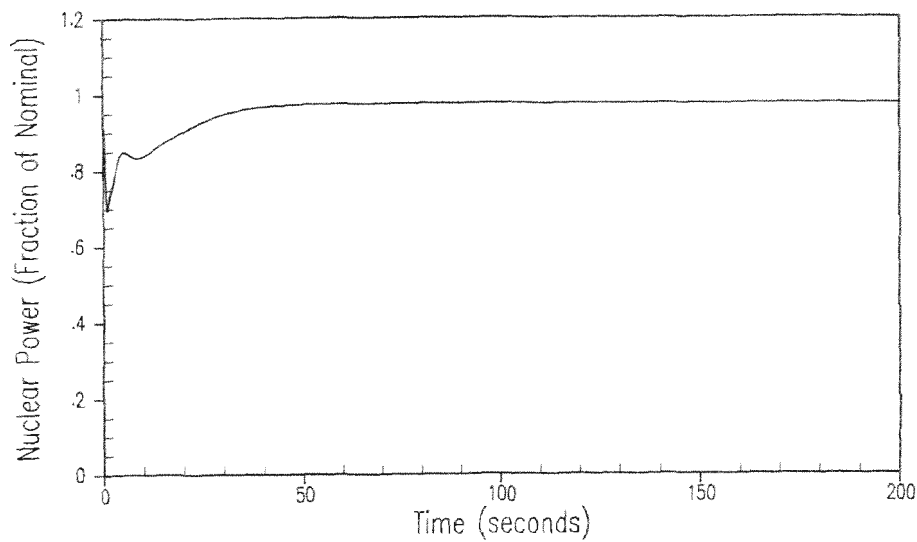
UFSAR FIGURE 14.1-15 | REV. No. 19



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

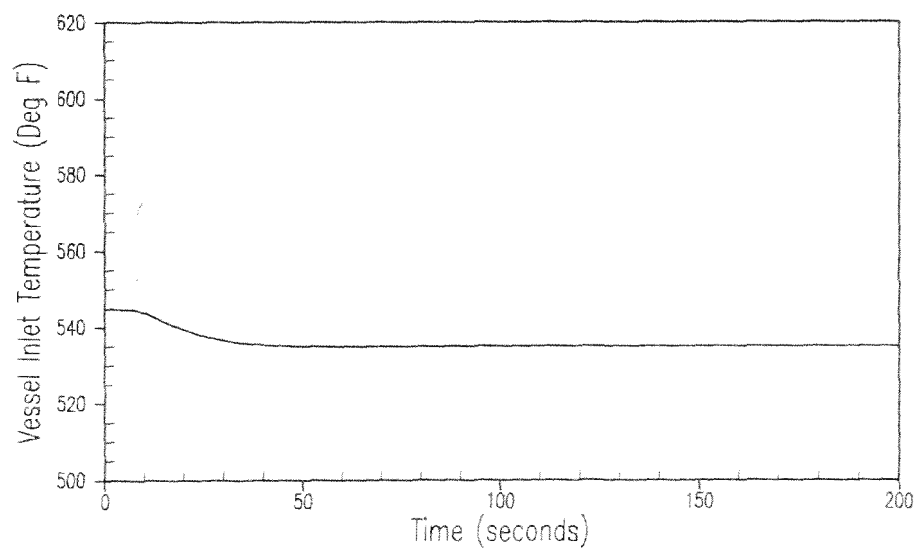
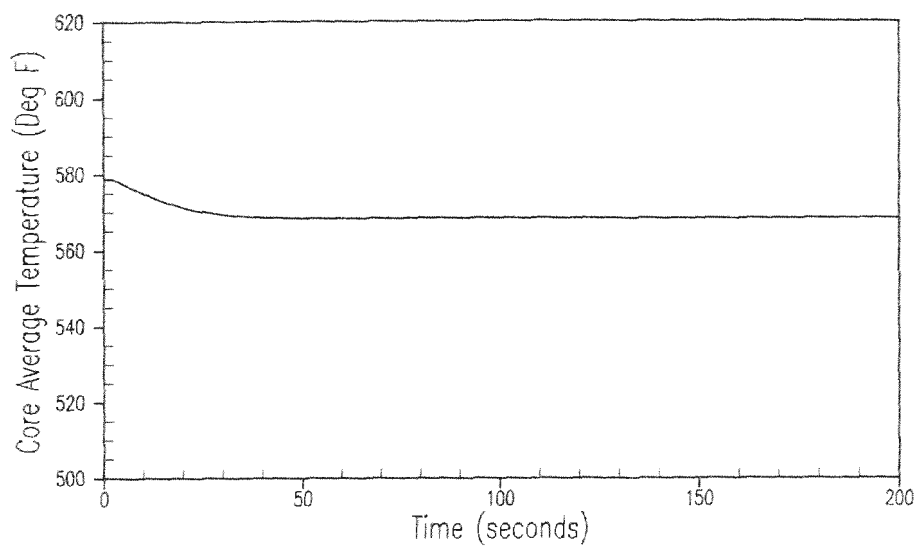
UFSAR FIGURE 14.1-16 | REV. No. 19



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

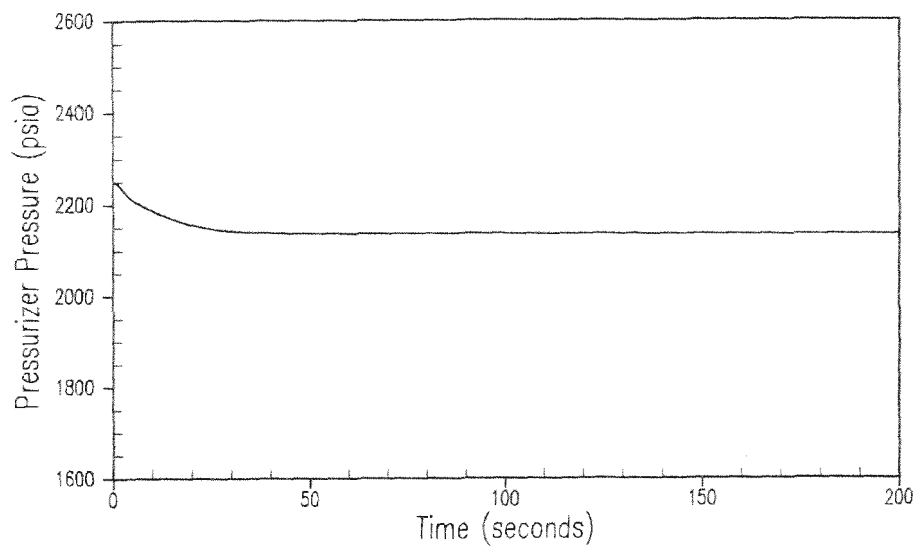
UFSAR FIGURE 14.1-17 REV. No. 19



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

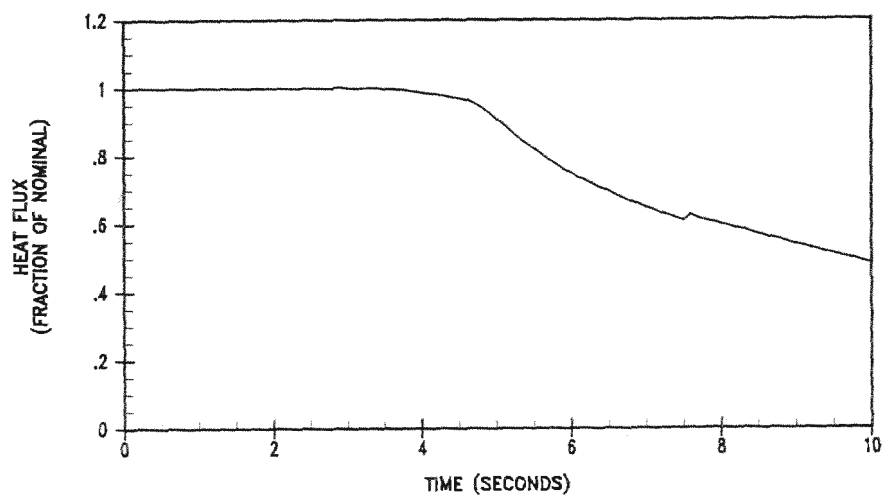
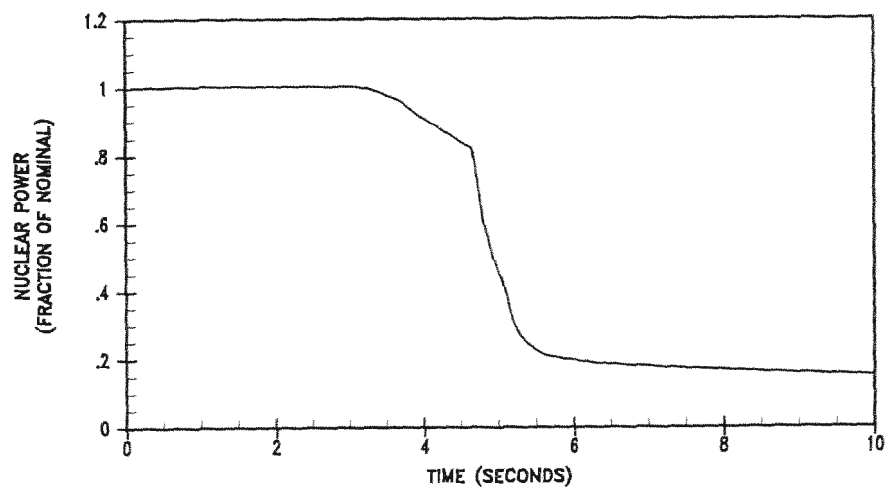
UFSAR FIGURE 14.1-18 REV. No. 19



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

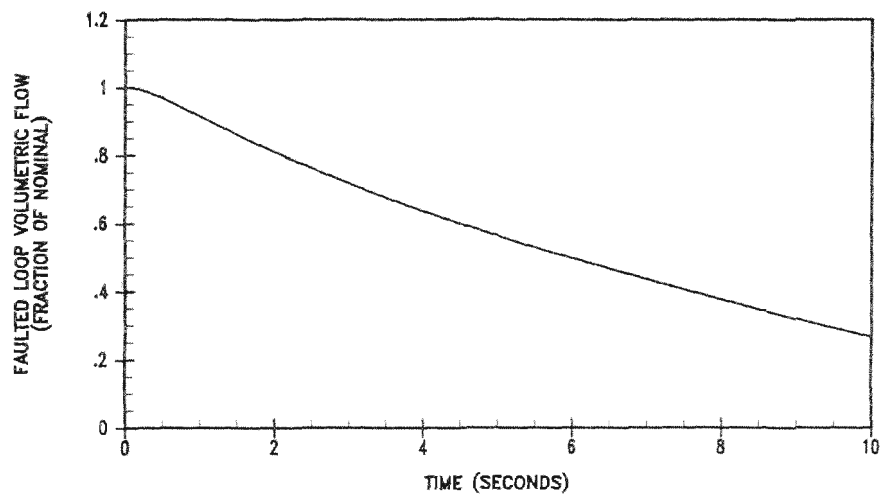
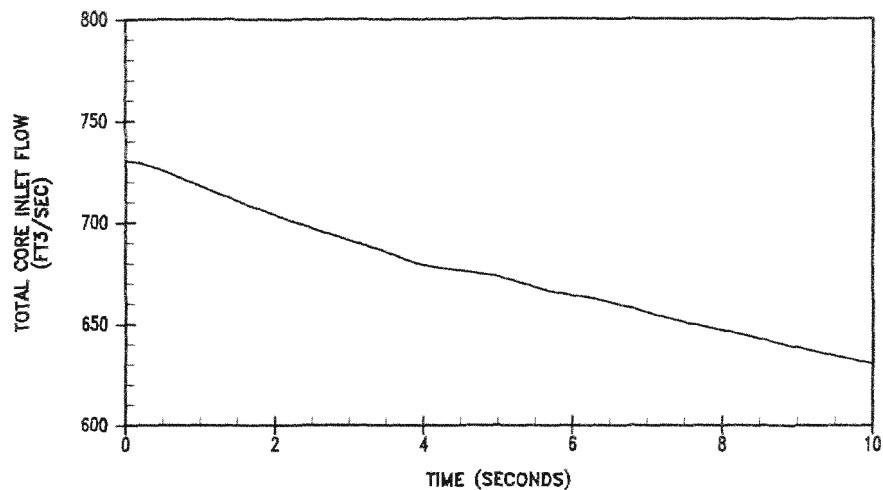
UFSAR FIGURE 14.1-19 | REV. No. 19



INDIAN POINT UNIT No. 2

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

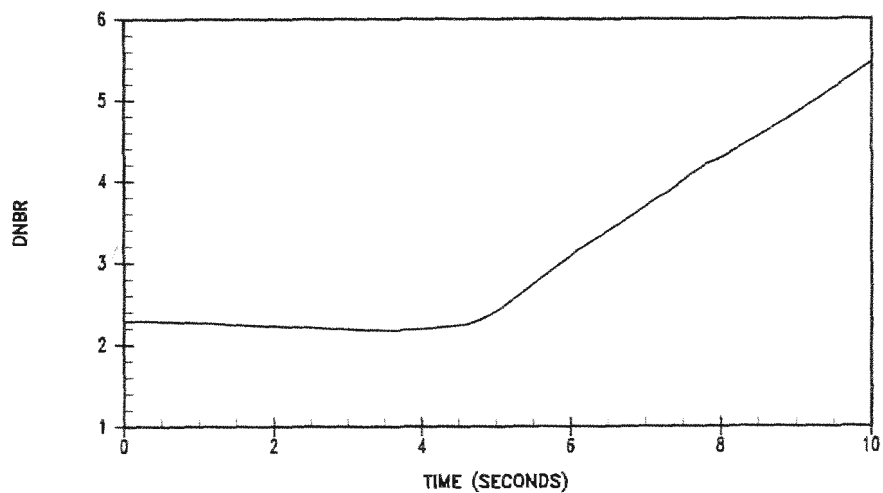
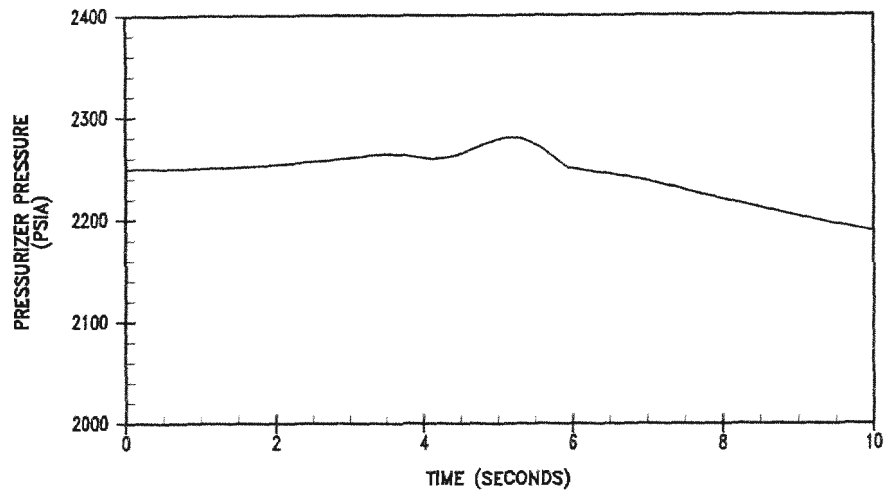
UFSAR FIGURE 14.1-20 REV. No. 19



INDIAN POINT UNIT No. 2

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

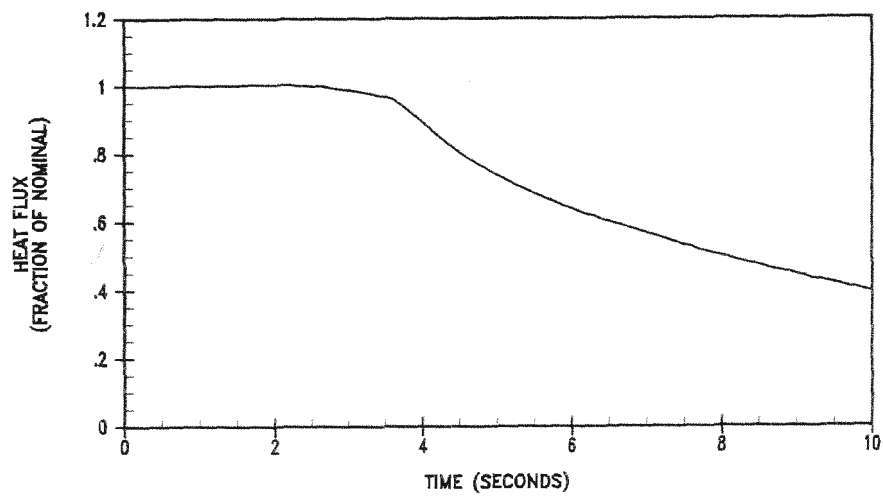
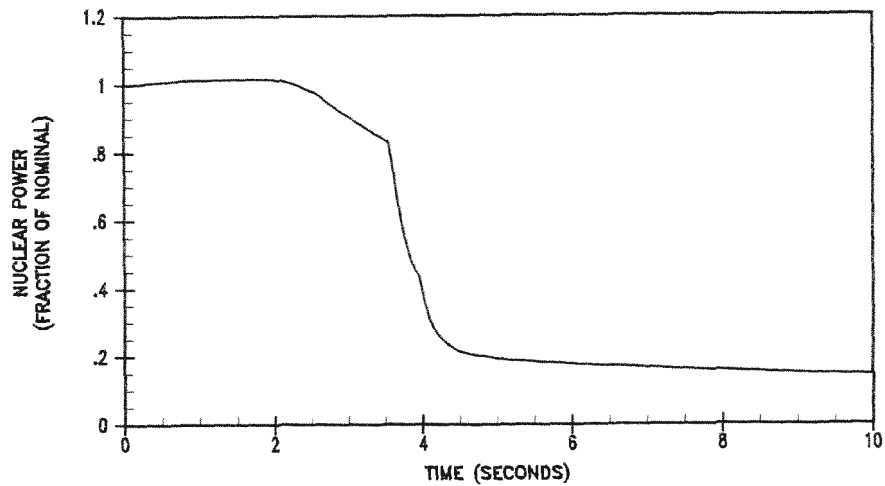
UFSAR FIGURE 14.1-21 | REV. No. 19



INDIAN POINT UNIT No. 2

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

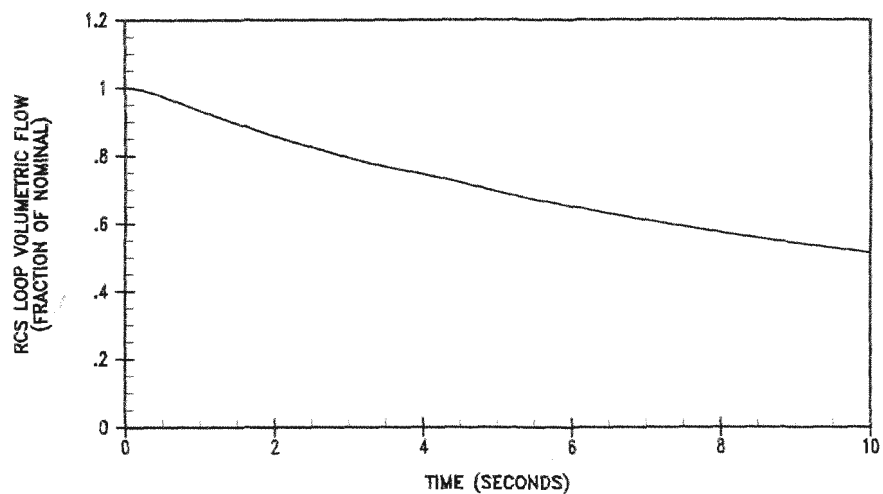
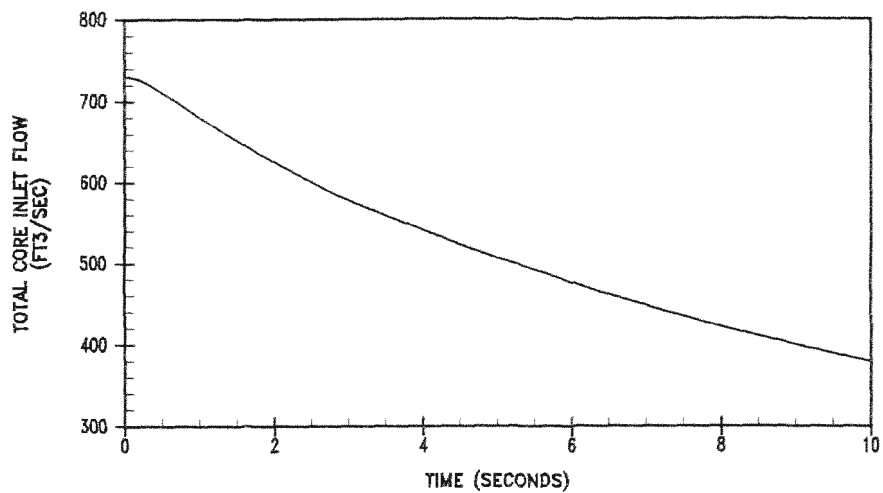
UFSAR FIGURE 14.1-22 | REV. No. 19



INDIAN POINT UNIT No. 2

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

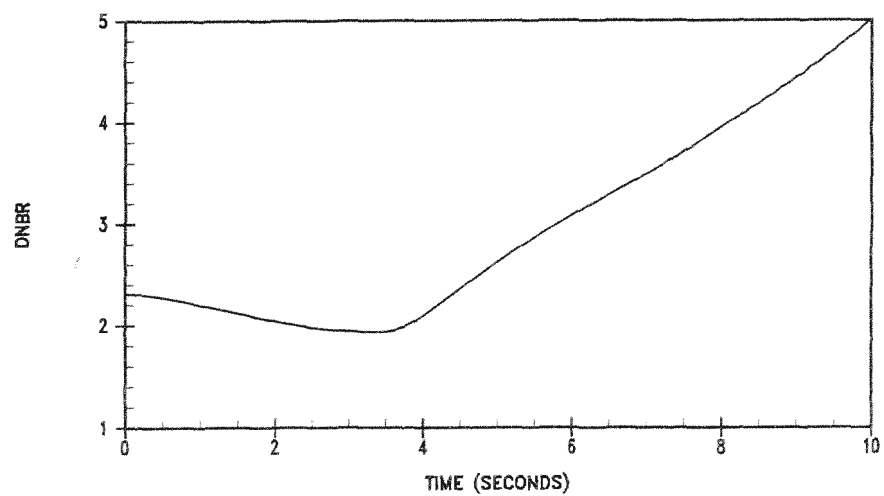
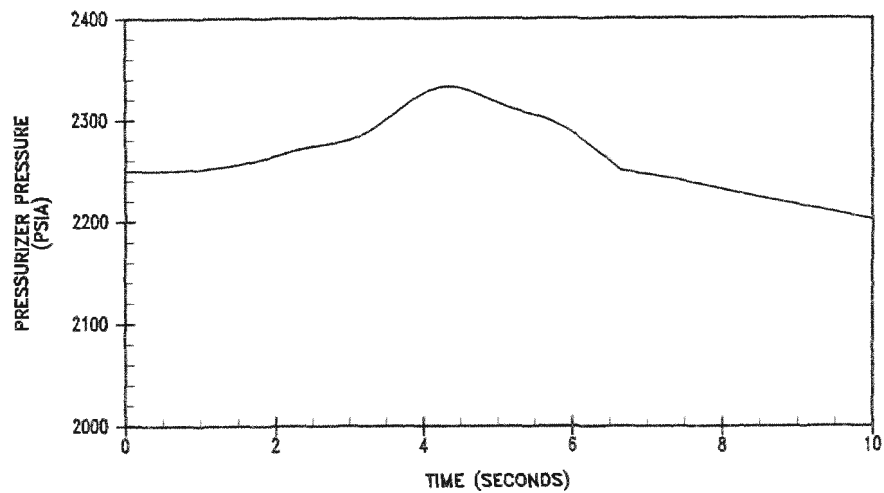
UFSAR FIGURE 14.1-23 | REV. No. 19



INDIAN POINT UNIT No. 2

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

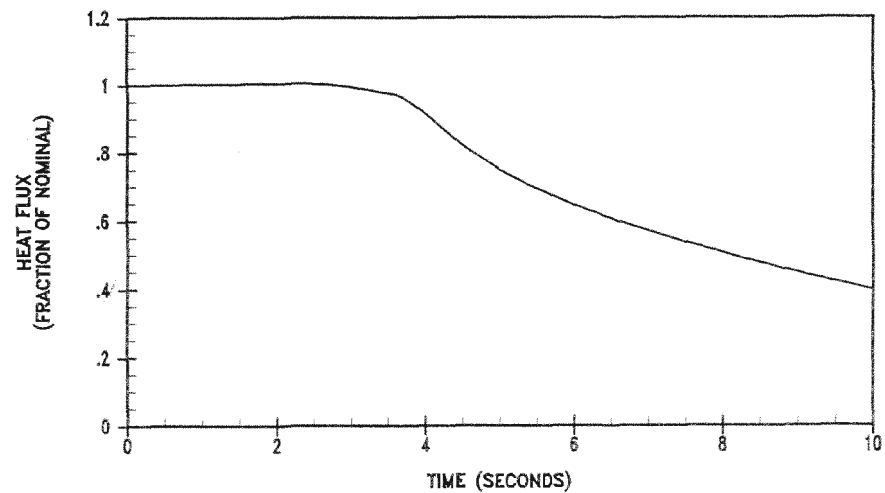
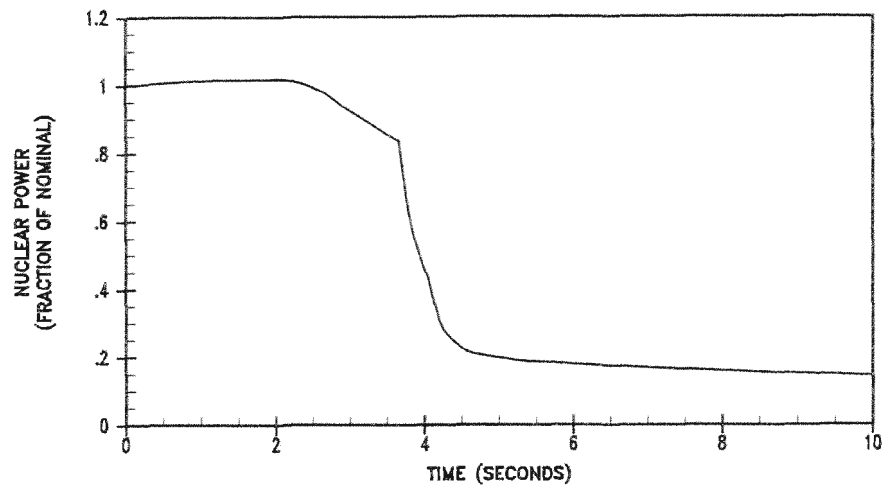
UFSAR FIGURE 14.1-24 | REV. No. 19



INDIAN POINT UNIT No. 2

FOUR PUMP LOSS OF FLOW –
UNDervoltage PRESSURIZER PRESSURE
AND DNBR vs TIME

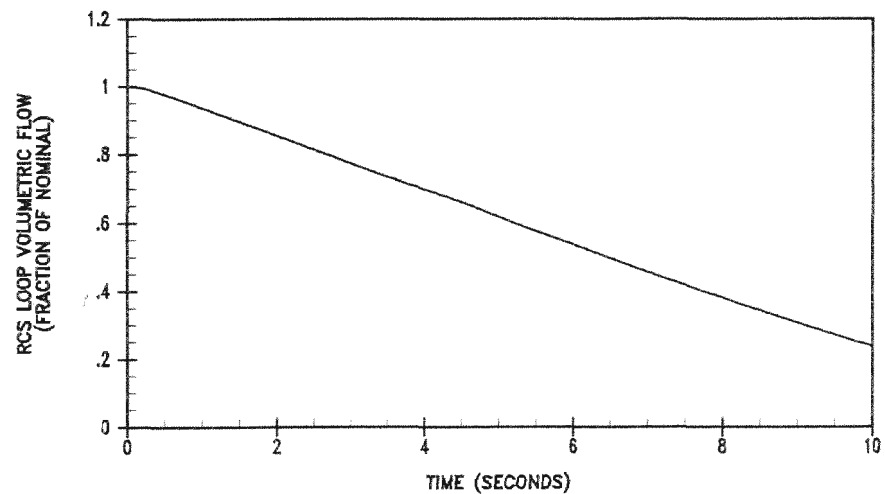
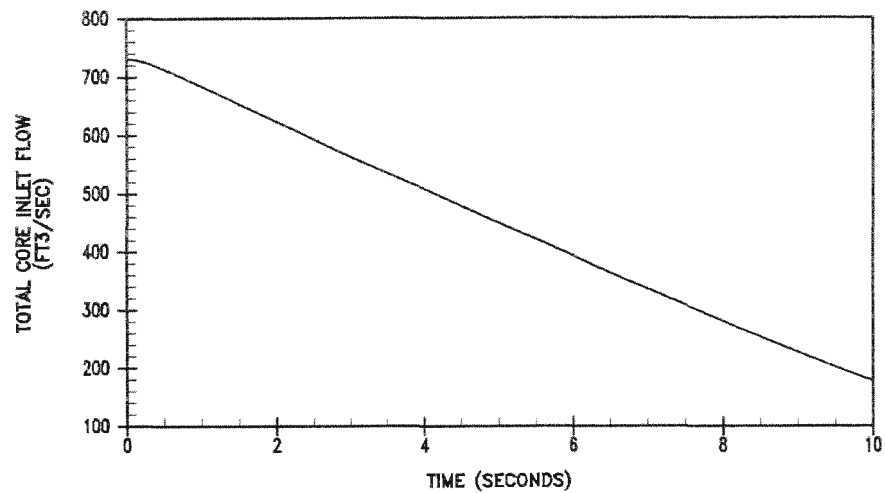
UFSAR FIGURE 14.1-25 REV. No. 19



INDIAN POINT UNIT No. 2

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

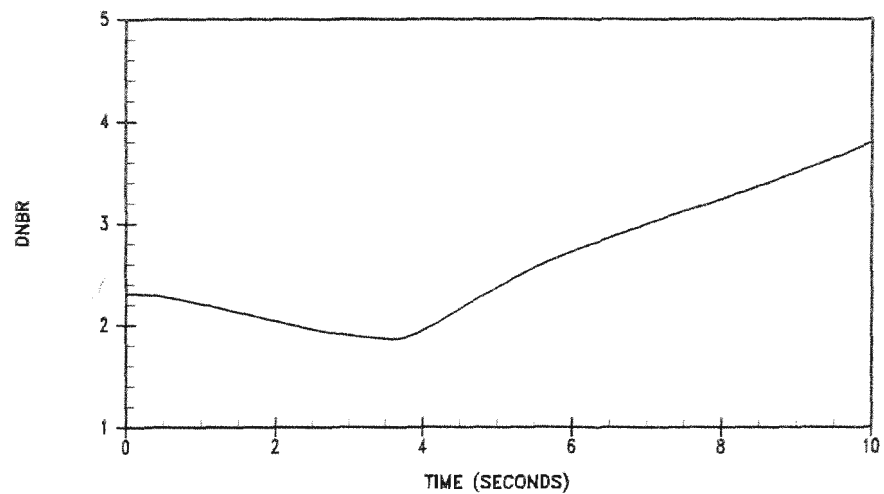
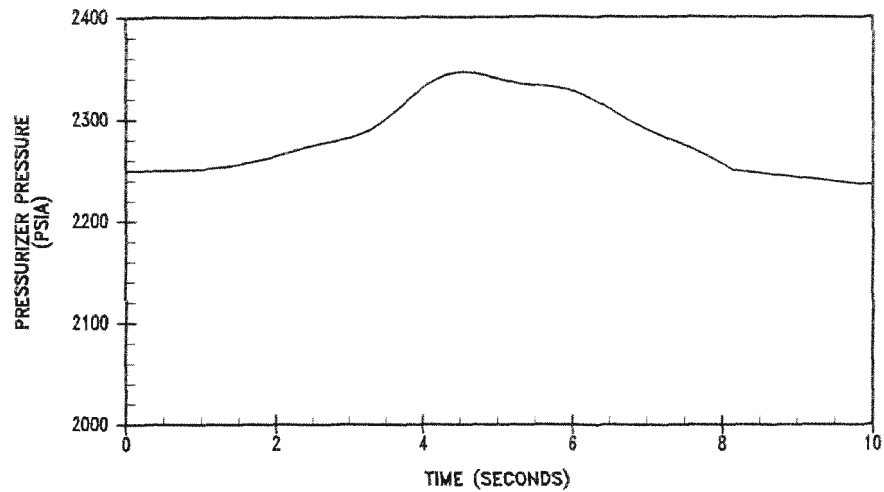
UFSAR FIGURE 14.1-26 | REV. No. 19



INDIAN POINT UNIT No. 2

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

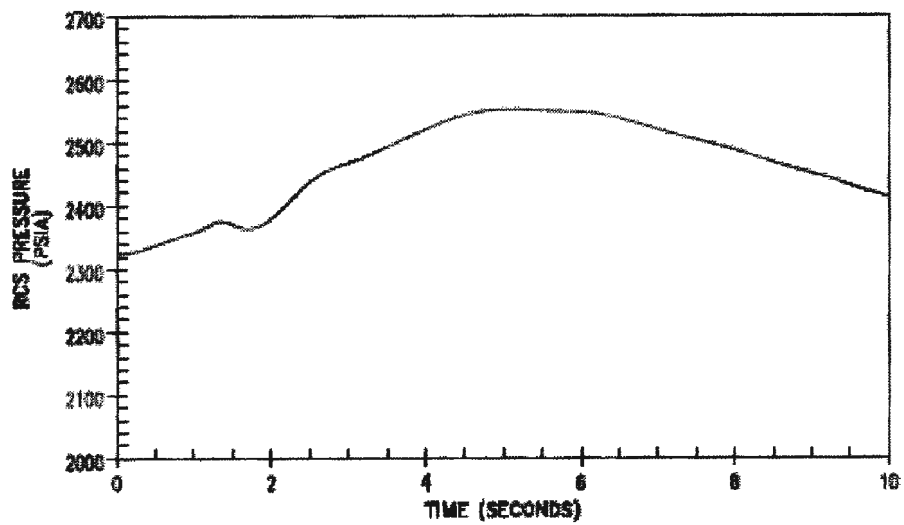
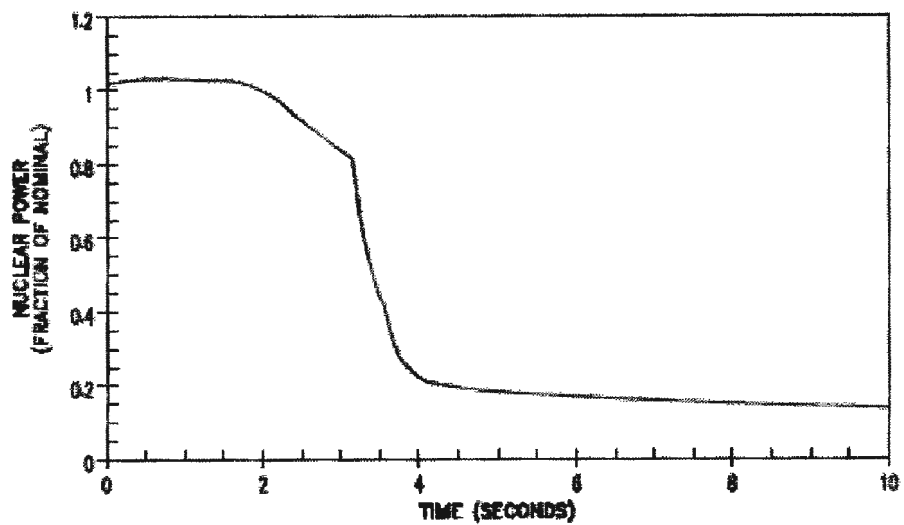
UFSAR FIGURE 14.1-27 | REV. No. 19



INDIAN POINT UNIT No. 2

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

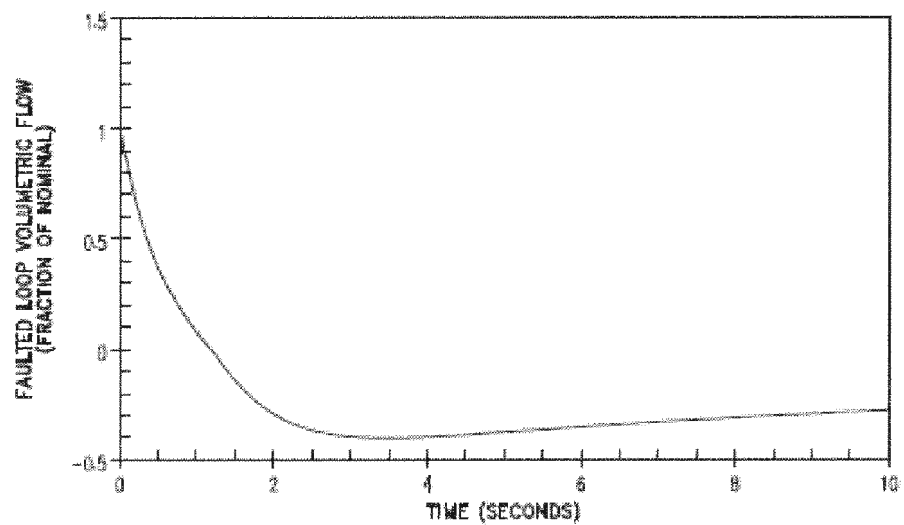
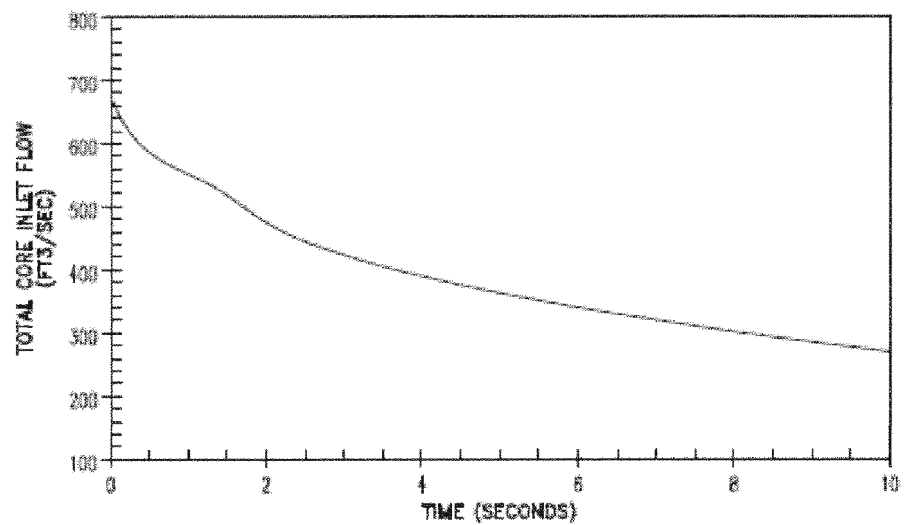
UFSAR FIGURE 14.1-28 REV. No. 19



INDIAN POINT UNIT No. 2

LOCKED ROTOR NUCLEAR POWER AND
RCS PRESSURE vs TIME

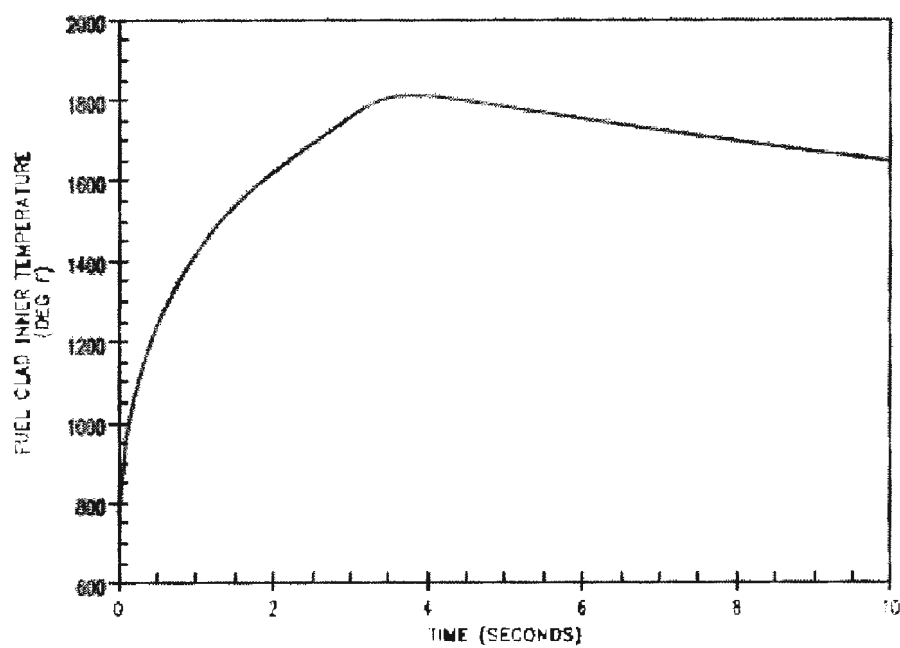
UFSAR FIGURE 14.1-29 | REV. No. 22



INDIAN POINT UNIT No. 2

LOCKED ROTOR TOTAL CORE FLOW AND
FAULTED LOOP FLOW vs TIME

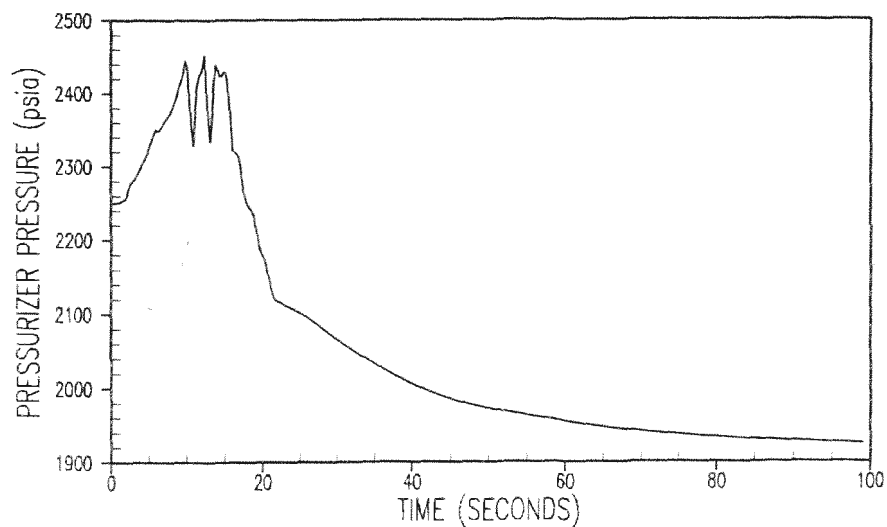
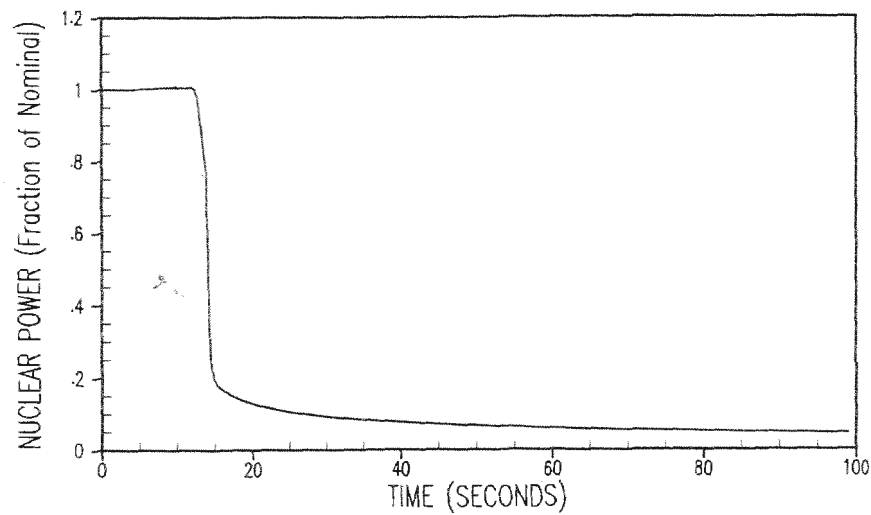
UFSAR FIGURE 14.1-30 | REV. No. 22



INDIAN POINT UNIT No. 2

LOCKED ROTOR FUEL CLAD
INNER TEMPERATURE vs TIME

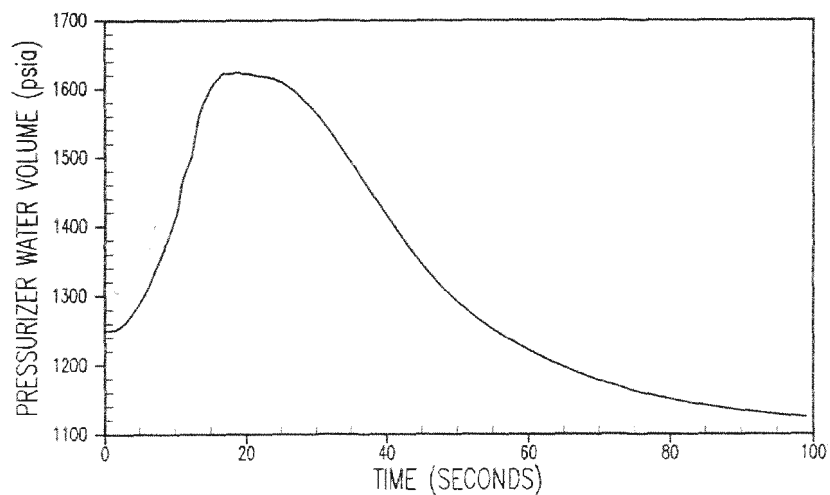
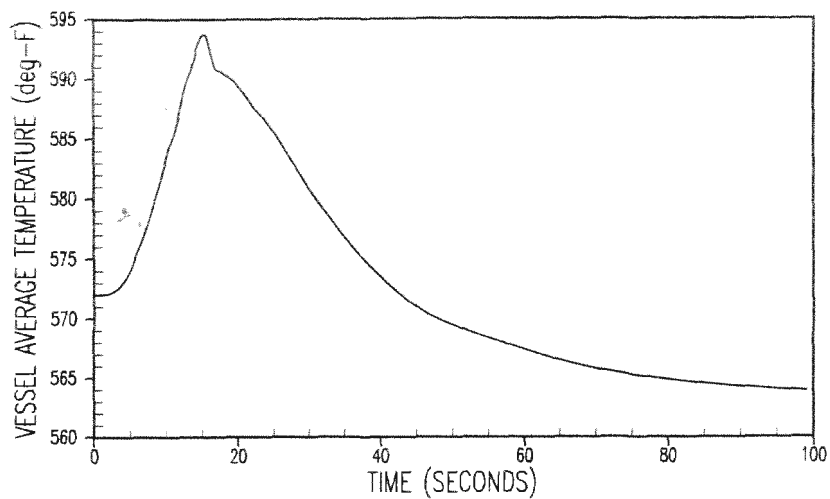
UFSAR FIGURE 14.1-30A | REV. No. 22



INDIAN POINT UNIT No. 2

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

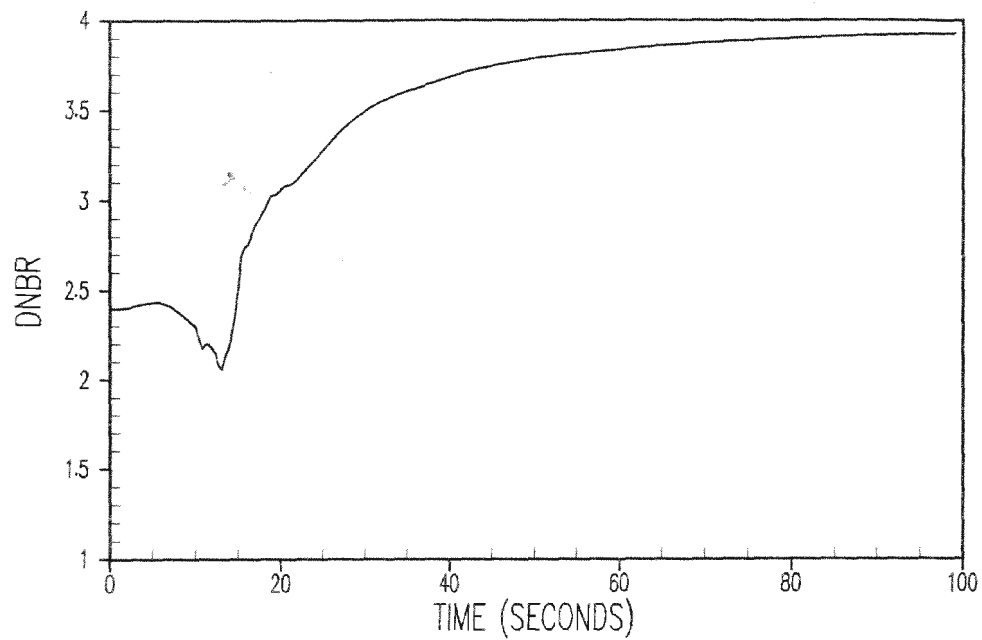
UFSAR FIGURE 14.1-31 | REV. No. 19



INDIAN POINT UNIT No. 2

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

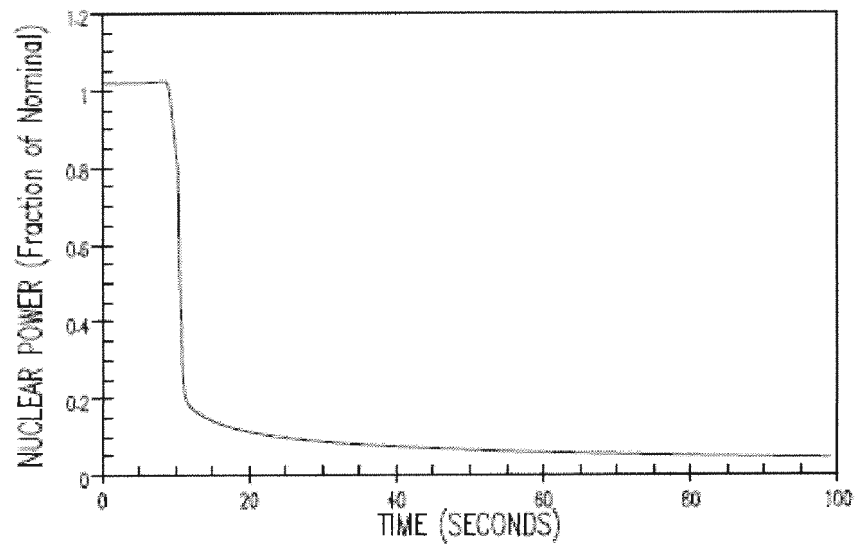
UFSAR FIGURE 14.1-32 REV. No. 19



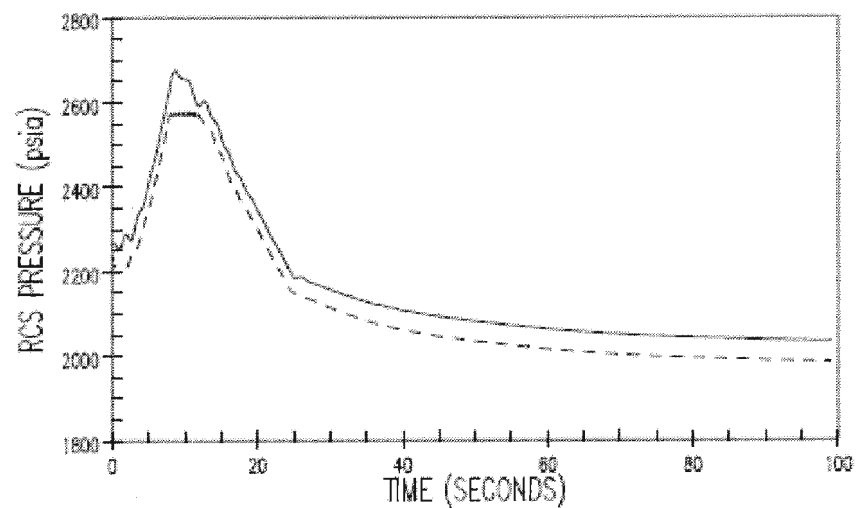
INDIAN POINT UNIT No. 2

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

UFSAR FIGURE 14.1-33 | REV. No. 19



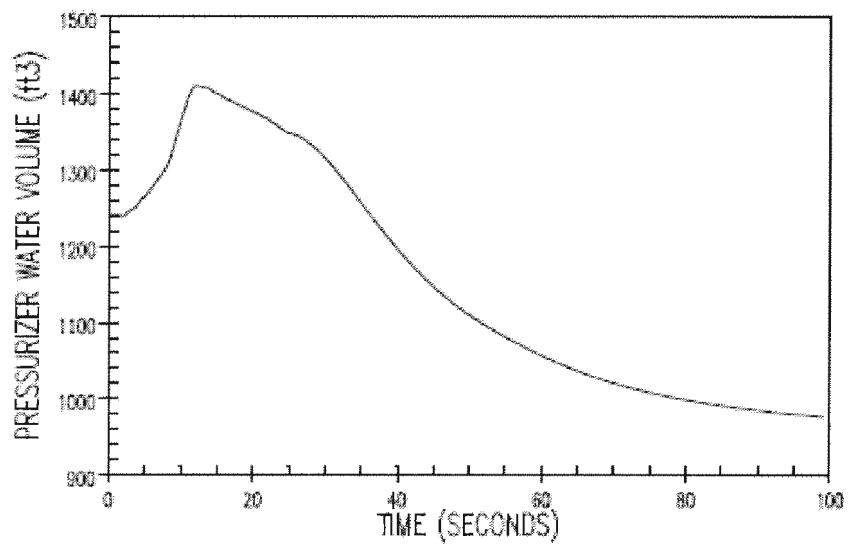
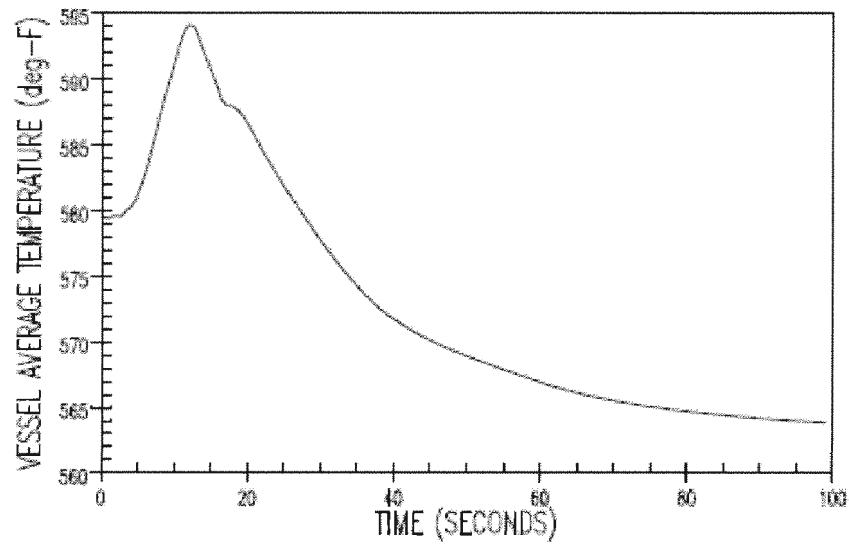
— RV Lower Plenum Pressure
 - - - Pressurizer Pressure



INDIAN POINT UNIT No. 2

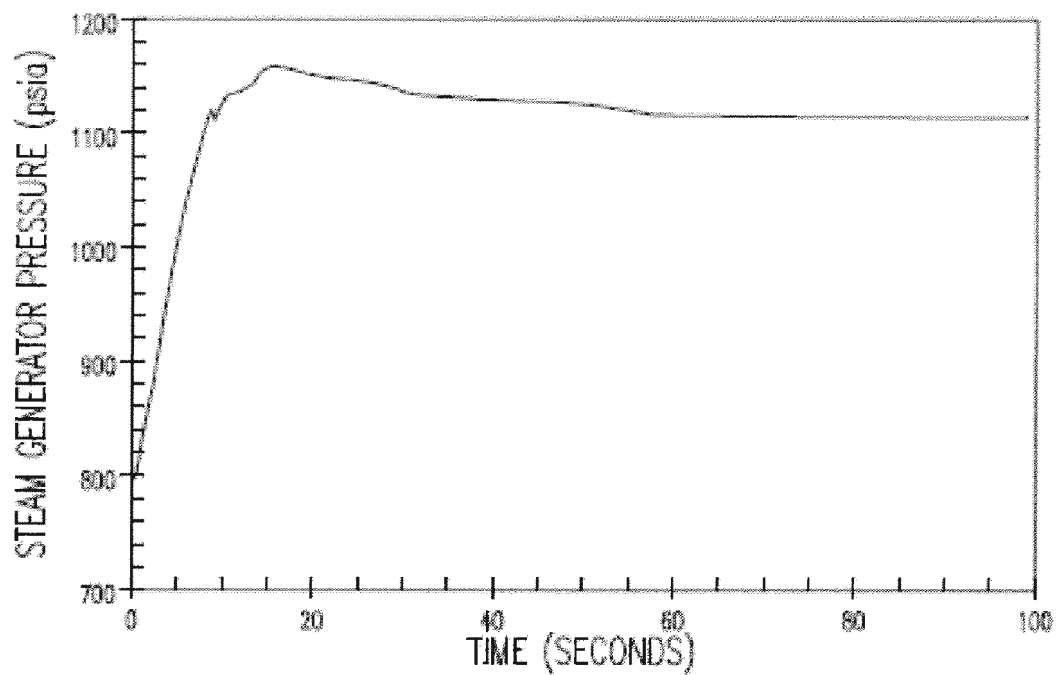
LOSS OF LOAD WITHOUT PRESSURIZER SPRAY
 AND PORV, NUCLEAR POWER AND
 PRESSURIZER PRESSURE vs TIME

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

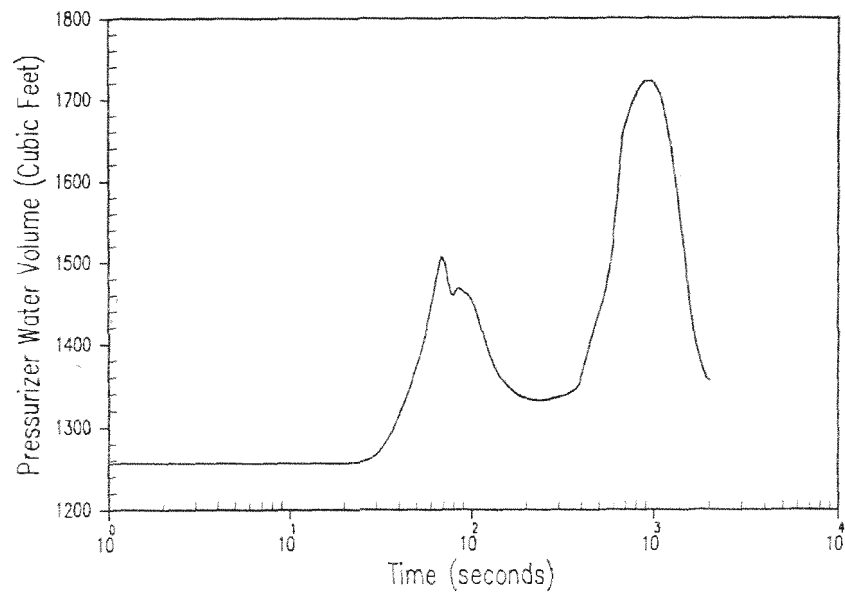
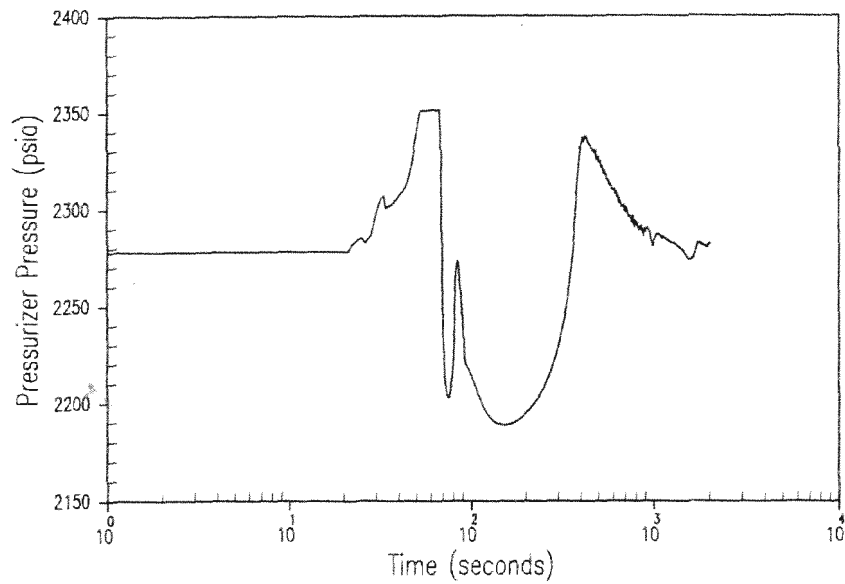


INDIAN POINT UNIT No. 2

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

UFSAR FIGURE 14.1-39

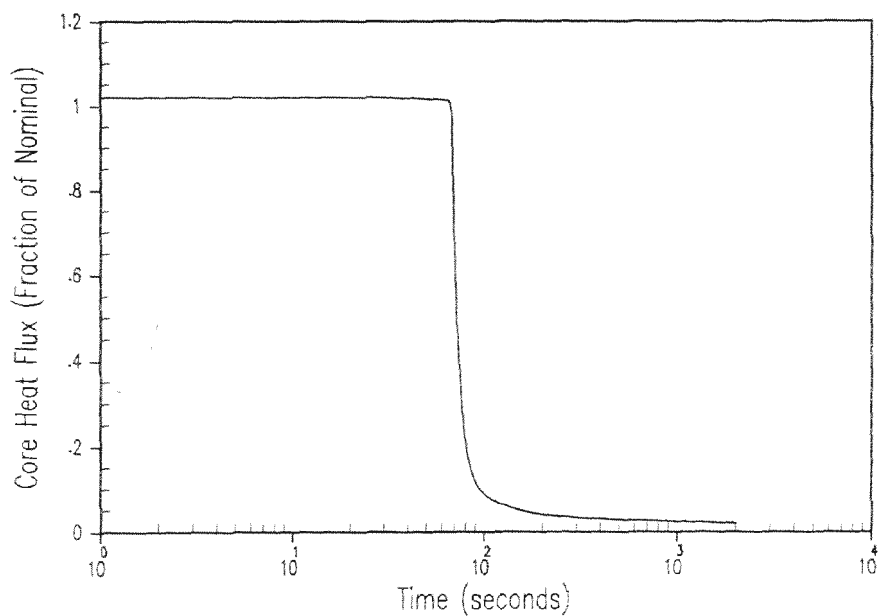
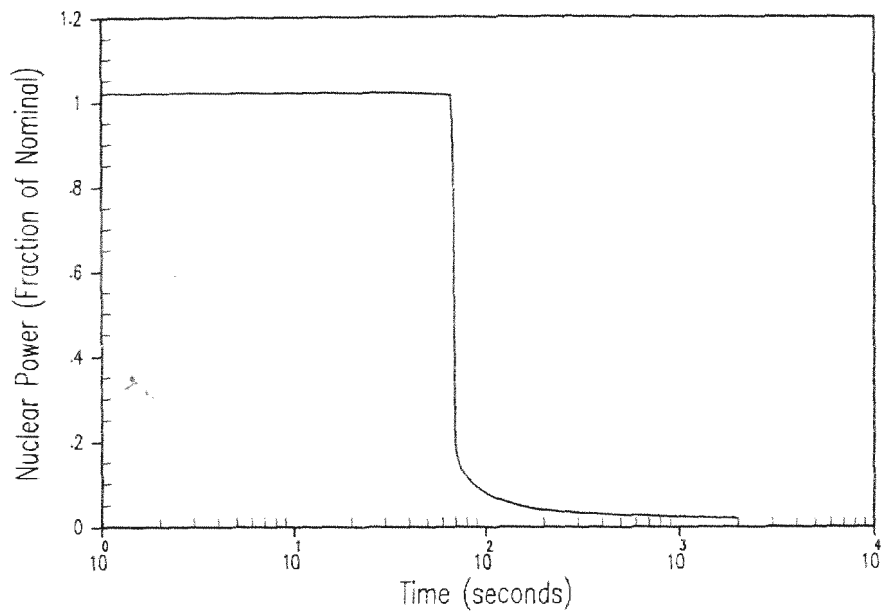
REV. No. 22



INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE
POWER AVAILABLE, HIGH T_{avg} PROGRAM,
PRESSURIZER PRESSURE AND
PRESSURIZER WATER VOLUME vs TIME

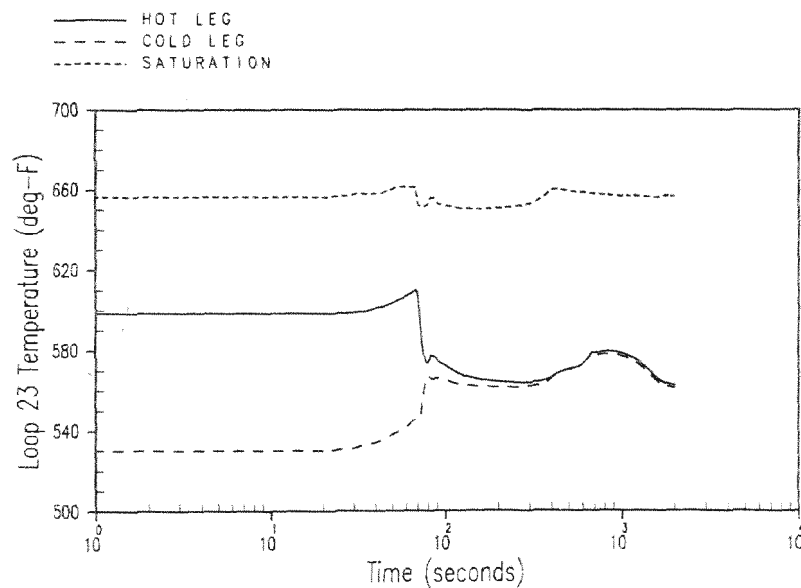
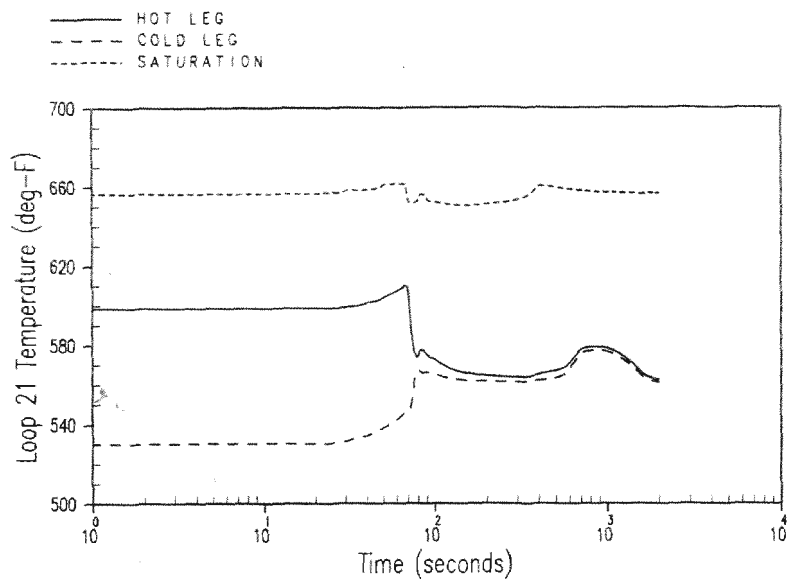
UFSAR FIGURE 14.1-43, sht.1 | REV. No. 19



INDIAN POINT UNIT No. 2

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

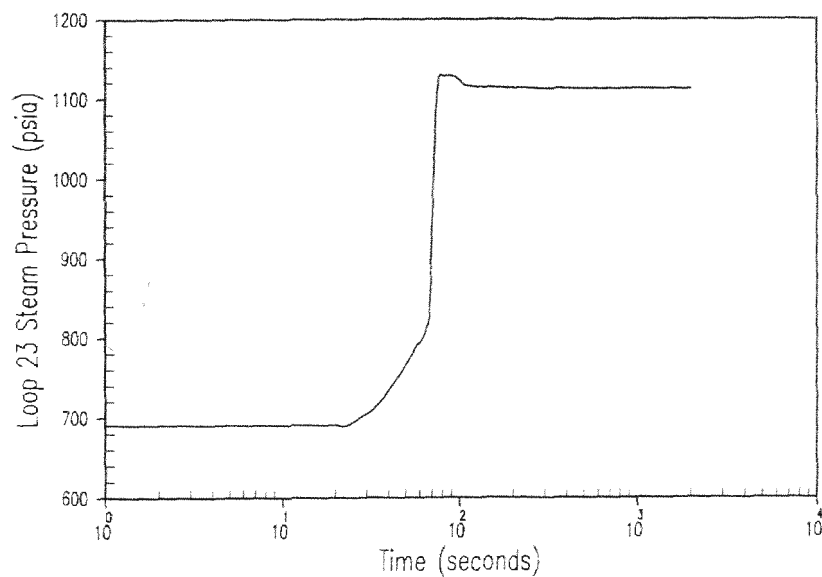
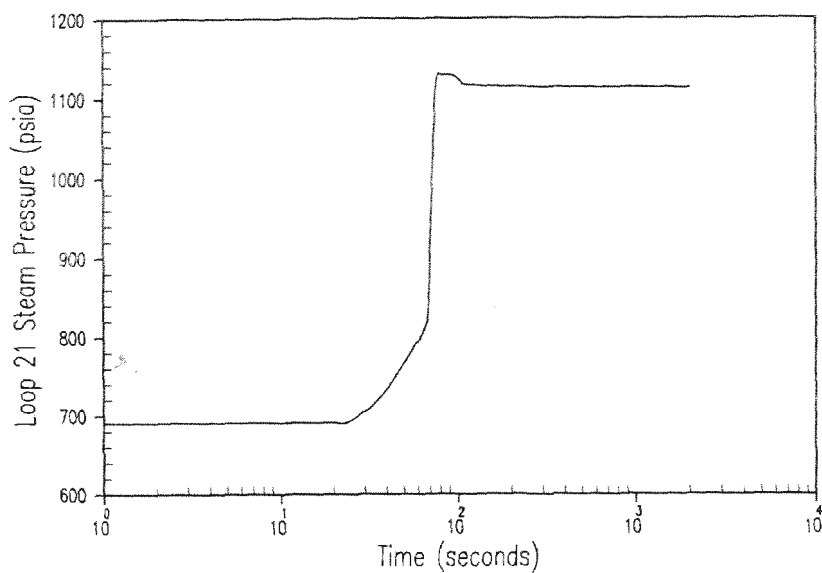
UFSAR FIGURE 14.1-43, sht.2 | REV. No. 19



INDIAN POINT UNIT No. 2

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

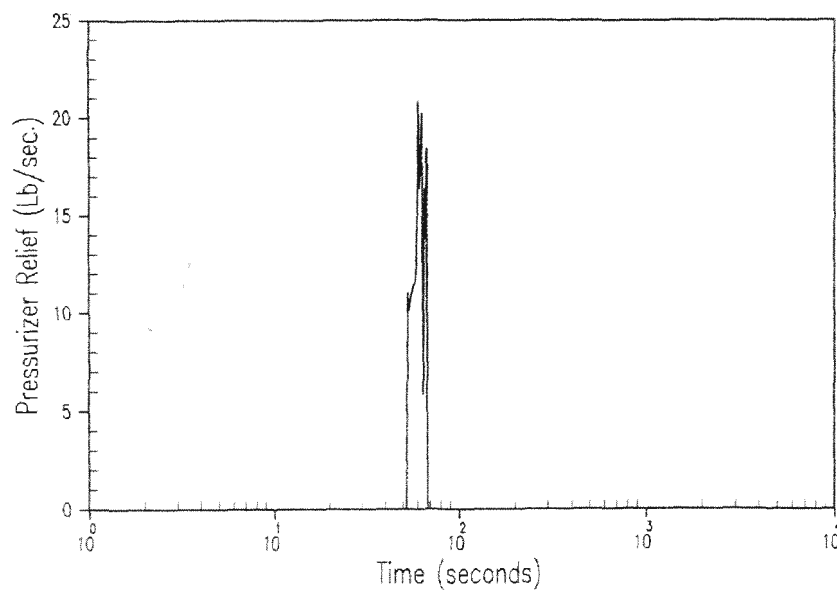
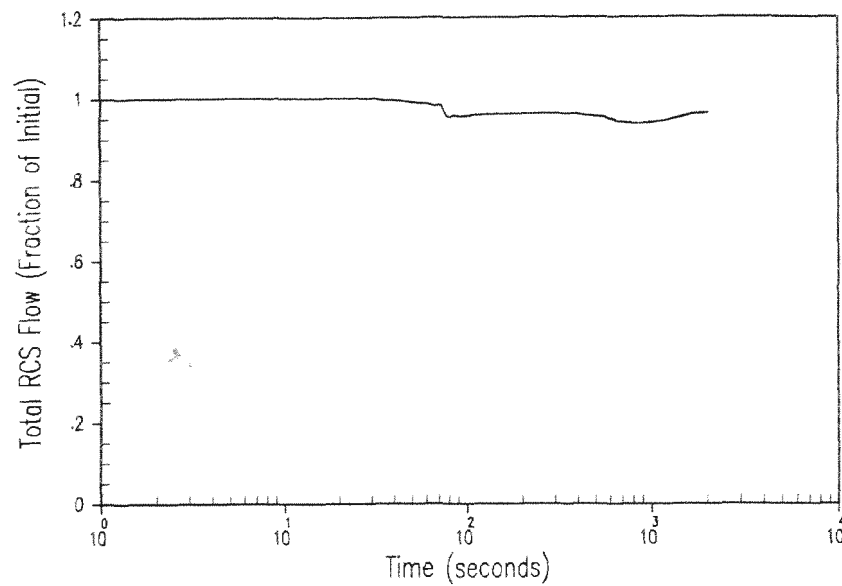
UFSAR FIGURE 14.1-43, sht.3 REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF NORMAL FEEDWATER, OFFSITE
POWER AVAILABLE, HIGH T_{avg} PROGRAM,
STEAM GENERATOR 21 AND STEAM GENERATOR 23
PRESSURE vs TIME

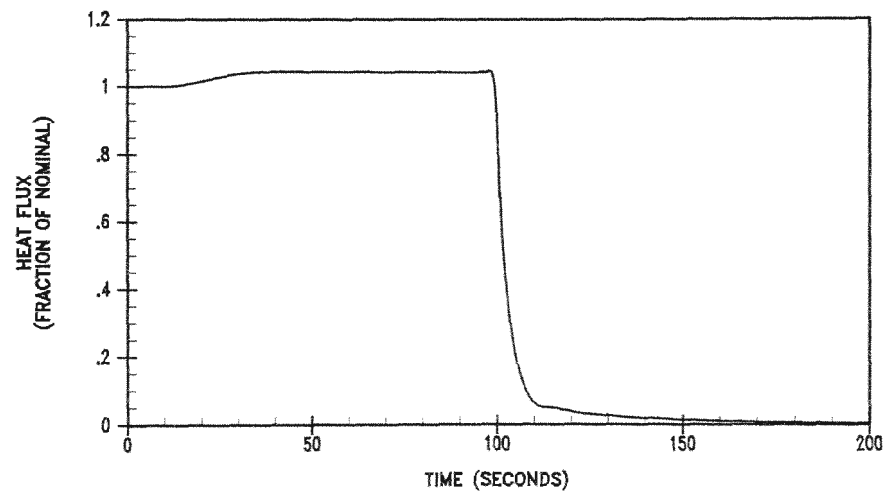
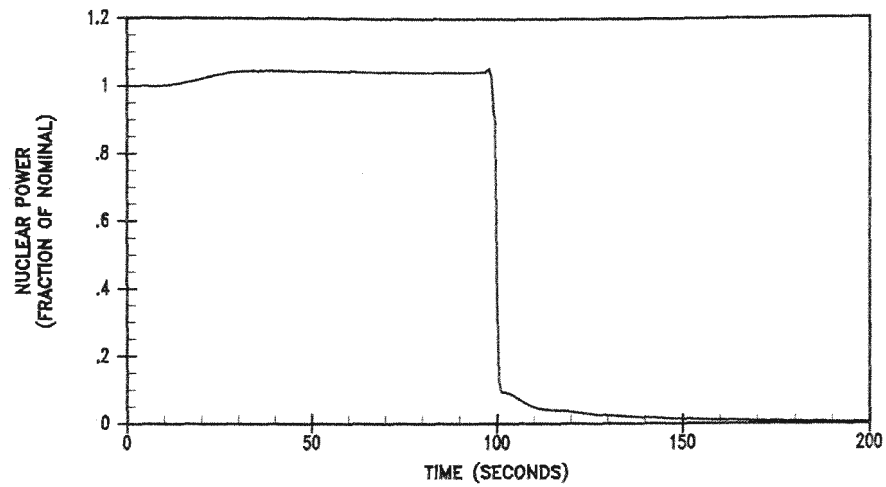
UFSAR FIGURE 14.1-43, sht.4 REV. No. 19



INDIAN POINT UNIT No. 2

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

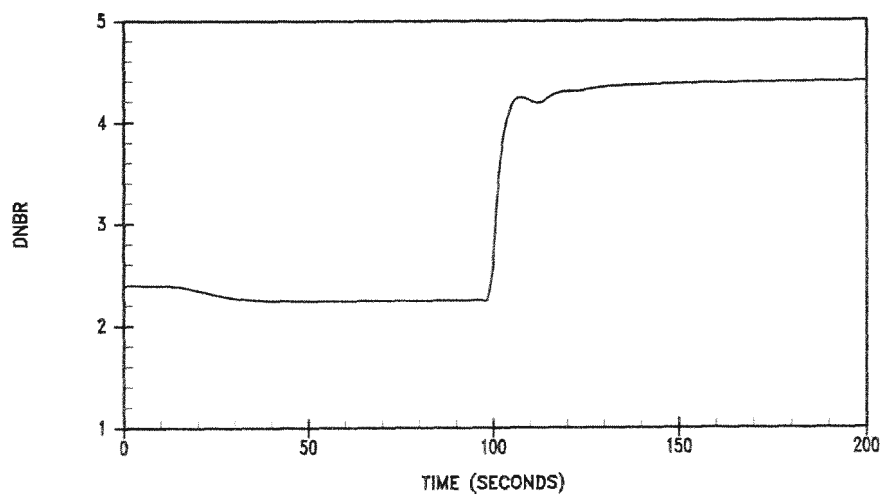
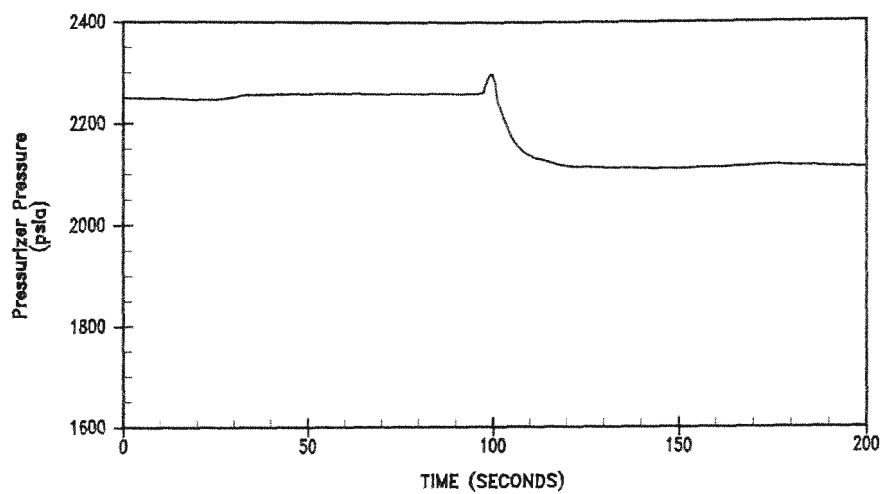
UFSAR FIGURE 14.1-43, sht.5 REV. No. 19



INDIAN POINT UNIT No. 2

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

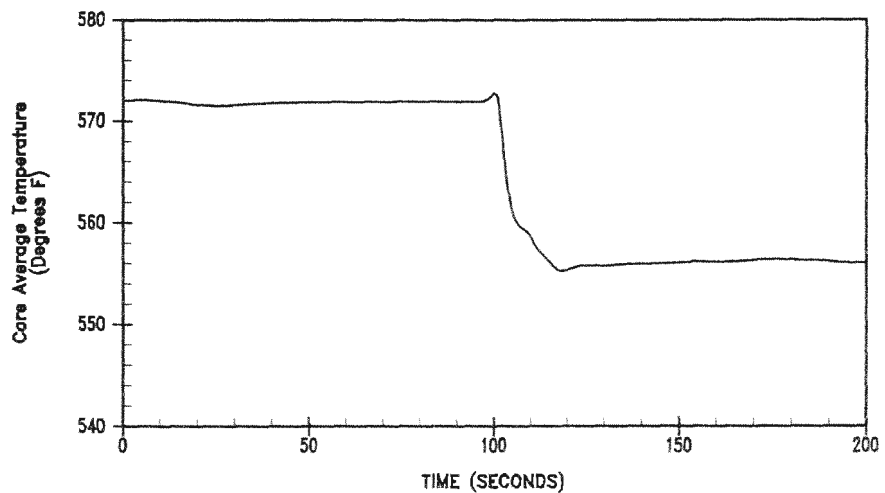
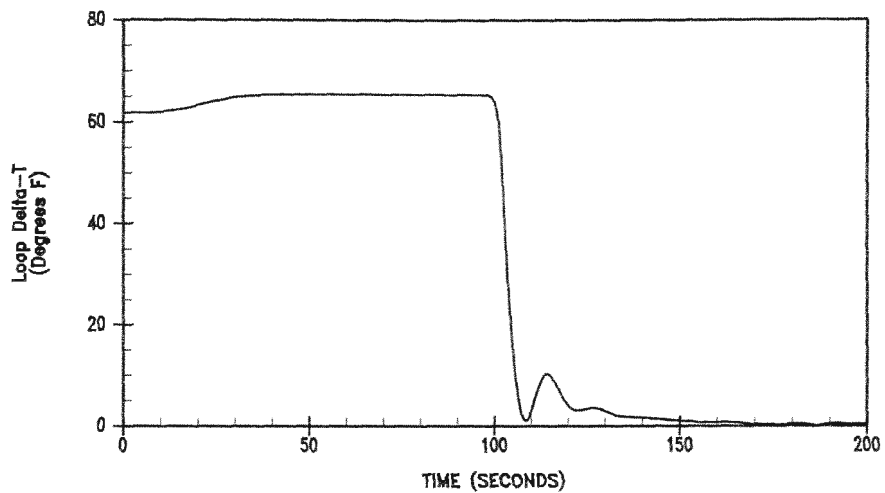
UFSAR FIGURE 14.1-45, sht.1 | REV. No. 19



INDIAN POINT UNIT No. 2

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

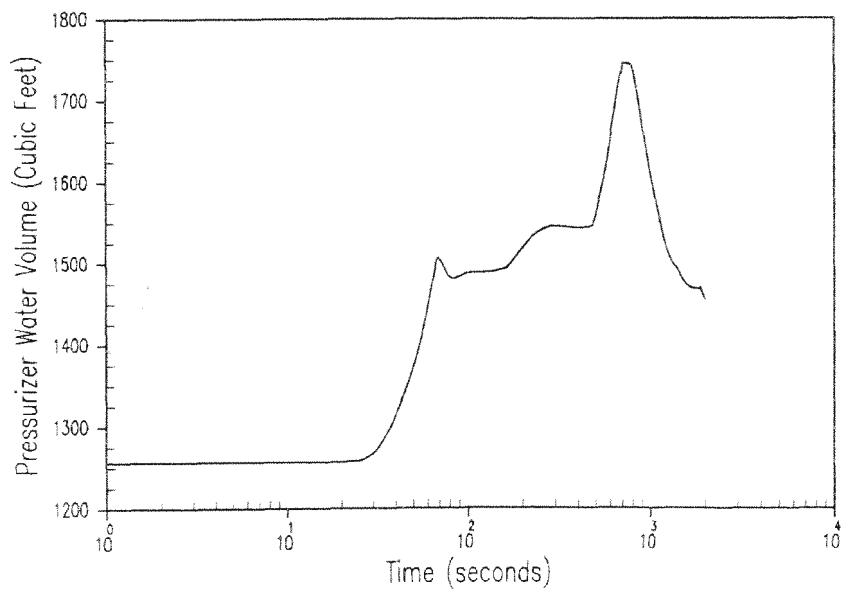
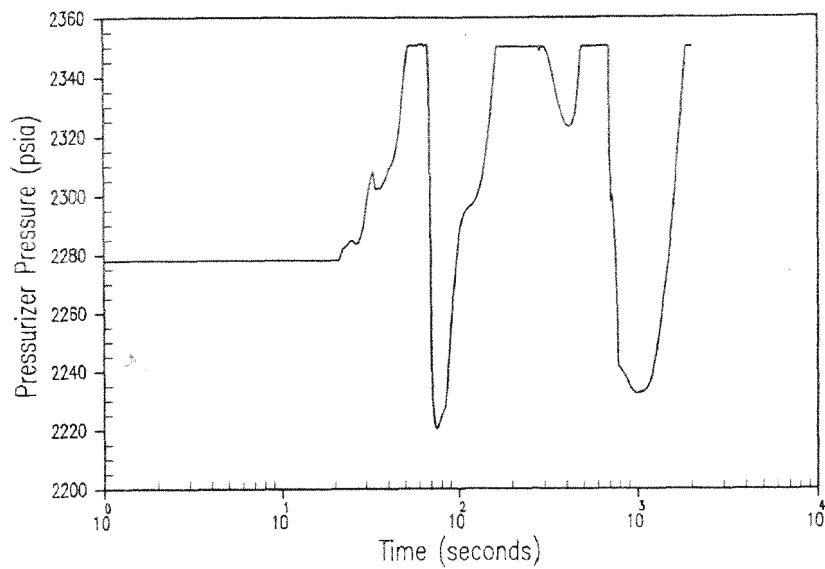
UFSAR FIGURE 14.1-45, sht.2 REV. No. 19



INDIAN POINT UNIT No. 2

FEEDWATER SYSTEM MALFUNCTION EXCESSIVE FEEDWATER
FLOW - HFP CONDITIONS MANUAL ROD CONTROL
LOOP DELTA -T, AND CORE T_{avg} vs TIME

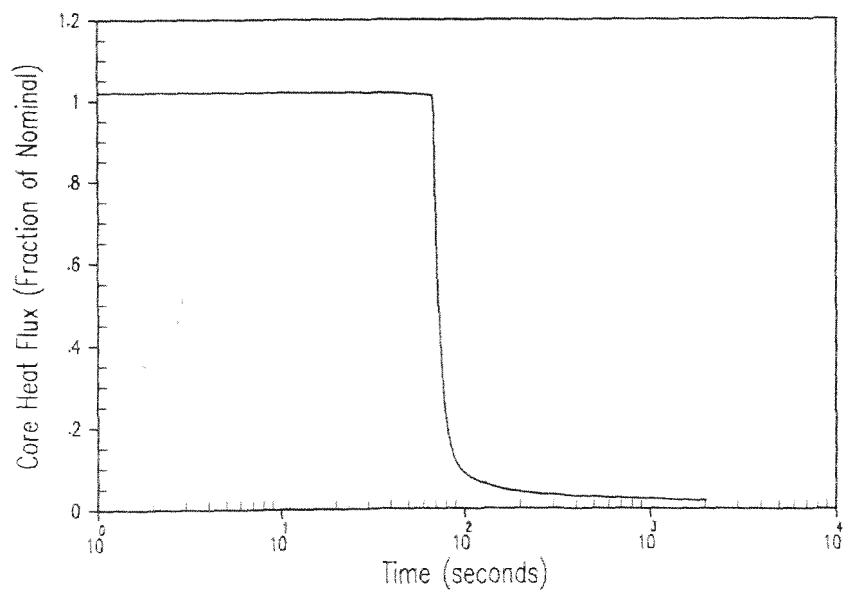
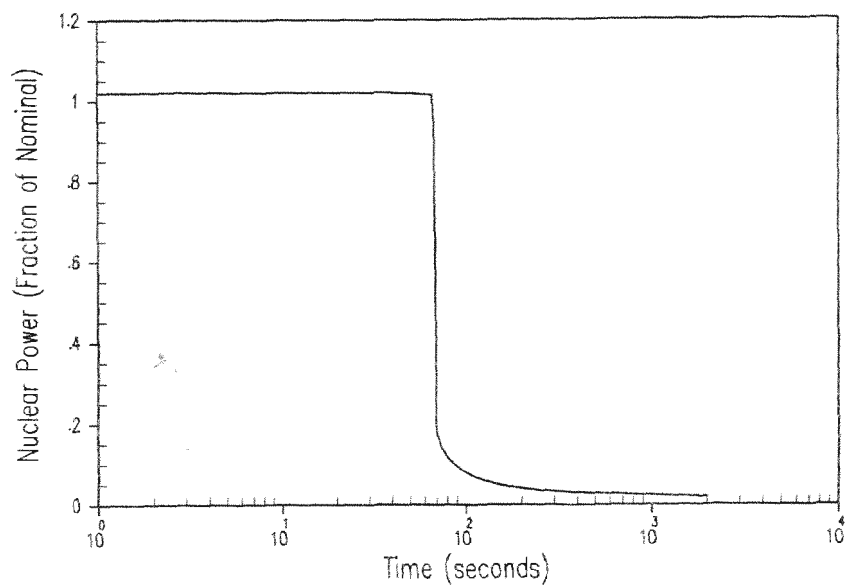
UFSAR FIGURE 14.1-45, sht.3 REV. No. 19



INDIAN POINT UNIT No. 2

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

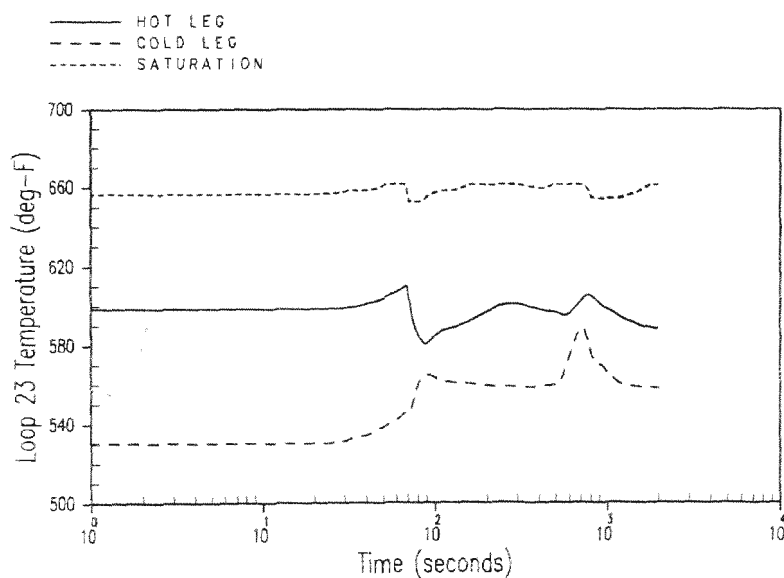
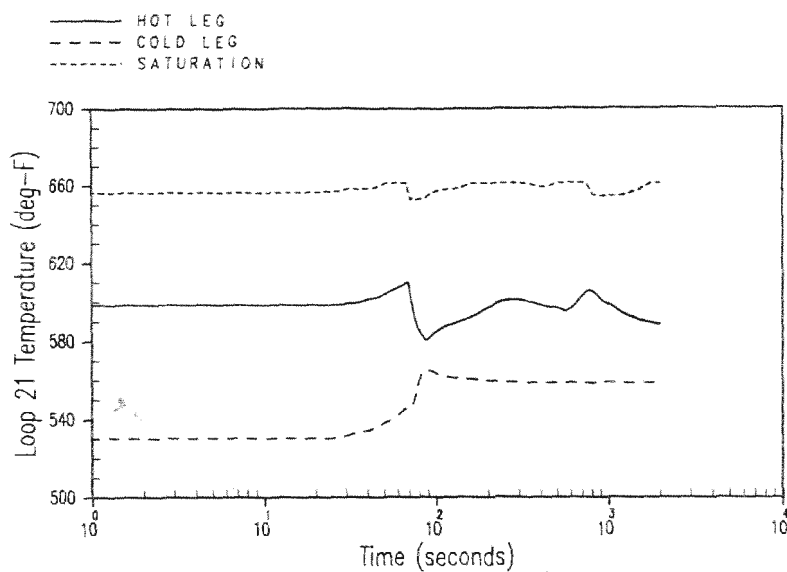
UFSAR FIGURE 14.1-50, sht.1 REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ALL AC POWER, HIGH T_{avg}
PROGRAM, NUCLEAR POWER AND
CORE HEAT FLUX vs TIME

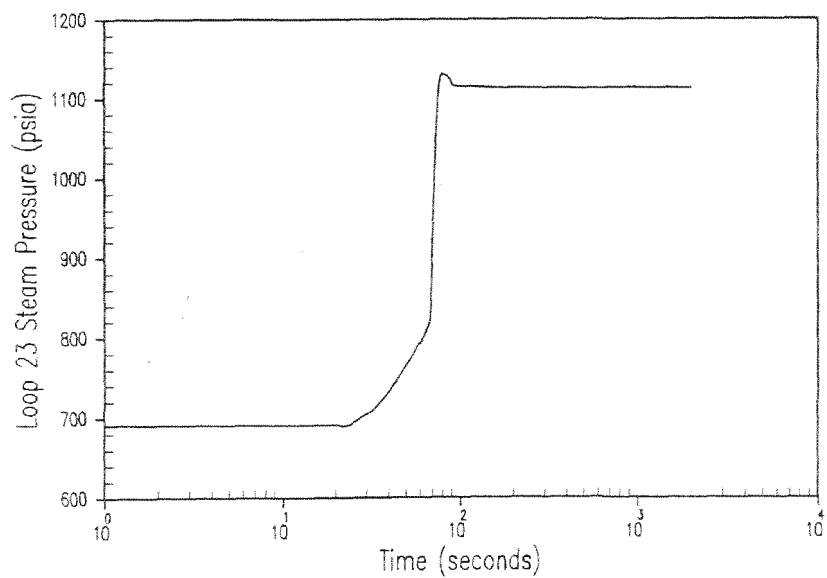
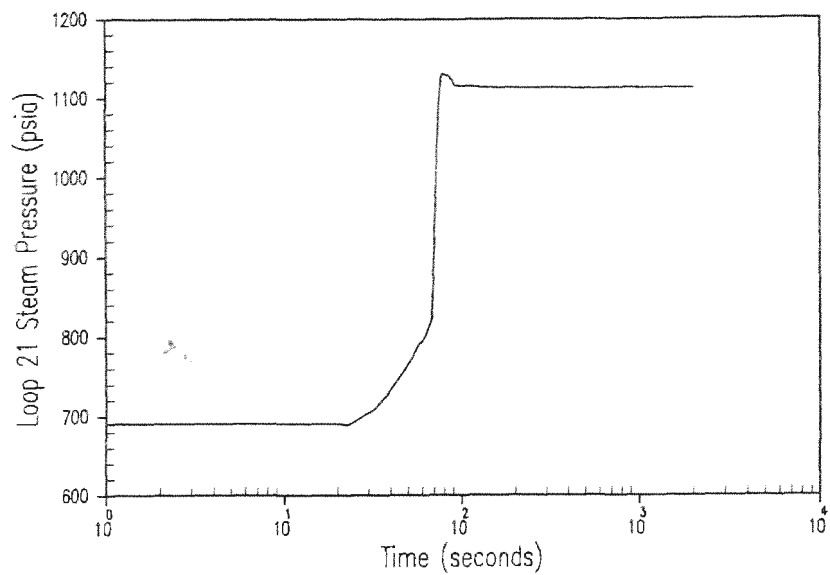
UFSAR FIGURE 14.1-50, sht.2 REV. No. 19



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

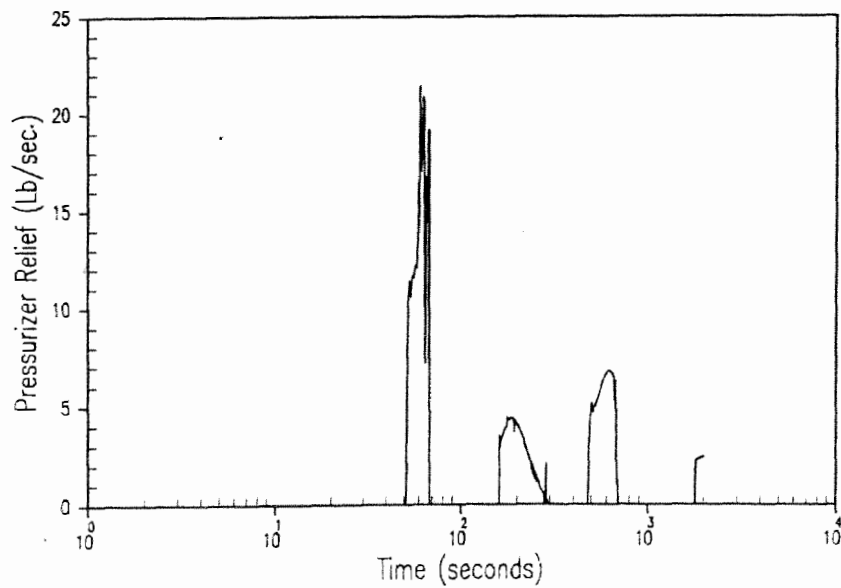
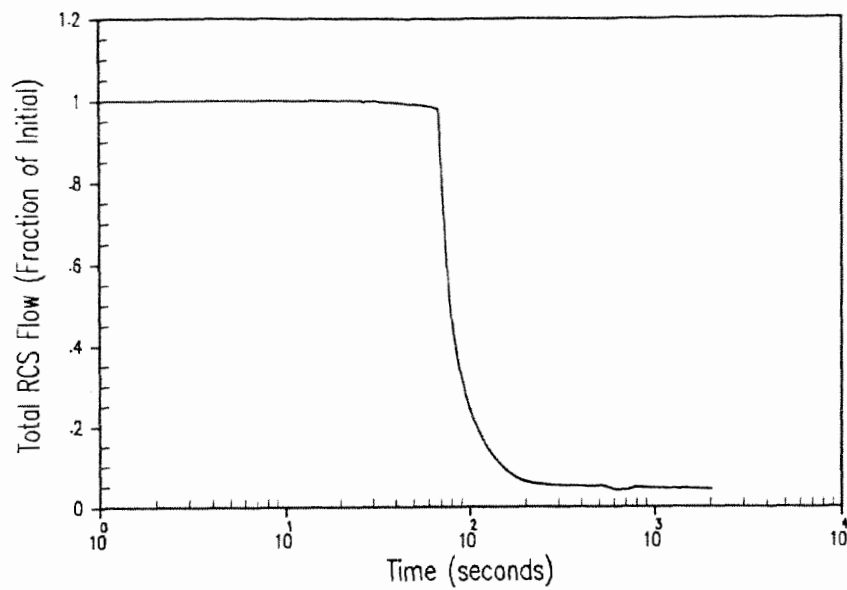
UFSAR FIGURE 14.1-50, sht.3 | REV. No. 19



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

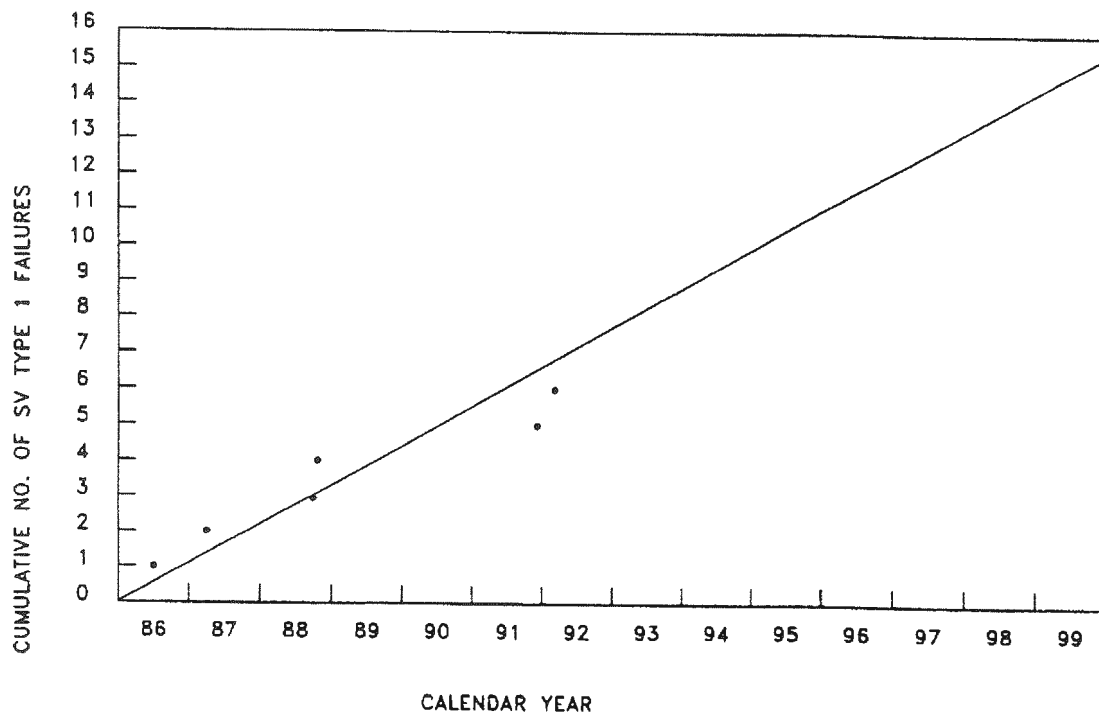
UFSAR FIGURE 14.1-50, sht.4 REV. No. 19



INDIAN POINT UNIT No. 2

LOSS OF ALL AC POWER TO THE
STATION AUXILIARIES, INTERMEDIATE T_{avg}
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 = $[(\text{SV TYPE 1 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$

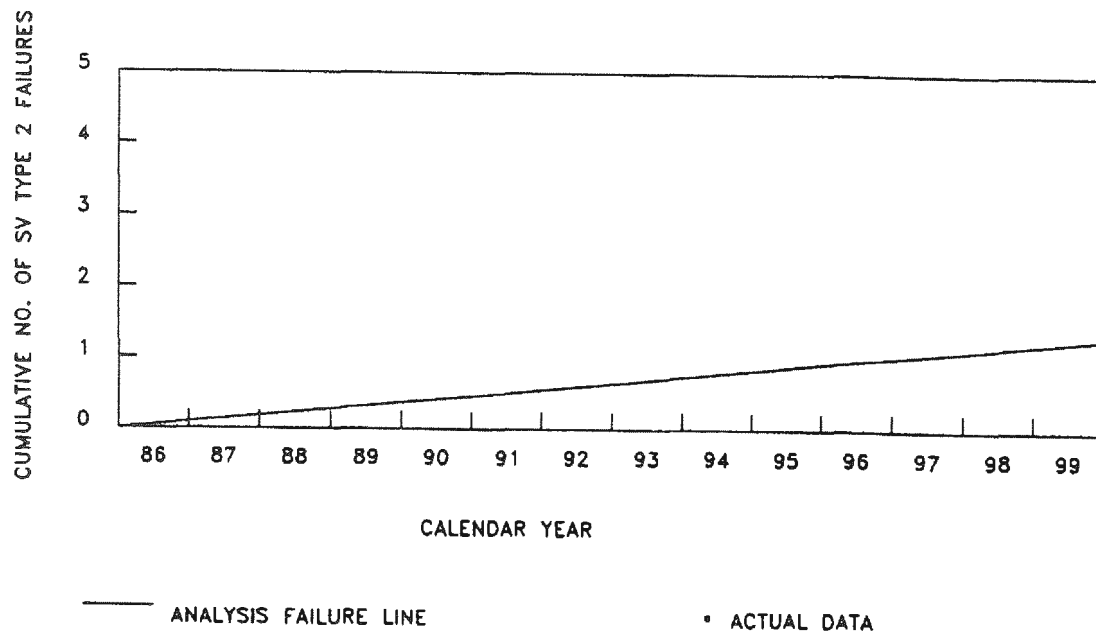
= $[(2.47 \times 10^{-6} / \text{HR}) * (2.917 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 1.1 \text{ FAIL./CAL. YR.}$

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



SV TYPE 2 FAILURE RATE

= $2.05 \times 10^{-7} / \text{HR}$

SLOPE OF ANALYSIS FAILURE LINE

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

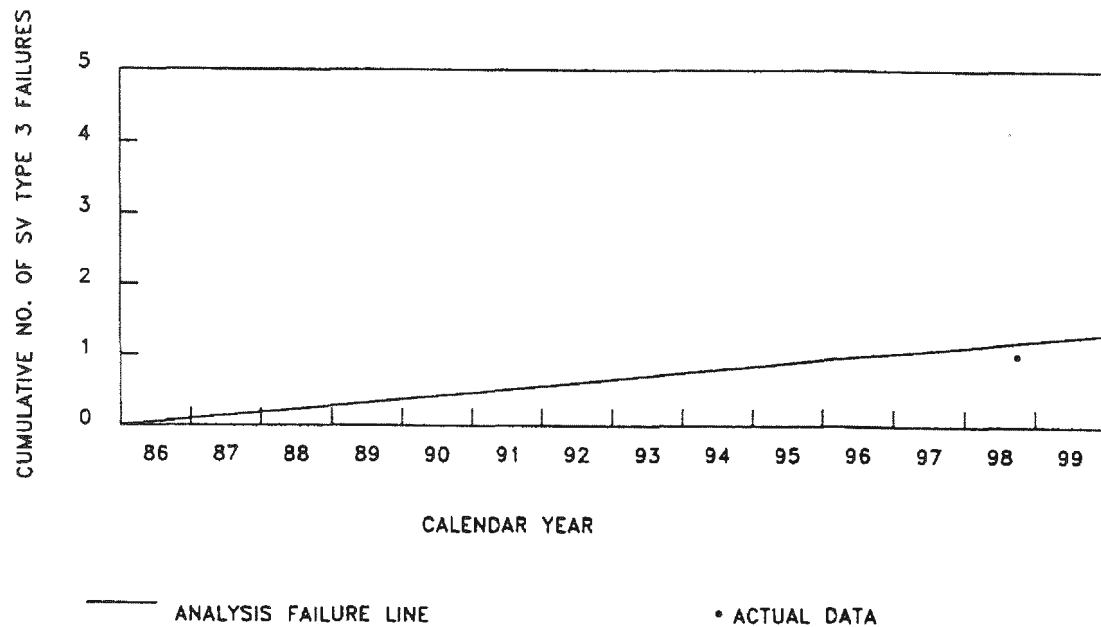
= $[(2.05 \times 10^{-7} / \text{HR}) * (2.917 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.093 \text{ FAIL./CAL. YR.}$

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



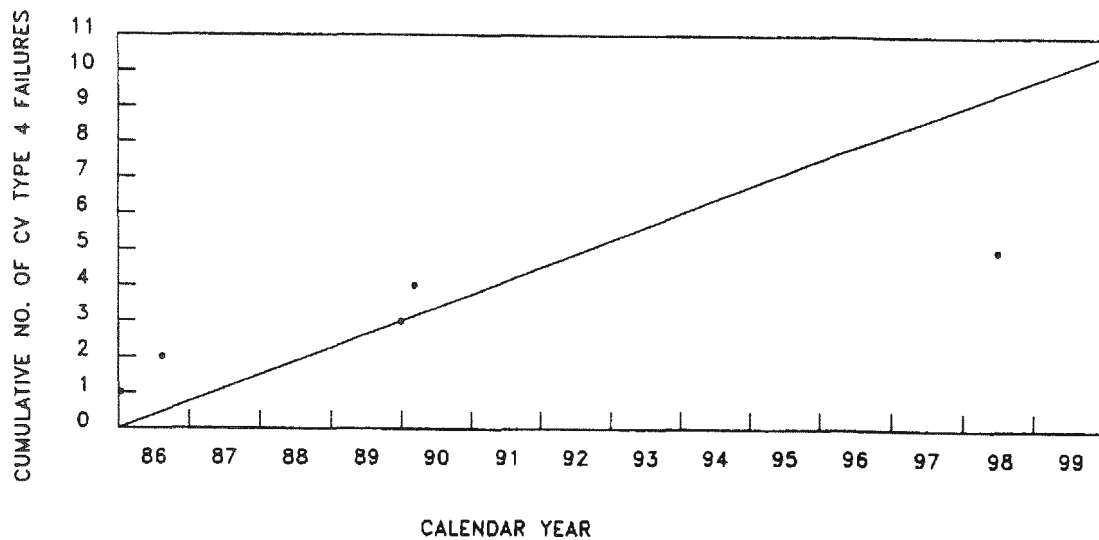
SV TYPE 3 FAILURE RATE = $2.05 \times 10^{-7} / \text{HR}$
 SLOPE OF ANALYSIS FAILURE LINE = $[(\text{SV TYPE 3 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$
 = $[(2.05 \times 10^{-7} / \text{HR}) * (2.917 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.093 \text{ FAIL./CAL. YR.}$

INDIAN POINT UNIT No. 2

UFSAR FIGURE 14.1-64
 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

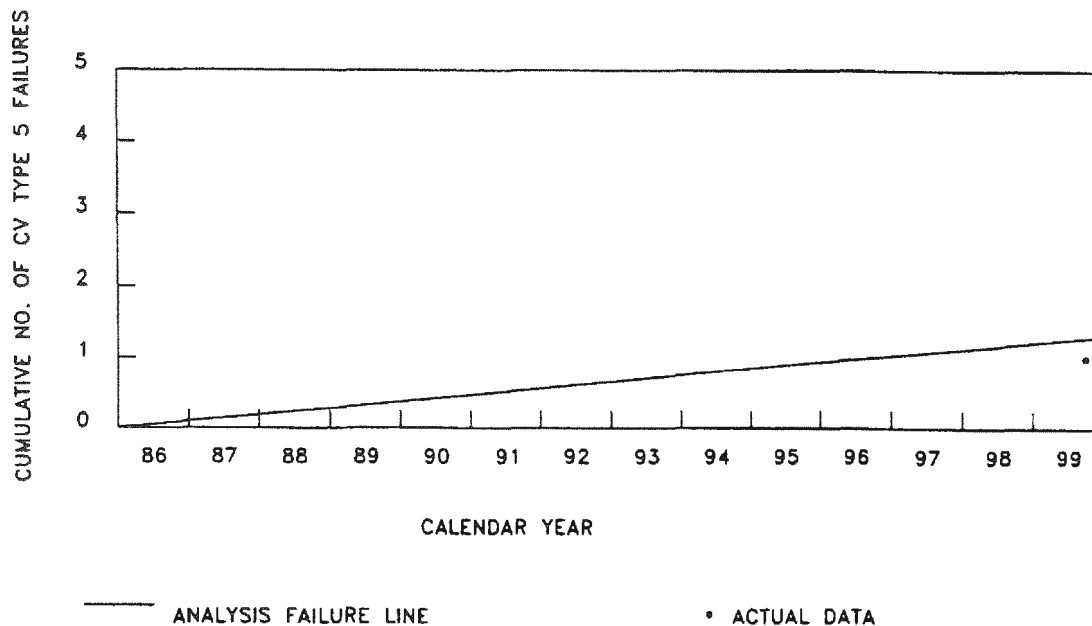
$$\begin{aligned}
 \text{CV TYPE 4 FAILURE RATE} &= 1.22\text{E-06/HR} \\
 \text{SLOPE OF ANALYSIS FAILURE LINE} &= [(CV \text{ TYPE 4 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS}) \\
 &= [(1.22\text{E-06/HR}) * (3.925\text{E+06 HRS})] / (6.42 \text{ CAL. YRS.}) = 0.75 \text{ FAIL./CAL. YR.}
 \end{aligned}$$

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



CV TYPE 5 FAILURE RATE = $1.53 \times 10^{-7} / \text{HR}$
 SLOPE OF ANALYSIS FAILURE LINE = $[(\text{CV TYPE 5 F.R.}) * (\text{OPERATING HOURS})] / (\text{CALENDAR YEARS})$
 = $[(1.53 \times 10^{-7} / \text{HR}) * (3.925 \times 10^6 \text{ HRS})] / (6.42 \text{ CAL. YRS.}) = 0.094 \text{ FAIL./CAL. YR.}$

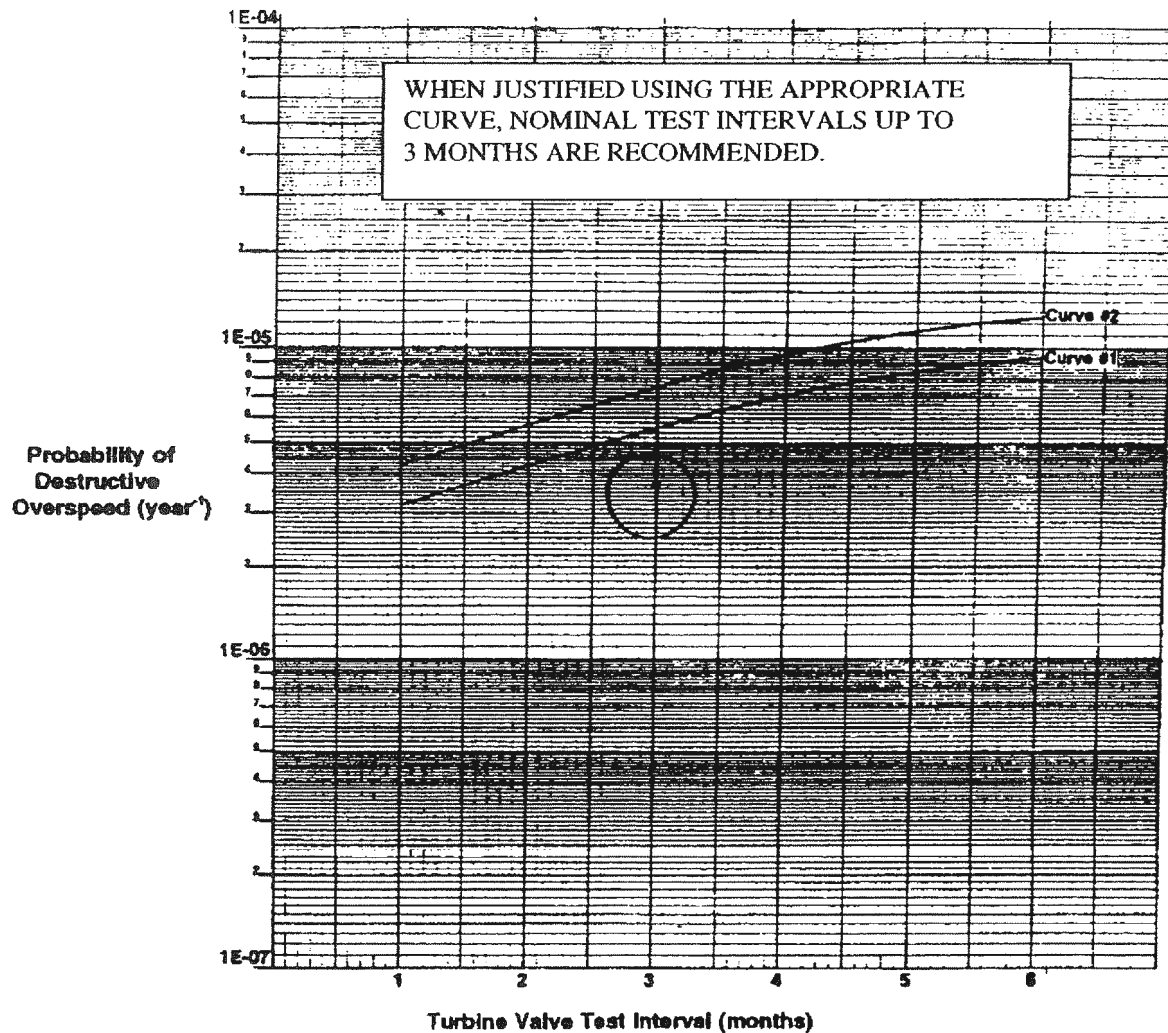
INDIAN POINT UNIT No. 2

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 $3.7\text{E-}06/\text{r}$ 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