SURVEILLANCE REQUIREMENTS (Continued)

2. At least once per 18 months.

Boron Injection Throttle Valves	Safety Injection Throttle Valves
Valve Number	Valve Number
1. 2-SI-141 L1	1. 2-SI-121 N
2. 2-SI-141 L2	2. 2-SI-121 S
3. 2-SI-141 L3	
4. 2-SI-141 L4	

h. By performing a flow balance test during shutdown following completion of modifications to the ECCS subsystem that alter the subsystem flow characteristics and verifying the following flow rates:

Boron Injection System Single Pump*	Safety Injection System Single Pump**
Loop 1 Boron Injection Flow 117.5 gpm	Loop 1 and 4 Cold Leg Flow $\geq$ 300 gpm
Loop 2 Boron Injection Flow 117.5 gpm	Loop 2 and 3 Cold Leg Flow $\geq$ 300 gpm
Loop 3 Boron Injection Flow 117.5 gpm	**Combined Loop 1,2,3 and 4 Cold Leg Flow (single pump) $\leq$640 gpm. Total SIS (single pump) flow, including miniflow, shall not exceed 700 gpm.
Loop 4 Boron Injection Flow 117.5 gpm	

*The flow rate in each Boron Injection (BI) line should be adjusted to provide 117.5 gpm (nominal) flow into each loop. Under these conditions there is zero mini-flow and 80 gpm simulated RCP seal injection line flow. The actual flow in each BI line may deviate from the nominal so long as the difference between the highest and lowest flow is 10 gpm or less and the total flow to the four branch lines does not exceed 470 gpm. Minimum flow (total flow) required is 345.8 gpm to the three most conservative (lowest flow) branch lines.

SPECIAL TEST EXCEPTION

POSITION INDICATOR CHANNELS SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.10.5 The limitations of Specification 3.1.3.3 may be suspended during the performance of individual full length (shutdown and control) rod drop time measurements provided;

a. Only one shutdown or control bank is withdrawn from the fully inserted position at a time, and

b. The group demand position indicator is OPERABLE during the withdrawal of the rods.

APPLICABILITY: MODES 3, 4 and 5 during performance of rod drop time measurements.

ACTION

With the group demand position indicator inoperable, or more than one bank of rods withdrawn, immediately open the reactor trip breakers.

SURVEILLANCE REQUIREMENTS

4.10.5 Each of the above required group demand position indicator(s) shall be determined to be OPERABLE by movement of the associated shutdown or control rods at least 8 steps in any one direction within 24 hours prior to the start of the rod drop time measurements.

ATTACHMENT 4 TO AEP:NRC:0860A

WESTINGHOUSE SUMMARY OF THE SAFETY EVALUATION

FOR INCREASED SI PUMP MINIFLOW

LOCA EVALUATION FOR D. C. COOK UNIT 2
WITH REDUCED HIGH HEAD SAFETY INJECTION

This evaluation assesses the impact of reduced high head safety injection on ECCS performance in response to a LOCA for the D. C Cook Unit 2 plant. W Safeguards Systems performed an independent calculation evaluating the impact to high head safety injection (HHSI) of increasing HHSI pump miniflow from 30 gpm to 60 gpm. The calculation assumed a 60 gpm miniflow and that each pair of cold legs receives greater than 300 gpm during flow balance testing. The ECCS flowrates were then calculated using the vendor performance curve degraded by 5% of design head. The total delivered safety injection flowrates to the RCS for both 30 gpm and 60 gpm are shown in Table I. The reduction of total safety injection is ~3-5% in the range of 1200-600 psia important for this evaluation.

Large Break LOCA Impact

HHSI pump flow provides an insignificant proportion of the total SI flow during a large break accident where RCS pressure rapidly drops to near atmospheric. Accumulator and low head safety injection (RHR) flow are important for this postulated accident. For this reason, small changes in HHSI pump flow have a negligible effect on the large LOCA calculated peak clad temperature.

Small Break LOCA Impact

The effect of HHSI reduction on small break LOCA is determined via an analysis with the approved W small break LOCA evaluation model performed on the D. C. Cook Unit 1 plant, which was analyzed at 3411 MWt core power. The calculated PCT increase derived from this LOCA analysis is 86.1°F, calculated on the worst break size. The inclusion of this PCT increase effect to the base PCT of 1668°F (worst break size) for D. C. Cook Unit 2 yields a value well below the 10CFR50.46 limit of 2200°F and is less limiting than the current worst large break PCT.

The sensitivity of PCT due to small HHSI flow reductions developed with D. C. Cook Unit 1 is applicable and bounding for D. C. Cook Unit 2 for the following reasons:

1. The two plants' hydraulic characteristics are nearly identical. The only significant difference is Unit 1 has 15x15 fuel and Unit 2 has 17x17 fuel. But more importantly the difference in fuel assembly flow areas between the two designs is less than 0.3%.

2. The effect of reduced HHSI on the transient is hydraulic. Reduction in SI diminishes the effects of boiloff replenishing in the core. Thus, small reduction in downcomer level and core mixture height will result. This effect is well behaved and observed through small LOCA analyses performed for numerous plants studying SI effects.

3. The effect of a reduction in core mixture height increases the length of core uncovered and thus the enthalpy rise of the steam. The steam enthalpy at the uncovered elevations determines clad temperature since the transient is quasi-steady state during the clad heatup period.

4. The small LOCA analysis for Unit 1 was performed at 3411 MWt, similar to the Cook Unit 2 power. Therefore, the additional enthalpy rise will be calculated correctly.

5. The heat linear generation rate for Unit 1 is greater than Unit 2 due to fewer fuel rods. Therefore, the effect on PCT of reduced HHSI will be maximized.

6. Other conservatisms in the analysis exist. For example, the small LOCA analysis for Unit 2 assumed an FQ of 2.32 while the plant is limited in operation to 2.04 by large break considerations.

This evaluation has assessed the impact of reduced HHSI on the performance of the ECCS at the D. C. Cook Unit 2 plant. The reduced HHSI has a maximum impact of 86.1°F on peak clad temperature for a small LOCA. The inclusion of this PCT increase to the base small LOCA PCT of 1668°F for D. C. Cook Unit 2 yields a value well below the 10CFR50.46 limit of 2200°F and is less limiting than the current worst large break PCT.

TABLE 1

Comparison of Total Safety Injection
Flow Delivered to the RCS

(Includes Charging, HHSI and LHSI Where Applicable)

RCS Pressure (psia)	30 gpm Miniflow (lb/s)	60 gpm Miniflow (lb/s)
14.7	510.7	509.3
114.7	213.2	210.8
140.7	105.0	103.3
214.7	103.0	100.5
414.7	93.5	91.1
614.7	84.3	81.4
814.7	73.6	70.6
1014.7	61.9	59.0
1214.7	48.2	45.4
1314.7	39.5	36.6

APPENDIX OF ADDITIONAL

RESULTS FROM THE

D. C. COOK UNIT 1 REDUCED

(60 GPM MINIFLOW)

HHSI EVALUATION

D. C. COOK 1 REDUCED
HHSI SENSITIVITY

SMALL BREAK

TIME SEQUENCE OF EVENTS (SEC)

EVENT	TIME 4 INCH
START	0.0
REACTOR TRIP SIGNAL	17.5
TOP OF CORE UNCOVERY	413.0
ACCUMULATOR INJECTION BEGINS	800.0
PEAK CLAD TEMPERATURE OCCURS	823.3
TOP OF CORE COVERED	1310

D. C. COOK UNIT 1
REDUCED HHSI
SENSITIVITY

SMALL BREAK RESULTS

RESULTS		4 INCH
PEAK CLAD TEMPERATURE (^oF)		1716
PEAK CLAD TEMPERATURE LOCATION (FT)		11.75
LOCAL Zr/H_2O REACTION, MAXIMUM (%)		0.93
LOCAL Zr/H_2O LOCATION (FT)		11.75
TOTAL Zr/H_2O REACTION (%)		0.3
HOT ROD BURST TIME (SEC)		----
HOT ROD BURST LOCATION (FT)		----
CALCULATION		
NSSS Power MWt 102% of		3411
peak Linear Power kw/ft 102% of		15.50
Hot Rod Power Distribution (		*
Accumulator Water Volume, cu. ft.		950
Fuel region + cycle analyzed	Cycle	Region
UNIT 1	8	W FUEL

*SAME COOK UNIT 1 CYCLE 8 RELOAD
SMALL BK ANALYSIS

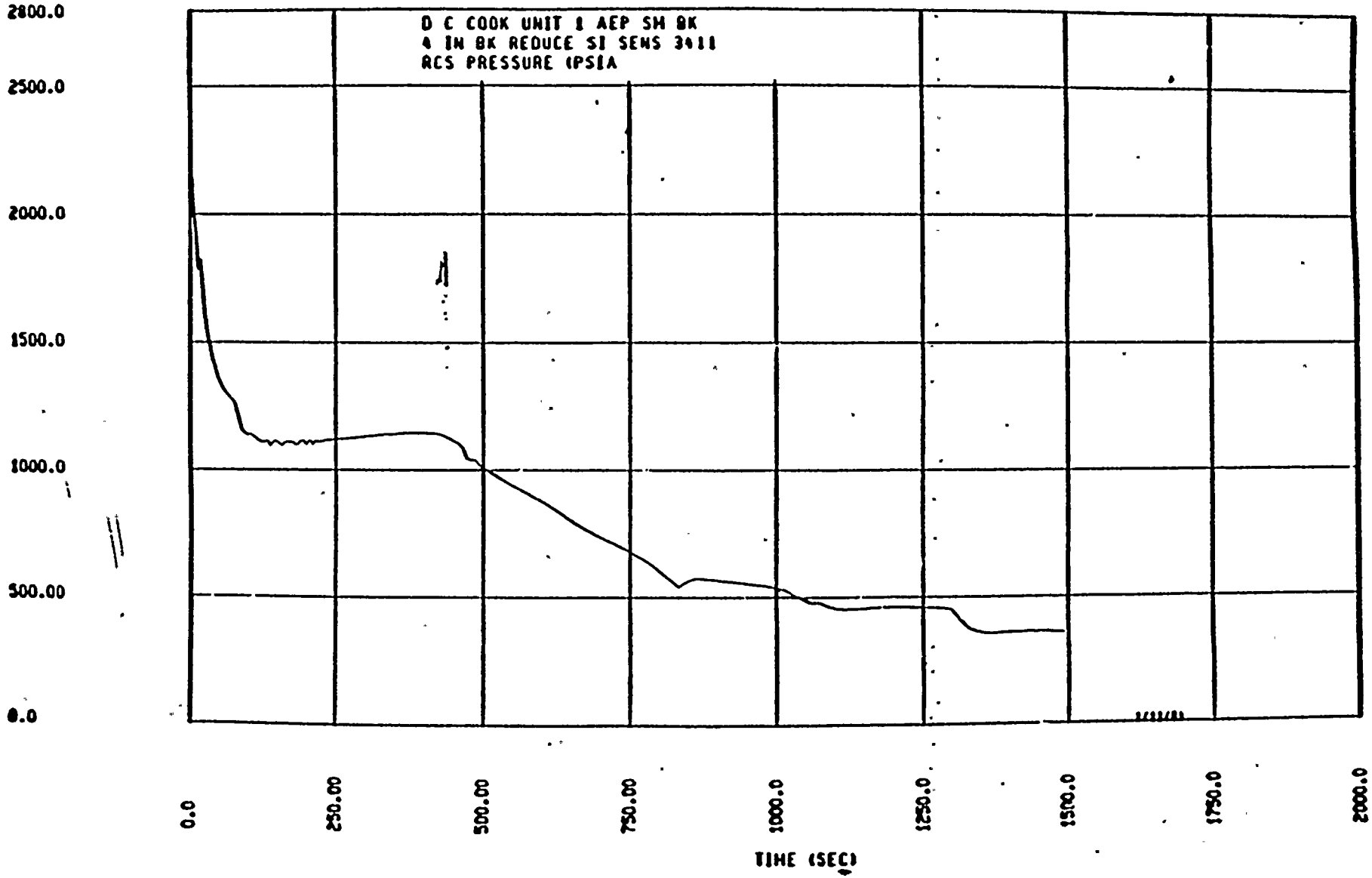

Fig. 1 RCS PRESSURE - 4IN DIA. CL BK

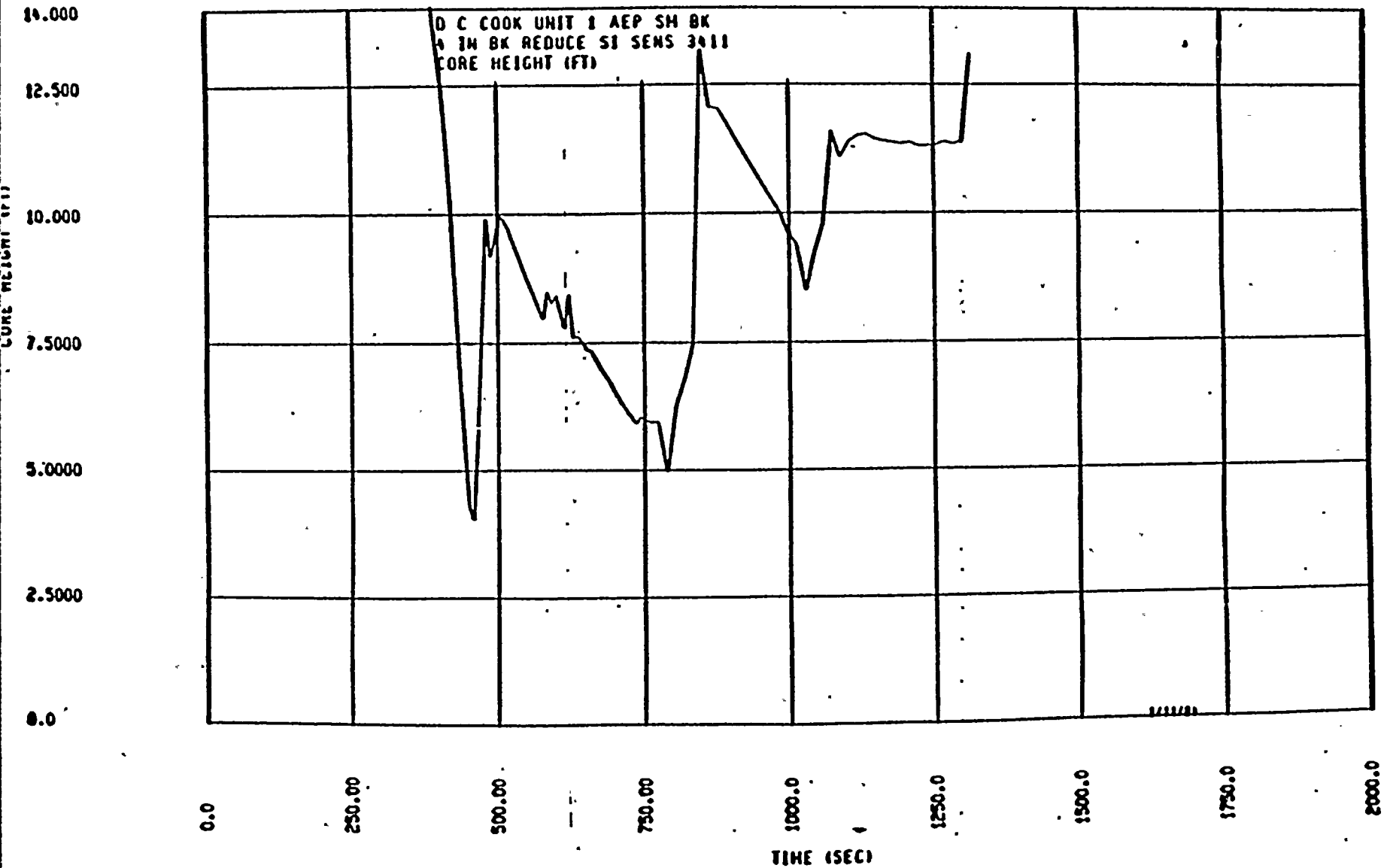

Fig. 2 CORE MIXTURE HEIGHT - 4IN DIA CL BK

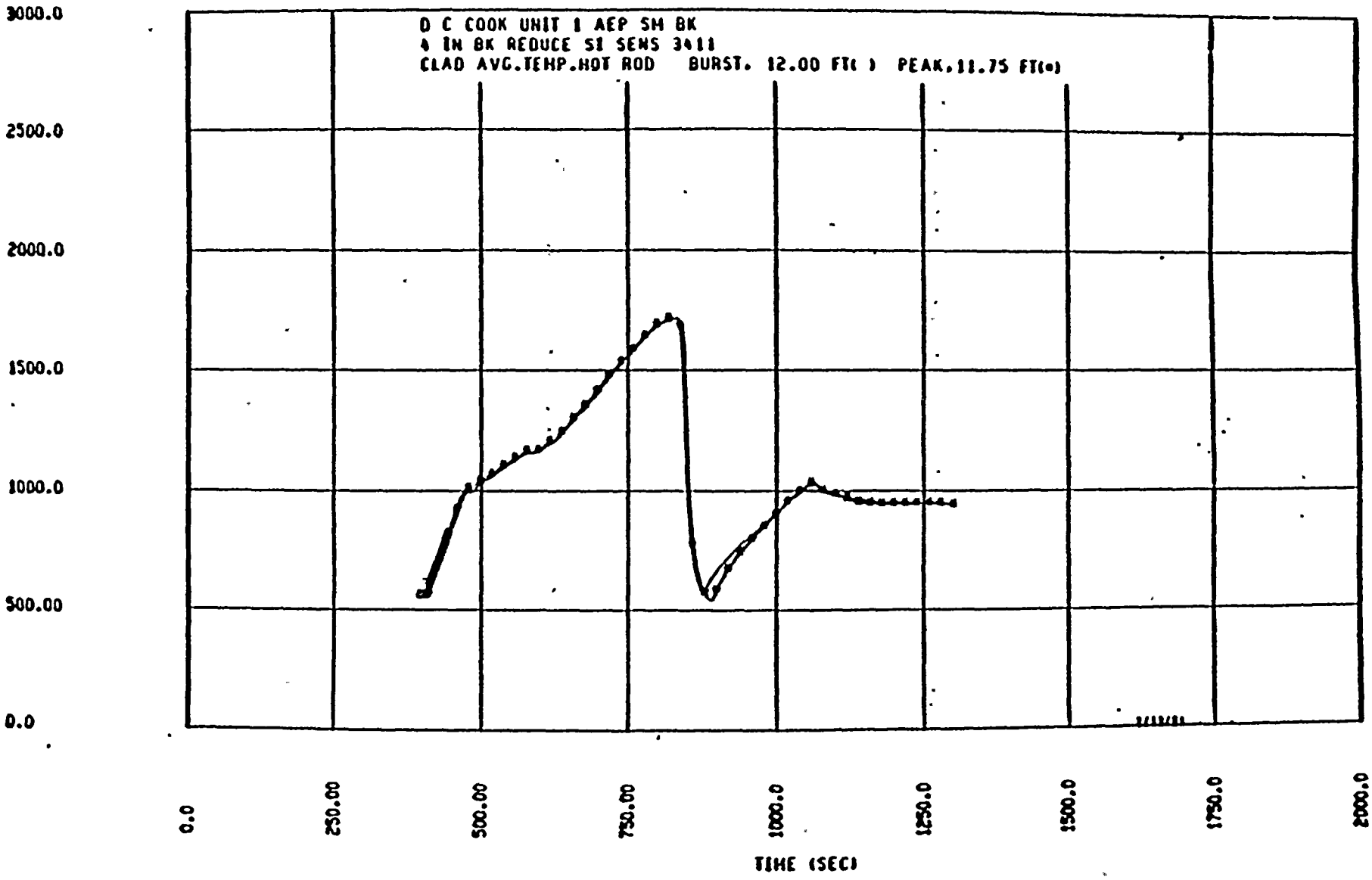

Fig. 3 HOT SPOT CLAD TEMPERATURE - 4IN BK

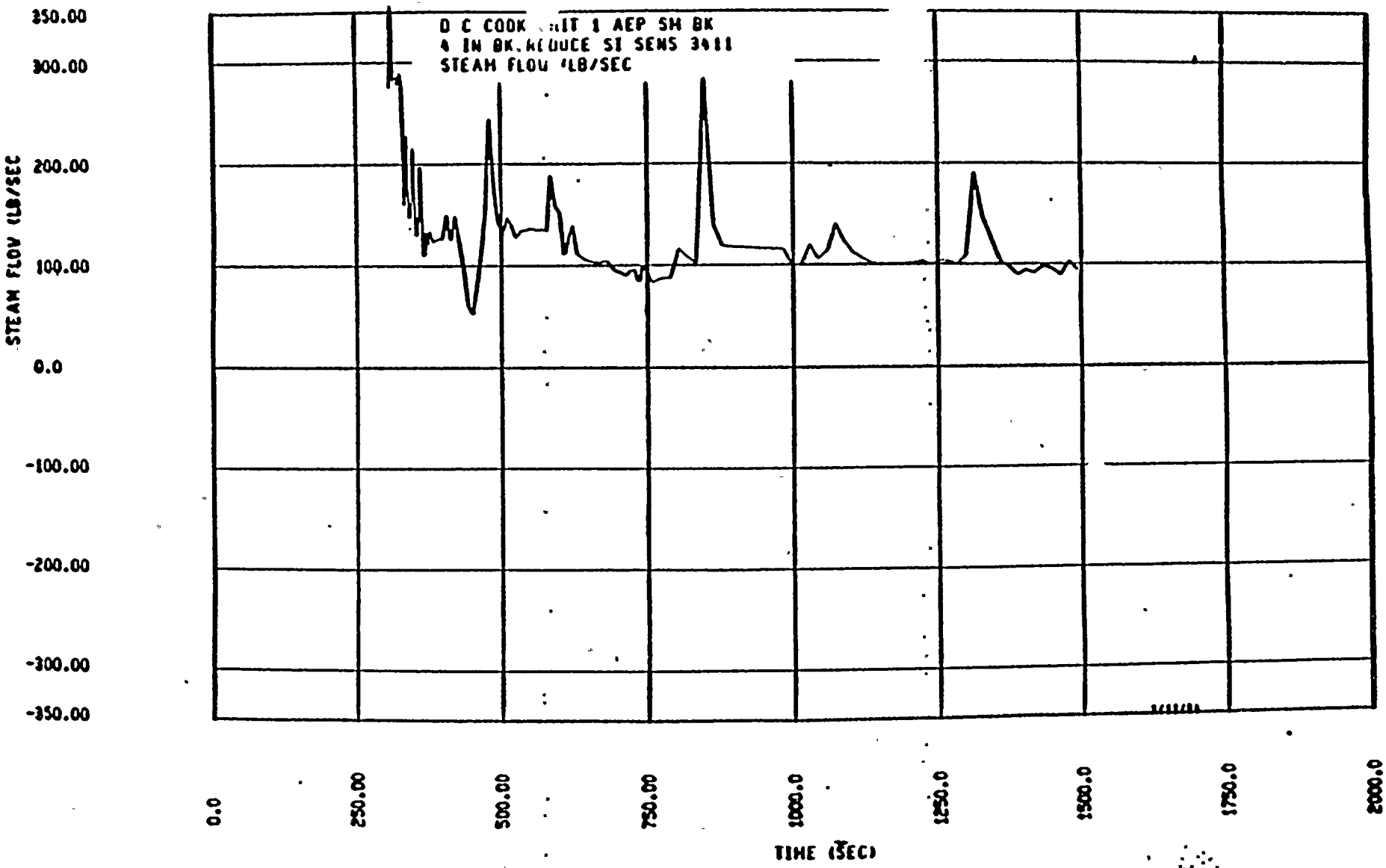

Fig. 4 CORE STEAM FLOW RATE 4IN BK