



Department of Energy  
Washington, D.C. 20545  
Docket No. 50-537  
HQ:S:82:117

OCT 26 1982

Mr. Paul S. Check, Director  
CRBR Program Office  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Check:

ADDITIONAL ITEMS FROM THE DECAY HEAT REMOVAL MEETING OF  
OCTOBER 20, 1982

The purpose of this letter is to submit additional items as agreed to  
in the October 20, 1982, meeting between the Nuclear Regulatory  
Commission and the Clinch River Breeder Reactor Plant Project.

Any questions regarding the information provided can be addressed to  
A. Meller (FTS 626-6355) or D. Florek (FTS 626-6185) of the Project  
Office Oak Ridge staff.

Sincerely,

John R. Longenecker  
Acting Director, Office of the  
Clinch River Breeder Reactor  
Plant Project  
Office of Nuclear Energy

Enclosure

cc: Service List  
Standard Distribution  
Licensing Distribution

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Response to Agreements and Commitments of  
October 20, 1982, Decay Heat Removal Meeting

- 1) Item The results of a delayed initiation and a single failure of the Direct Heat Removal Service were discussed.

Action A table of DHRS operating cases and sensitivities will be added to the docket by October 26, 1982, and included in a future PSAR update.

Response That table is provided as attachment 1 to this enclosure.

- 2) Item Pump Testing at DHRS Temperatures. The temperature testing experience and plans for the primary and EM pump were discussed.

Action The test experience and plans will be summarized for the EM pump and primary sodium pump and placed on the docket by October 26, 1982, and included in the PSAR in a future amendment.

Response This item concerned the capability of the EM pump and the primary sodium pump to operate at the temperature associated with DHRS operation. For the Na/NaK Electromagnetic pump, testing was performed on the prototype pump in a sodium loop in the Sodium Component Test Installation at the Energy Technology Engineering Center (ETEC) operated by Atomics International. One of the test series consisted of head-flow tests performed at a sodium temperature of 1130°F. A cavitation test, variable voltage tests, and head flow mapping tests were performed at 1130°F. Figure 1 shows the 1130°F Head-Flow Mapping Efficiency versus Sodium Flow Rate and summarizes the EM pump capability at 1130°F.

For the primary sodium pump, tests are to be performed on the prototype pump in a sodium loop in the Sodium Pump Test Facility at ETEC. One of the tests to be conducted involves a heat-up of the test loop sodium by loop heaters and pump power (with the pump on main motor flow) to 1100°F over a period of twelve hours. Once temperature has stabilized, the pump will be tripped to pony motor speed and operated on pony motor speed for four hours. Temperature will then be decreased to 1005°F over the next twelve hours.

These tests will demonstrate the ability of the EM pumps and the primary sodium pumps to operate at the temperatures associated with DHRS operation.

- 3) Item EM pump capability. The capability of the EM pump within the DHRS was discussed.

Action The results will be summarized and placed on the docket by October 26, 1982, and included in a future PSAR amendment.

Response This item concerned the capability of the EM pump to pump 600 gpm, based on test results, even though it is specified as a 400 gpm flat, linear induction, electro-magnetic pump. During the EM pump sodium test program noted in the previous item, head-flow mapping tests were performed at different sodium temperatures (1130°F, 800°F, 600°F, and 450°F) and varying voltages. Each of the test series at the four temperatures included flow rates of 600 gpm. Figures 1 through 4 plot the Head Flow Mapping Efficiency versus Sodium Flow Rate for the four temperatures and reflect the 600 gpm flow rate at each temperature. A review of those figures demonstrates the capability of the EM pump at 600 gpm. Additionally, a design limit test was performed to determine the amount of excess capacity available for emergency operation. As shown in Figures 5 and 6, a flow rate of 800 gpm is possible at the design limit.

DHRS OPERATING CASE(1)	PEAK TEMPERATURE	NUMBER OF PHTS LOOPS	NUMBER OF IHTS LOOPS	NUMBER OF DHRS TRAINS	CONSERVATIVE DECAY HEAT	EVST HEAT LOAD	NA FLOW GPM	NAK FLOW GPM
Design Case	~ 1120°F	3	0	2	Yes	Yes	560	800
Updated Design Case	~ 1052°F	3	0	2	Yes (3)	Yes	560	800
Single Failure Evaluation #1	~ 1055°F	2	2	1	Nominal Values Used	No	600	600
Single Failure Evaluation #2	~ 1160(2)	2	0	1	Yes (3)	No	600	600
Delayed Start Design Case (~ 45 minutes to DHRS operation)	~ 1078	3	0	2	Yes (3)	Yes	560	800

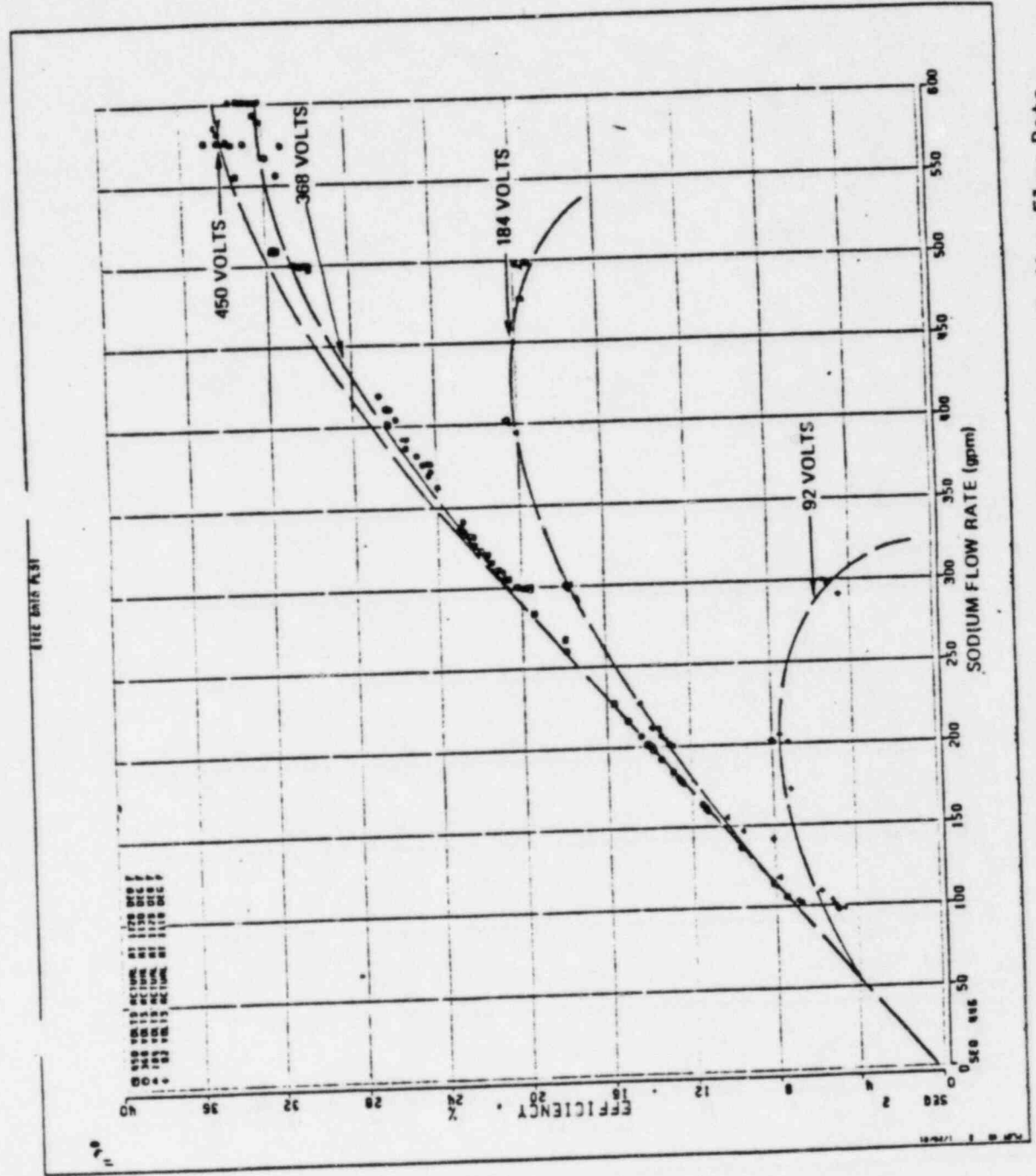
(1) Conservatism included in all cases: Shutdown at end of cycle at full power; no consideration of insulation losses; no consideration of SGS heat capacity.

(2) Exceeds present DHRS hot leg temperature limit of 1140°F.

(3) Decay heat values have been revised to reflect current conservative design values

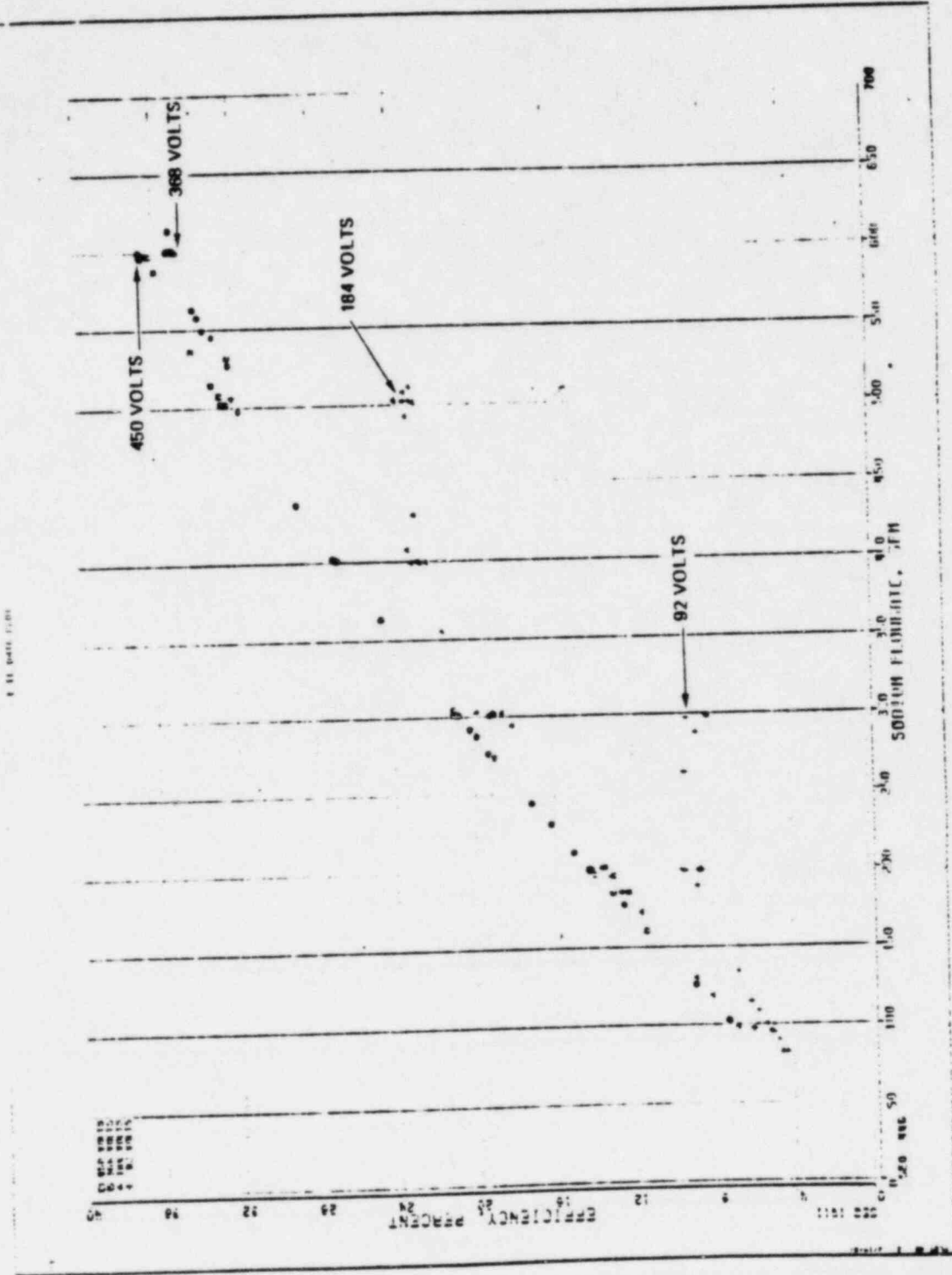
ATTACHMENT 1. DHRS Operating Cases and Sensitivity Evaluations

FIGURE 1



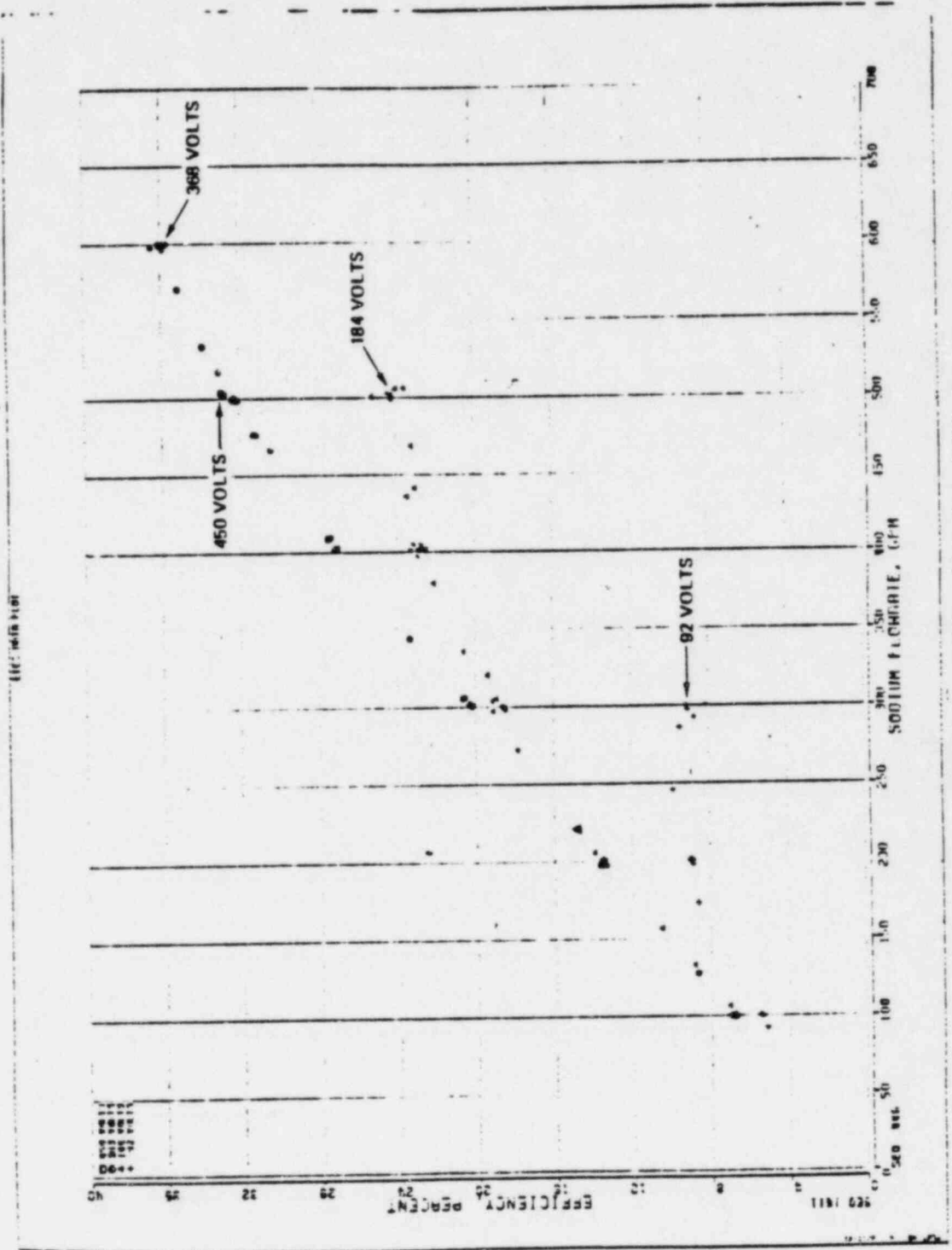
1130°F Head-Flow Mapping Efficiency versus Sodium Flow Rate

FIGURE 2



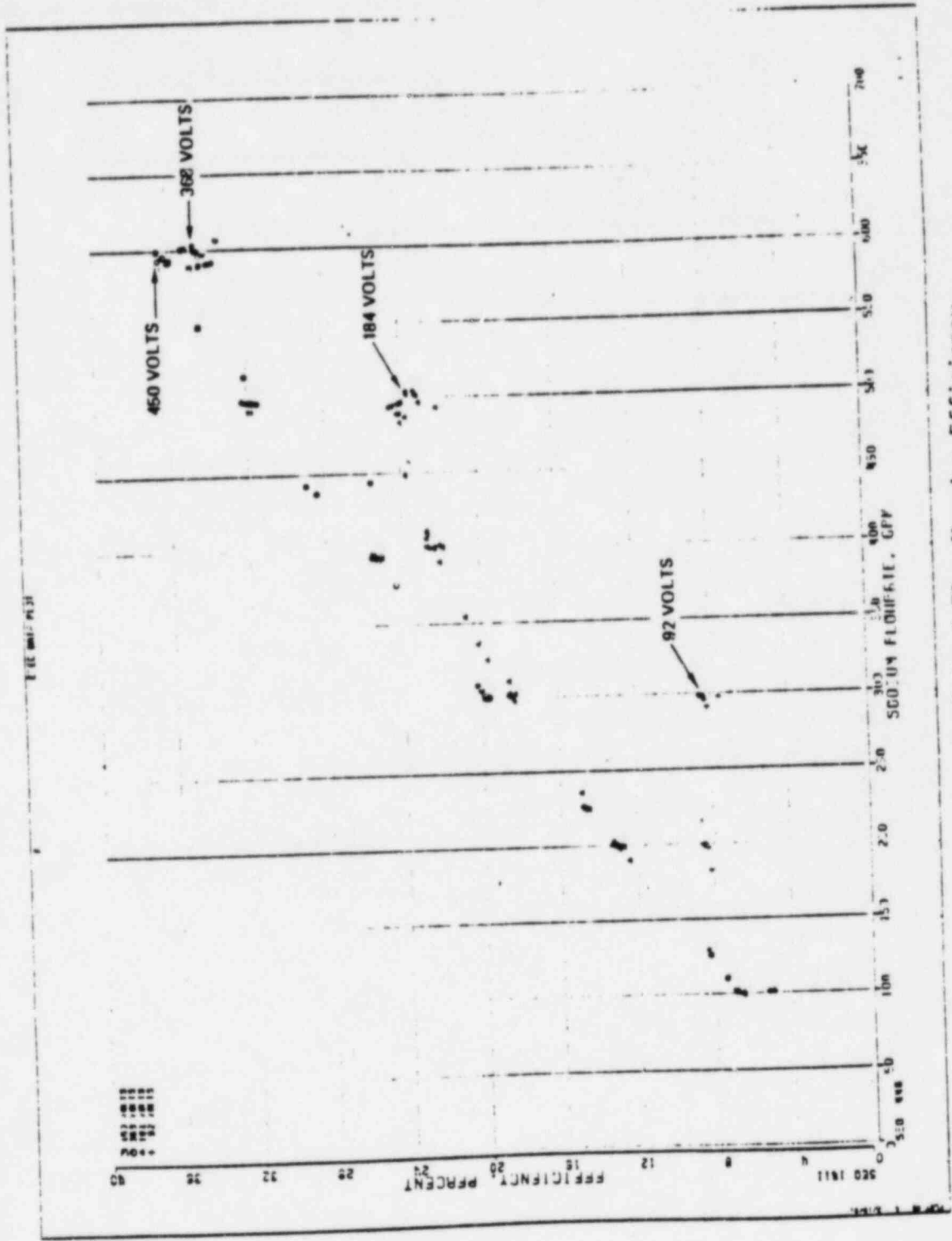
800°F Head-Flow Mapping Efficiency  
versus Sodium Flow Rate

FIGURE 3



600°F Head-Flow Mapping Efficiency versus Sodium Flow Rate

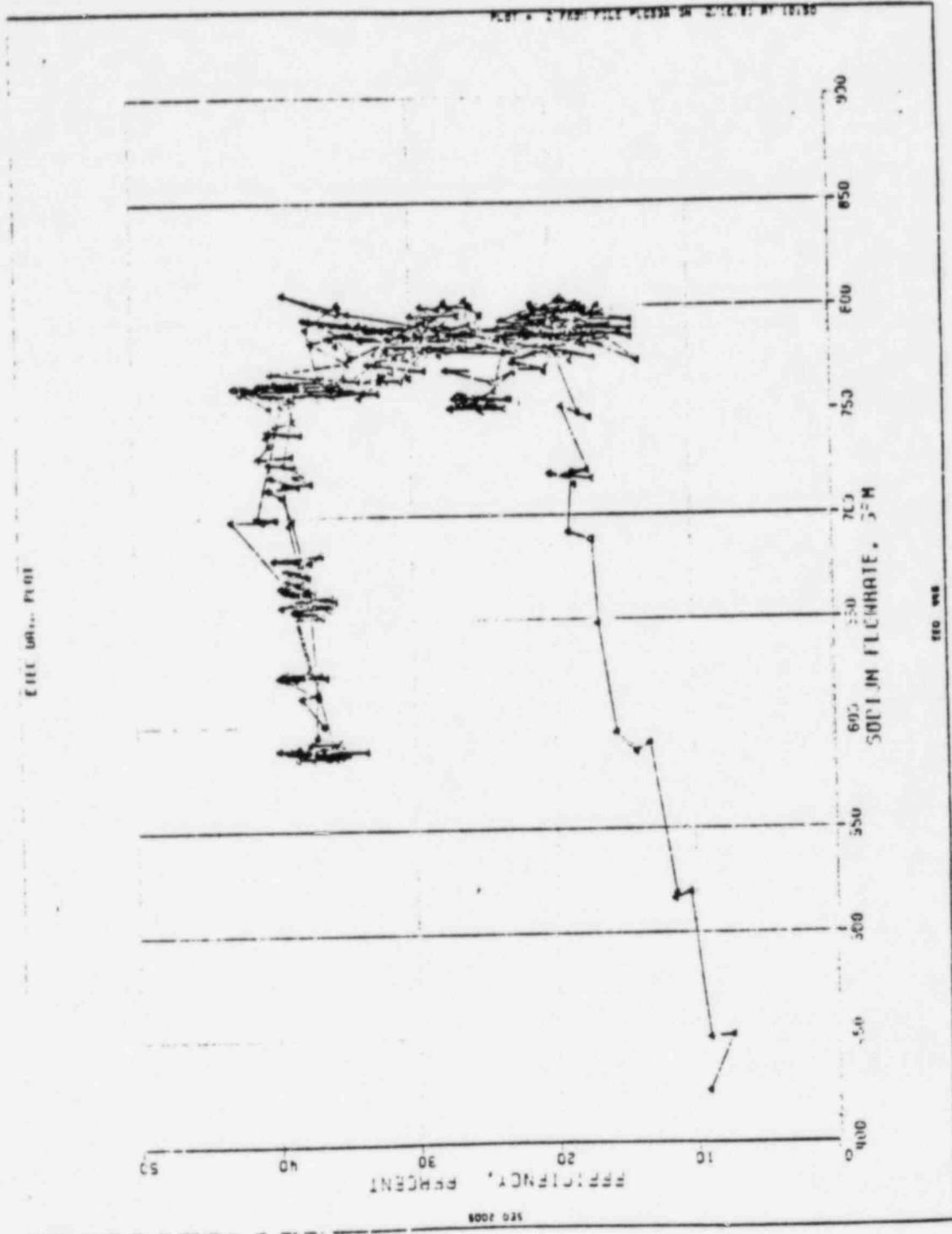
FIGURE 4



450°F Head-Flow Mapping Efficiency versus Sodium Flow Rate

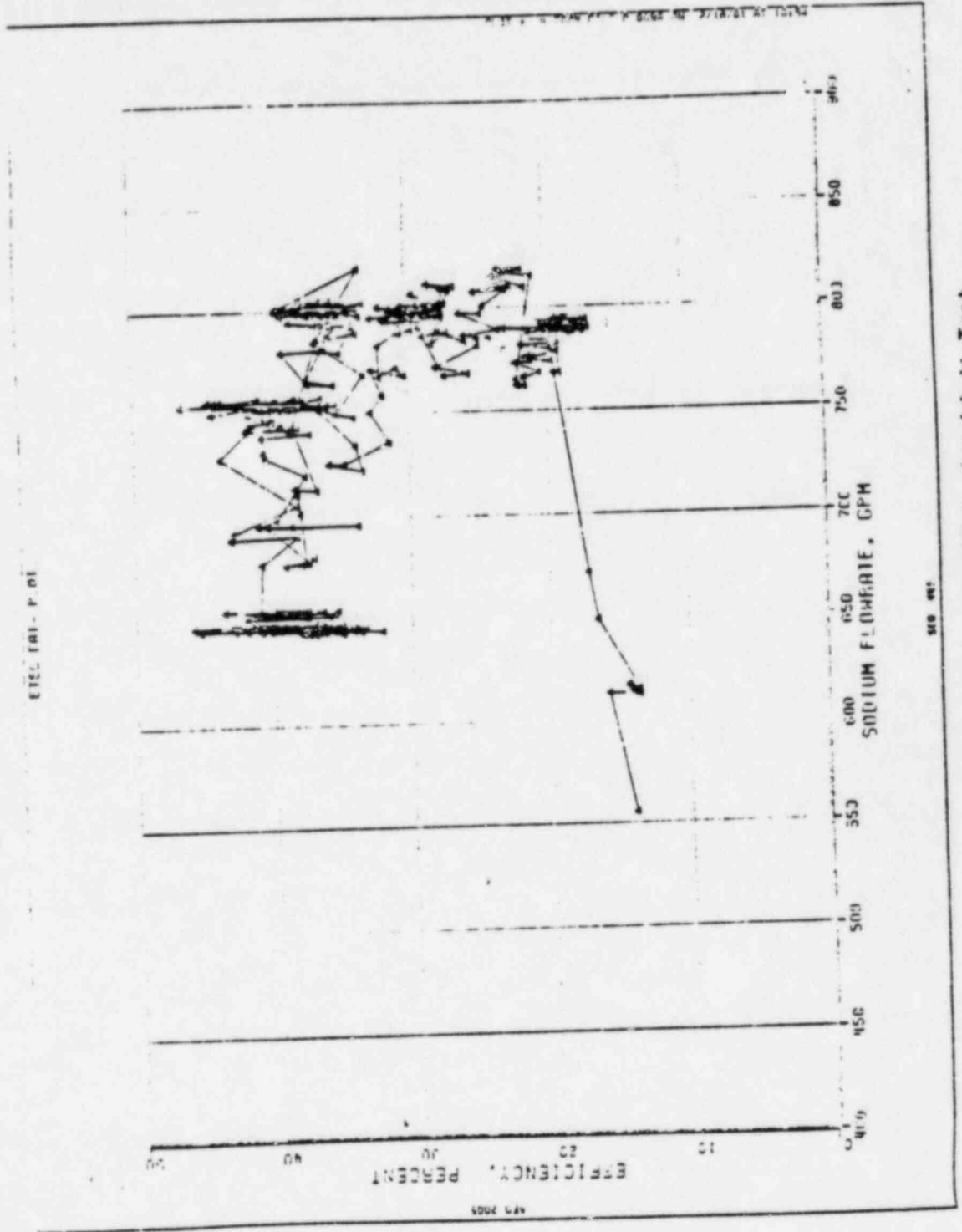


FIGURE 5



CRBR EM Pump - 450°F Design Limit Test,  
02/06/81, 1142 to 1258 hours

FIGURE 6



CRBR EM Pump - 600°F Design Limit Test,  
02/06/81, 1431 to 1530 hours