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FLOW CAPACITY TESTS AT 183-B AND
POSSIBLE MODIFICATIONS FOR INCREASED FLOW

by

L. B. BRINKMAN

April 2, 1962

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FLOW CAPACITY TESTS AT 183-B AND
POSSIBLE MODIFICATIONS FOR INCREASED FLOW

INTRODUCTION

The reactor flow at 105-B is presently being limited by the amount of water that can be pumped from the 183-B Building to the 190-B tanks. The pumping capacity of the 183-B system is several thousand gpm less than that of the other 183 systems. This is due mostly to the fact that the static head between the 183 clearwell and the 190 tank water surface at B Area is 6 to 8 feet greater than at D or F Area. At H Area the lines from 183 to 190 are much shorter.

In order to maintain the present reactor flow of 88,800 gpm, some of the filtered water must be used to supplement the process system for reactor cooling. This is accomplished by a 4" line from the filtered water header in the 190 Building to the No. 4 tank and also by cracking the limotorque valve in the tie line between the filtered water line and the process water line. Opening this valve a small amount allows a portion of the filtered water to flow into the process system through the tie-line just outside of the 183 Building. The amount of water used must be limited and carefully controlled so as to maintain adequate pressure in the filtered water system.

CONCLUSIONS

A modest increase in the amount of water available for the 190-B Annex pumps can be achieved by utilizing the existing currently unused portion of the condenser water line as a part of the process water system. The relatively inexpensive modifications consist of two cross connections between the process system piping and the condenser system piping.

DISCUSSION

In September of 1961, flow tests were conducted to determine the capacity of the 183-B pumping system without the benefit of the filtered water system. The limotorque valve and the valve in the 4" line to the No. 4 tank were closed, thereby limiting the process water to that supplied by the 183-B pumps. Steel tapes attached to the tank level targets enabled reading the tank levels to the nearest 1/8" at 10 minute intervals. The loss per minute in the total 190 tank water subtracted from the reactor flow and miscellaneous bearing cooling water gave the total water supplied by the 183-B pumps.

Tests were conducted for both a six pump and a five pump operation at 183-B. The results of the tests are shown on Figures 1 and 2. The five pump test duration was only 25 minutes because the tank levels dropped very rapidly and the test had to be terminated when the levels reached the 35 foot point. However, the data obtained appear to be

quite consistent. From the data obtained in the five pump and six pump tests, two points on the 183 system curve were established for the average 190 tank levels at 36 feet 6 inches approximately. The established system curve is shown in Figure 3. The test pump curves for both the five and six pump operations are slightly lower than the curves produced using the vendor's pump curves.

As can be seen from Figures 1 and 2, the pumping capacity of the 183 system varies inversely with the tank levels. The static head on the discharge side of the 183 pumps increases as the tank levels go higher. The tests indicate that the 183-B pumping capacity is limited to about 88,000 gpm with the average tank level at 36 feet 6 inches and to 87,000 gpm when the tank levels are at 39 feet 6 inches. Lowering the tank levels three feet increases the flow only 1000 gpm. Since the tank levels are now near the minimum level established by safe operating procedures⁽¹⁾, any appreciable increase in flow over the present limits must be achieved by modifications to the 183 system.

Some additional flow may be achieved by opening the two bypass lines around the 190 tanks. However, these lines now contain so much crud, especially in the valves, that a pipe cleaning project would probably be necessary before these bypass lines could be used to transport process water.

A modest increase in flow from 183-B could be achieved by utilizing the portion of the condenser water line between the 183 Building and the 190 Building for transferring process water. There is presently a 10-inch lateral to the 183-B steam turbines from the 36-inch main running to the 190 Building. Since B Area operates both the 183 and 190 turbines on a non-condensing basis, the portion of the condenser water line between the 183 Building and the 190 Building is not being used. Presently, the only use of the condenser water line is to supply raw water to the power house for sluicing ashes. A 14-inch lateral which takes off from the 36-inch condenser water main upstream and adjacent to the tee for the 10-inch line to the 183 Building is used for this purpose⁽²⁾. Minor modifications at the 183 Building and the 190 Building would enable the condenser water line to be used for transferring process water from the 183-B Building to the 190-B Annex suction header.

Outside of the 183 Building, the 10-inch condenser water line and the north 36-inch process water line are about three feet apart. These two lines could be connected with a 10-inch tie line and gate valve. The 10-inch condenser line inside the 183 Building would then be blanked off. Inside the 190 Building the 24-inch condenser line runs overhead above the process water piping downstream from the 190 tanks. A 12-inch tie line and gate valve would be installed between this condenser line and the north suction header running to the Annex Building.

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A portion of the water pumped from the 183 Building would then enter the condenser water line via the 10-inch tie line at 183, flow through the condenser line to the 190 Building, and then back into the process system. This system essentially would add a third process line, which would by-pass the 190 tanks. The total flow to the 190 Annex pumps should be increased in the order of 2000 to 2500 gpm above the 88,000 gpm.

This system would make it necessary to use process water for sluicing ashes from the power house. The amount of water used for sluicing, however, would not materially affect the amount of water available for reactor flow. Ash sluicing requires about 1500 gpm for about two hours and is usually done once a day in the normal winter weather. This amount of process water would reduce the potential reactor flow only about 125 gpm and the cost of chemicals should be less than \$500 per year. During the two-hour sluicing period, the water surface in the 190 tanks would drop about 1 foot and then be raised to original elevation during the next 22 hours.

In the event that it should be necessary or desirable to use the condenser water line again for its original purpose, closing the two gate valves in the tie lines would again separate the condenser water line from the process water line. The construction costs for installing these two tie lines is estimated to be in the neighborhood of \$10,000.

An alternate to using process water for sluicing ashes would be to install a valve in the main 36-inch line upstream from the tee to the power house and then construct a new line from the 36-inch main to the 14-inch line to the power house. This new line would tie into the 36-inch main upstream from the new valve and into the 14-inch line downstream from the existing valve in that line. The main line would also contain a new valve. Due to the configuration of pipes and anchors in this area, the construction of this new line would be quite difficult and expensive. It is not recommended because the small savings in process water would be marginal compared to the additional construction cost.

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183-B TO 190-B FLOW TEST
6 PUMP OPERATION
9-19-6

FIGURE 1

TOTAL FLOW - 1000 G.P.M.
88
87

AVERAGE PUMP DISCHARGE PRESSURE = 70.6 PSI
183-B CLEARWELL LEVEL = 7.2'

37 AVERAGE TANK LEVEL - FEET
38
39

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