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Filter Capacity Tests

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FROM

W. R. Corley

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FILTER CAPACITY TESTS

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I. INTRODUCTION

Increases in production rates in the 100 Areas have caused a demand for additional amounts of cooling water for process use. Consequently, continual efforts have been made to push the existing filter plants well beyond designed capacity. The latest and most successful effort was made at the 100-B Area filter plant during the spring of 1951.

II. SUMMARY

Tests at the 100-B Area indicate that the 100 Area filters can be operated safely at 3400 GPM per unit, or 13.3% beyond the designed capacity, during the period of most difficult water treatment (February-June). By extrapolation of the data to the most favorable water treatment periods (August-January), it is indicated that net water available for production use is approximately 5% above 3400 GPM.

Recommendations:

1. It is recommended that no additional filter plant capacity be installed in existing areas until anticipated water loads exceed 3400 GPM per filter basin unit.
2. It is further recommended that an investigation be made of the feasibility of changing water flows to the piles on a seasonal basis to take advantage of the fact that the season requiring the greatest theoretical quantity of water (because of high raw water temperatures) is also the season during which it is easiest to produce the greatest quantity of water.

III. DISCUSSION

A high flow filter test was started at the 100-B Area filter plant on February 2, 1951 by removing one filter basin from service and maintaining the normal plant load on the remaining eleven units. The immediate effect was, of course, a shortening of the filter runs as the load per unit was increased. This effect became most apparent during the month of April when the average filter runs were only 15 hours as contrasted with 22-29 hours in the other areas. Another noticeable effect was a pronounced decrease in the efficiency of settling and consequently in the turbidity of the water applied to the filters. This inefficiency of settling was compensated for in part by increasing the coagulant feed rate.

Water quality was not affected by the tests as far as could be determined by chemical analyses, pressure drop rates, and 107 Basin activity readings. To maintain normal high quality water, however, it is necessary to modify the operating procedures slightly as follows:

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III. DISCUSSION (Continued)

1. Sampling frequencies of the individual filters were increased as "iron breakthrough" was more sudden and more serious than at normal filtration rates.
2. "Recovery time" on a freshly washed filter had to be less than two hours, otherwise, excessive amounts of iron appeared in the clearwell. This "recovery time", of course, was decreased by increasing the coagulant dose.

The work load on the operating personnel was increased because of increases in the frequency of sampling and filter backwashing. However, after the operating procedures had been modified, the standard crew was able to operate the plant without additional help.

The months of February, March, April and May were all either the highest on record for river water turbidity or the second highest. Consequently, it is believed that it is very unlikely that the high flow rates would cause a breakdown in water quality under the worst conditions yet encountered at the Hanford Works. As the turbidity of the river water decreased during the latter part of June, 1951, it was possible to increase the length of the filter runs steadily throughout the month. If this data is extrapolated to August, the out of service time due to backwash will be about one-third that of the month of April. In addition the amount of backwash water will be about one-third that of the month of April. These two factors will enable the plant to produce a net of about 5% more water in August than in April.

The amount of water available for process use under the worst conditions in April, 1951 was 5000 GPM less than the amount flowing to the clearwells. This 5000 GPM was backwash water, miscellaneous area water, 105 miscellaneous water (loop, basin, etc). The present differential in the other 100 Areas will average between 3000-4000 GPM under normal conditions for the same purposes, and would very probably be close to 5000 GPM at the increased filter flow rates. Water use in the discharge basin in 105 would have to be limited to 2000 GPM except for short periods of an hour or so duration. Flows of 10,000 GPM or so as have been experienced at the 100 D-DR Areas would not be permissible without advance arrangements being made and the main flow of process water being reduced.

The capacity of each filter plant, based on the foregoing discussion, would be as follows:

<u>Area</u>	<u>183 Gross</u>	<u>Available for Process Use</u>
100-B	40,800	35,800
100-D	54,400	39,200*
100-DR	34,000	39,200*
100-F	40,800	35,800
100-H	54,400	49,400

* Can be varied $\pm$ 5000 GPM depending on amount being exported from 100-D to 100-DR.

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