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REPAIRS TO THE RETENTION BASINS (BLDGS. 107)
IN 100-B, 100-D, AND 100-F

This Document consists of

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INTRODUCTION

On August 28, 1945, in the course of special tests being run at the river bank in 100-F Area, a large marshy spot was noticed at the river's edge east of the F Area retention basin. An inspection was made immediately, and it was determined that an area 175 feet long and from 20 to 100 feet wide was being fed with water from approximately 30 springs. Measurements showed that these springs were warmer than river water and slightly radioactive, and it was suspected that they might be coming from the retention basin. A similar condition was found to exist at 100-D Area. No evidence of leakage could be found at 100-B Area.

On the basis of these findings, a program of leakage tests was initiated, and on September 12, 1945, repair work was started on the 100-F Area basin.

This report details the tests made, and the nature and extent of the repairs necessary to correct the existing conditions.

SUMMARY

Both sections of each basin were tested; Of the six sections tested, two were found to be leaking in excess of 100 G.P.M., the North basin at 100-B Area and the West basin at 100-F Area. These were repaired by caulking at 100-F and caulking and concrete repair at 100-B. The following table lists the leakage tests made before and after repairing the basins.

<u>AREA</u>	<u>SECTION</u>	<u>ORIGINAL LEAKAGE</u>	<u>LEAKAGE AFTER REPAIR</u>
B	North	535 G.P.M.	150 G.P.M.*
B	South	90 G.P.M.	Not repaired
D	North	45 G.P.M.	Not repaired
D	South	45 G.P.M.	Not repaired
F	East	70 G.P.M.	Not repaired
F	West	200 G.P.M.	60 G.P.M.

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 *Approximately 50 G.P.M. of this total was leaking directly into
 the discharge flume from the North section.

DISCUSSION

100-B Area

At the time leakage was found at D and F Area, an examination was made of the riverbank at 100-B Area, and no evidence of leakage from the retention basin could be found. However, leakage tests were made on both sections of the basin.

In December, a four day test indicated that the South section was leaking at the rate of $\frac{1}{4}$ inches per day (90 GPM). No action was taken toward repair of this section since the loss was considered to be normal.

On January 28, 1946, the North section of the retention basin was isolated and a leakage test indicated $2\frac{1}{4}$ inches loss per day (535 GPM). To further localize the source of leakage, the level was brought down below the level of the central discharge flume. At this point the indicated leakage was 315 GPM. This section was then pumped out completely. Radio-active algae were washed down from the walls with a fire hose, and when pumping was complete there was a one inch layer of sediment and algae left on the floor which gave contact readings in the order of 15 mrep/hr. It was necessary to erect coffer dams on either side of each expansion joint, and remove the water, sediment and algae to reduce the activity and dry out the repair area before repairs could be made. At this point weather conditions necessitated postponing further work.

In March, an inspection was made of the expansion and construction joints in the North basin. The caulking (mastic and cork) was removed from the expansion joints. A faulty section of concrete was found adjacent to the West expansion joint on the slope of the North wall. In April the concrete was repaired and the expansion joint was re-caulked using asphalt with a softening temperature of (150° - 170°). The section was refilled on April 10. Leakage tests made from April 12 to April 23 indicated a leakage rate of 180 G.P.M. of which approximately 80 G.P.M. was leaking directly from the basin into the discharge flume.

Repairs were made to the flume and the leakage was reduced to 150 G.P.M. of which, it was estimated, approximately 50 G.P.M. was leaking to the flume.

100-D Area

As a result of the condition found at 100-F Area, an inspection was made at 100-D Area, and a similar marshy spot was found between the basin and the riverbank. The temperature of the water was comparable to that of the water in the basin and the activity was in the order of 1.5×10^{-4} μ Ci/l. During the period from September until April, 1946, weekly tests were made to check any change in condition. These tests were abandoned when high water on the river inundated the marshy spot.

On October 25, 1945, the South section of the basin was isolated, and a leakage test was made which indicated a loss of 2 inches per day or 45 G.P.M. for a 30 day period. Since this loss was not considered to be excessive, this section was returned to service on November 26, 1945, at which time the North section was isolated. Measurements made from this date to December 21, 1945, indicated a similar loss in the North section. On this basis, no

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repairs were necessary and both sections were returned to service on December 21.

To prevent the spread of contaminated algae, the walls of the basin were washed down with a fire hose as the water level was lowered.

100-F Area

As previously stated in the introduction, the first indications of retention basin leakage were noticed at F Area on August 28, 1945. A large area, approximately 175 feet long and from 20 to 100 feet wide was affected and approximately 30 small springs could be detected. On September 13, 18, and 19 special samples were taken and tested for temperature and radio-activity. The temperature of the water was considerably higher than river temperature, and activities in the order of $5 \times 10^{-4} \mu\text{Ci/L}$ were experienced.

On October 6, the Site Survey Group of the E.I. Section was instructed to make weekly surveys of temperature and activity of the drainage water. They determined that samples taken near the spillway from the basin were comparable in temperature to retention basin water, although the activity was only 1% of the retention basin activity or approximately $6 \times 10^{-4} \mu\text{Ci/L}$.

Attempts made to study the source of this leakage by the addition of chemicals to the water between the retention basin and the 1904 building were unsuccessful.

On September 12, the East section of the 100-F Area basin was isolated and water level measurements were made. It was determined that the loss from this section was 3 inches per day or approximately 70 G.P.M. Since this leakage was thought to be about normal this section was returned to service on October 4, and the West section was isolated. The loss, over a 3 day period, was determined to be 9 inches per day or 200 G.P.M. It was decided to empty this section to determine the cause of leakage and repair it if possible.

On October 27, 1945, a start was made on pumping down the West section. It was found that deposits of sediment and algae on the walls were sufficiently active to create a radiation hazard, contact readings as high as 30 mrep/hr being found. To prevent this material from drying out and being wind-scattered, the walls were thoroughly washed down with a fire hose as the level receded.

Early in November the basin was emptied, and an inspection made which indicated that leakage was occurring in spots along the expansion and construction joints. The bottom of the basin was covered with approximately one inch of algae and sediment, which gave readings of 5 - 10 mrep/hr. At this point weather conditions made it necessary to discontinue further work.

On February 1, 1946, a hole was chipped in the basin floor near a suspected leak to check sub-soil conditions. These were found to be satisfactory. Re-caulking of all joints was also begun at this time. Squeegees were used to push back the algae and sediment from the repair work, and the joints were dried with a kerosene torch.

The method of repairing consisted of heating the original caulking material and flowing it back into the joint, and then filling any voids with molten asphalt (150° - 170° softening point). Repairs were completed on February 21, 1946.

On February 22, the basin was refilled, and a test made which indicated a daily loss of 2.7 inches (approx. 60 G.P.M.). On the basis of this test it was returned to service on February 26, 1946.

C. N. GROSS, SUPERINTENDENT
P DEPARTMENT

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