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PROJECT

DUH--10969

DE92 003705

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Date September 1, 1943

Subject Project 9536 - Sanford - Retention

Basin and Effluent Dilution

By H. Worthington

To J. H. Tilley

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<u>H. Worthington</u>	<u>9/2</u>		
<u>J. H. Tilley</u>	<u>9/3/43</u>		
<u>J. H. Tilley</u>	<u>9/3</u>		

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September 1, 1943

MEMORANDUM

TO: J. H. TILLEY

FROM: HOOD WORTHINGTON

PROJECT 9336 - HANFORD - RETENTION BASIN AND
EFFLUENT DILUTION

Our retention basin, as shown on such drawings as W 69713, W 69714 and W 70040, provides a full basin with a holding time in normal operation of 3.3 hours, and a second basin of equal capacity for emergency use. Our original purpose was to dilute the effluent from this basin with 10 times its own volume of river water before admitting it to a part of the river in which fish could swim into it. It now appears that the basin is large enough for us to dispense with any dilution system so far as radioactivity in the water is concerned. If the temperature is too high or the oxygen content too low, dilution may be required. This dilution, however, would be of a kind with which those skilled in the disposal of wastes are entirely familiar.

Referring to Wende's memorandum of July 15, 1943 to Babcock on "Activity in Cooling Water at Site W," it is found that if 1% coating failure occurs (in regions of average activity), then the water from a retention basin through which it advances in a plane front (i.e., the water velocity is uniform throughout the cross-section of the basin) will have an activity of 8.5×10^{-6} r/hr. at 1 cm from activity in 1 cc due to fission recoil, and 2.8×10^{-5} due to metal solution. There is some question as to both of these figures. The Metallurgical Laboratory has used a figure 13 times as high for fission recoil. Applying this factor, we arrive at 1.1×10^{-4} units from fission recoil. The figure for metal solution is now believed to be about one third that given by Wende, or 9×10^{-6} units.

The most unfavorable of these numbers is 1.1×10^{-4} units, which is 10% more than that required to give 0.1r/24 hrs. to a fish. Such a dosage of radiation is not excessive for a man, but it is not known what a fish can stand. We do know, however, that 1% coating failure is excessively high for continued operation.

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It is proposed that we take the position that the seating failure for continued operation will be reduced by a factor adequate both to compensate for the non-uniform velocity profile in the basin mentioned above, and to reduce the exposure of fish to any reasonable figure, such as 0.01r/24 hr., or even 0.001r/24 hr. It is then consistent with this position to require only such dilution as is necessary to take care of the lack of oxygen in the water, or of its temperature.

JW

BW:fw

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