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Date 9/9/44

Subject Review of Water Supply, Induced Activities, Water Monitoring in 100-B

To H. M. Parker

From Jane H. Hall

Cop. No. [REDACTED]

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September 9, 1944

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 KANSAS CITY, MO.

Review of water supply, induced activities, and retention monitoring in 100 g area

1. Water Supply

The water is brought from the river, pump house to a ten-million-gallon reservoir, from there to the filter plant where chemicals are added to precipitate foreign matter, prevent corrosion, etc. 2 ppm of chlorine, about 7 ppm of sodium chlorate, and 40 ppm of sodium silicate are added. These chemicals are the only ones added which will affect the activities measured in the water during pipe operation. From the filter plant, the water goes to the generators, to the pile, and from there to the retention basin. The basin has a capacity of 7.2 million gallons and receives a water flow of 30,000 gallons per minute. The hold-up time is thus 4 hours.

II. Induced Activities

The principal activities produced in the water supply are as follows:

Location	Half-life	Type of Radiation	Intensity
Old (n.p.) 16	7 sec.	-	4 mev
Old (n.p.) 19	11 sec.	-	1
Old (n.p.) 22	2.4 min.	-	3.3
Al 27 (n.p.) 23	"	-	2.3
Al 27 (n.p.) 27	40 min.	-	1.0
Na 23 (n.p.) 24	15 hours	-	0.6, 0.8, 1.0, 1.1
Al 27 (n.p.) 24	"	-	1.0, 2.0

(The Na²⁴ activity is due primarily to the sodium silicate added to the water; the Al²⁷ to the Al²⁷.)

The activities which will be of concern to the health group are: Al²⁷ at the entrance of the retention basin and Na²⁴ in the water discharged to the river. The Al²⁷ activity due to beta and gamma rays has been calculated by Woods to be 340 μ R in the water at the entrance of the basin and 175 μ R to a person ingesting 100 g of water.

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to the surface of the water. Because of the short half-life, it has decayed to a very low value by the time it leaves the basin.

The activity due to Ra^{226} is masked by the Al^{28} at the entrance to the basin, but in the exit stream it is about 8 $\frac{\mu\text{Ci}}{\text{liter}}$. Consequently, the water leaving the basin needs only to be diluted to twice the volume to reach the fish tolerance level.

III Coating Failure

It is very difficult to predict the effect of a coating failure upon the activity in the retention basin. Presumably, Mr. Gault will be able to detect a break of the order from 30 to 40 mm² when the power is 50 horsepower. In the event of a ring failure the pile will be shut down and within an hour the tube containing the faulty ring will be removed. Experiments are being conducted at Clinton now which may help in predicting the increase of activity in the water due to a coating failure.

IV Monitoring Instruments

Plans call for an ion chamber at the entrance of the retention basin and a Ge tube and counting rate meter at the exit. The ion chamber will record in the elevator control room in 105.

V Tentative Tests

Pump tests will be started Sept. 16. In connection with this test to determine the time for the water to go through the entire water system, it might be of value to have a member of the health group present at this test. The Technical Department has also scheduled production test # 105-247 (Claus to Alford, 6-1-44) on the activity of pile discharges. Active samples of water from discharge face, retention basin, and other points will be analyzed for amount and type of radioactivity. The information resulting from this test should be sent to the Health Department.

John B. Hall

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