ER ID 06203

T[illegible]104

SECRET

SECURITY INFORMATION

(3)

This Document Consists of 17 Pages
No. 3 of 7 Copies, Series A

COPRECIPITATION METHODS FOR DECONTAMINATING LIQUID RADIOACTIVE WASTES

The papers presented in this document were compiled by F. C. Mead, Jr. of Mound Laboratory and J. F. Newell of Los Alamos Field Office from work performed by the waste disposal groups at the two installations.

UNCLASSIFIED

"This material contains information affecting the national defense of the United States within the meaning of the espionage laws, Title 18, U.S.C., Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law."

Best Available Copy

14397

Received by ER-RPF
JUL 27 1992

per liter (6.3×10^{-3} μc/cc). The volume of this waste is small, about 3,000 gallons per month, however, the citrate concentration interferes with carrier precipitation procedures.

Laboratory work and pilot plant studies indicate that the citrate can be oxidized biochemically with decontamination of the resulting supernatant by the usual coprecipitation method.

The experimental data show that 100 gallons per day of the citrate waste can be fed to an activated sludge aerator volume of 1,000 gallons, producing a final effluent from the settling tank containing about 100 ppm of citrate. In addition to the destruction of citrate, the activated sludge also removes a considerable amount of plutonium. The activity removal, however, is considered as incidental to the process because the effluent is discharged to the coprecipitation waste treatment plant. The remaining 100 ppm of citrate will be diluted sufficiently with the rest of the waste to eliminate interference.

The estimated cost of the citrate reduction plant is $3,000. Operation labor has been included in the estimated cost for operation of DIW plant.

Laundry Wastes

Laundering of contaminated clothing produces a waste containing a low level of activity in addition to the soaps, detergents and ordinary soil common to laundry practice. Plutonium is the predominant radioactive material present in the laundry wastes at Los Alamos, averaging about 1,500 C/h/L (1.35×10^{-6} μc/cc). Total solids average about 750 ppm and biochemical oxygen demand about 500 ppm. No synthetic detergents are used in the laundering operations

since it has been determined that ordinary soaps will adequately decontaminate the clothing.

About 5.4 gallons of waste is produced per pound of clothing laundered. An average of 3.75 pounds of clothing per worker per day is laundered for all personnel requiring protective clothing. Thus, the average volume of laundry waste is about 20 gallons per worker per day. The same worker will produce about 30 gallons of sanitary sewage per day.

Three approaches have been investigated for decontamination of the laundry wastes:

1. Biological treatment of the straight laundry waste.
2. Chemical treatment of the straight laundry waste.
3. Biological treatment of the laundry waste with sewage.

Biological treatment with trickling filters and chemical treatment studies of the straight laundry wastes were performed when laundering was accomplished with synthetic detergents such as Igepol and Versene as well as with commercial grade soaps. With the presence of the synthetic detergents it was necessary to (1) apply the waste at a very low rate (not to exceed 6 gal/sq. ft. of filter area/day), (2) provide a two-stage trickling filter system, (3) provide high recirculation rates (20 to 1) over each filter, (4) provide supplementary nitrogen and phosphorus in the waste, and (5) maintain temperatures in the filters above 60 degrees Fahrenheit. It should be noted that the 6 gallons per square foot of filter area per day is based upon application of raw laundry waste to the first stage filter without regard to the recirculation. This process produced very little sludge, less than 10 gallons