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Development Department

April 18, 1966

MOUND LABORATORY-MONSANTO
CENTRAL FILE NO. 66-4-504

Isotope Recovery and Purification
Operations Quarterly Report
January 1. to March 31, 1966

- 1A - T. B. Rhinehammer
- 2A - D. L. Scott
- 3A - L. V. Jones
- 4A - N. E. Rogers
- 5A - D. R. Spangler
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Isotope Recovery

During the report period, January 1, to April 1, 1966, 27.78 grams of tritium (decayed to 4-1-66) were recovered from 844 liters of contaminated gases from T-building storage. Table I summarizes the work during this quarter.

The primary interest for the past eight months has been to reduce the amount of tritium-containing material stored in the Technical Building. To date, all of the gaseous material has been processed, leaving only salt and low-level residues in storage. During the next quarter salt and low-level residues will be unpackaged and the amount of tritium evaluated calorimetrically. If the amount of tritium in a particular batch is above AEC burial limits, the material will be processed; otherwise, it will be buried without further recovery.

Isotope Separation

Construction of the re-vamped thermal diffusion facility was completed on March 12, 1966. Included was the fabrication and installation of a new Mound Laboratory designed column to replace a column of Savannah River Plant design which had been found to be badly out of alignment.

The two original Mound columns required cleaning and re-sealing of water-jacket "O" ring seals.

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A new electrical lead-in and gas seal had to be made for the top of the thermal diffusion column newly obtained from Savannah River Plant. The seal on the column as received was found to be defective.

The tungsten weights retained from the three previously installed columns had to be shortened to fit the new mercury wells.

Depleted uranium was charged into the three chemical beds. In two of the three uranium beds leaks occurred past the copper gaskets used as seals. It was discovered that the knife-edges on the body and lid of the uranium bed were not correctly machined. It was necessary to re-machine them.

The new piping was flushed with trichloroethylene to remove any foreign matter, such as solder flux and then checked for leaks. The three vacuum manifolds proved to be leak-tight. The new process manifolds and piping were checked under helium pressure with a mass spectrometer leak detector. Argon spiked with tritium was used to pressurize the system to about ten pounds per square inch gauge pressure. Then the Kanne health physics monitoring system was used to locate minute leaks. By this procedure, ten leaks in heliarc welds were located and repaired that were not detected by normal helium leak detection equipment.

The newly installed all-metal valves gave some concern until it was discovered that they would shut off satisfactorily if dirt was kept out of their seats. Additional flushing and cleaning was necessary for problem valves.

Before full scale operation can begin various components such as pumps and control equipment must be checked individually. Volume measurement of tanks must be taken.

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Finally the complete system must be operated using an inert gas to determine separation parameters of the control system. It is expected that this will be complete by the end of June 1966.

Effluent Recovery System

The Effluent Recovery System is currently collecting contaminated waste gases at an average rate of about 0.03 cubic meters per minute. The average concentration of collected tritium gases as measured by an ionization chamber indicates that about 15,000 curies are received each month. The Effluent Recovery System is routinely removing 95 per cent of the tritium in the collected waste gas before it is exhausted to the atmosphere.

Additional difficulties have been caused by chloride corrosion. Soda-lime/charcoal beds have been installed after each Hopcalite bed to adsorb all halogen acids. This should eliminate future corrosion problems.

Original Signed By
J. P. Highland for

D. R. Spangler

DRS/zgb

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T. B. Rhinehammer

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TABLE I

Tritium Recovery from Wastes

	<u>January</u>	<u>February</u>	<u>March</u>	<u>Total</u>
Salt Batches Reacted	0	0	0	0
Total Weight of Salt Loaded (gms)	0	0	0	0
Total Tritium Loaded as Salt (gms)	0	0	0	0
Total Tritium in Salt Residues After Reaction (gms)	0	0	0	0
Volume of Contaminated Gas Processed in Liters (STP)	118.	464.	262.	844.
Total Tritium in Contaminated Gases (gms)	3.49 1-1-66	14.75 2-1-66	10.14 3-1-66	28.14 4-1-66
Per cent of Tritium Recovered from Salt and Gas	98.0	98.8	98.9	98.7
Total Volume of Pure Hydrogen Isotopes from Salt and Gas to Thermal Diffusion Column Feed Tanks, in Liters (STP)	87.	401.	148.	636.
Total Tritium from Salt and Gas to Thermal Diffusion Column Feed Tanks (gms)	3.42 1-1-66	14.57 2-1-66	10.03 3-1-66	27.78 4-1-66

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