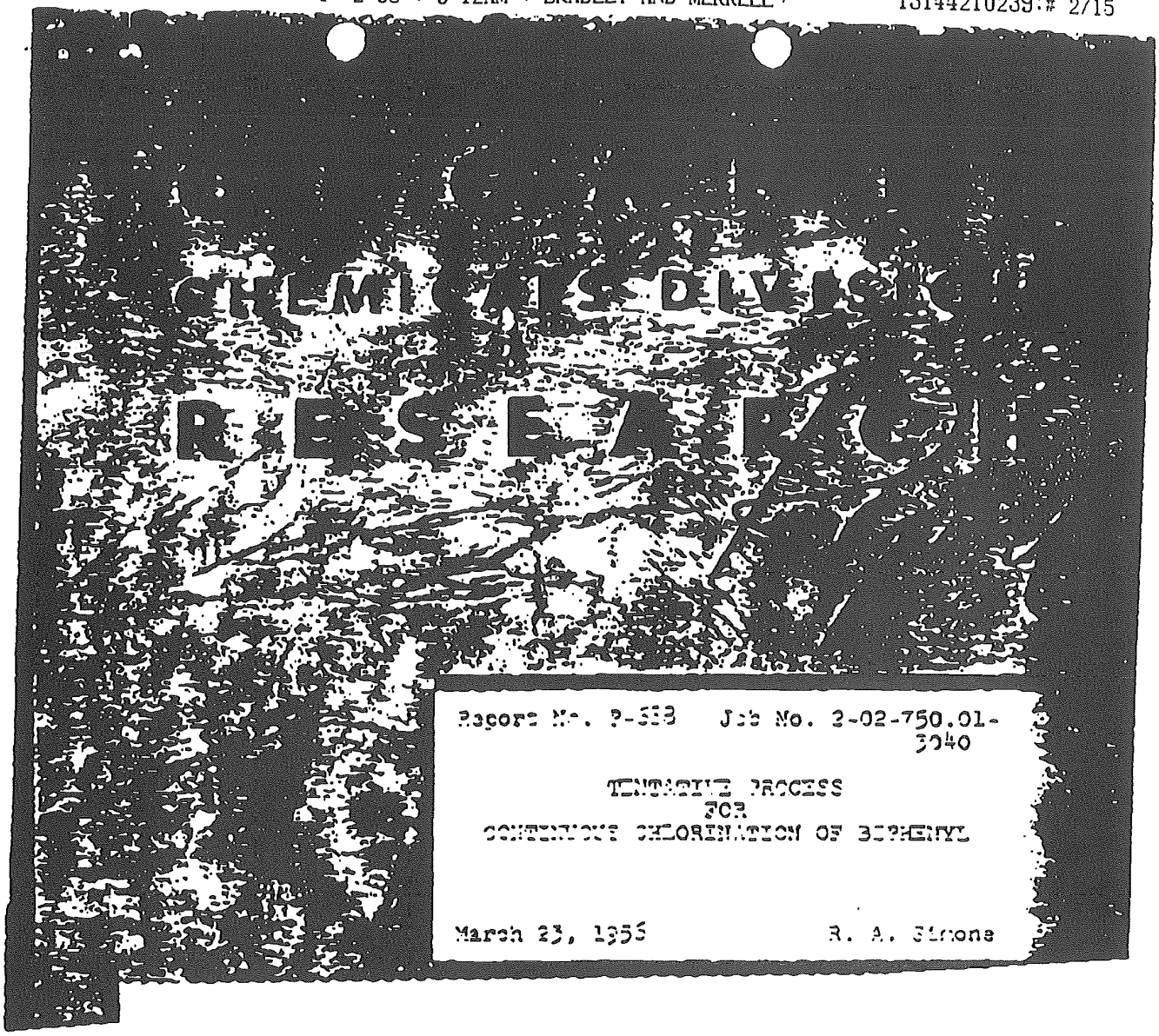

Report No. P-313 Job No. 3-02-750.01-3040

TENTATIVE PROCESS
FOR
CONTINUOUS CHLORINATION OF BIPHENYL

March 23, 1955 R. A. Simone

STR 005253

PLAINTIFF'S EXHIBIT 437

WATER_PCB-SD0000025969

9. Anniston Plant
Mfg. Dept.

St. Louis Research Report No. P-688

March 23, 1956

SAFETY REVIEW COMMITTEE
APPROVED BY APPROVED

TENTATIVE PROCESS FOR CONTINUOUS CHLORINATION OF BIPHENYL

Job No. 2-02-750.01-3040

Monsanto Chemical Company
Organic Chemicals Division
St. Louis Research Department

Work done by:
A. M. Ellenburg
R. A. Simone

Written by:
R. A. Simone

STR 005254

WATER_PCB-SD0000025970

from Aroclor 1160 to 1142 or 1148 were required, the third stage would also have to be drained. An alternative when such a shift is necessary would be to chlorinate the third stage batchwise to Aroclor 1160 and drain the reactor. The overflow should be closed during the batch chlorination to avoid overflow due to molar expansion.

The product from the fourth stage should not be considered truly representative of a continuous operation until at least 3500 gallons have been discharged. The intermediate material will be partially composed of varying degrees of batch material.

MATERIAL SPECIFICATIONS, ANALYTICAL METHODS

The raw, crude and finished material specifications are the same as those given by present product specifications.

The analytical methods for finished Aroclors are the same presently used on present production. In addition, infrared spectra of 10% carbon disulfide solutions of finished Aroclors are to be run by the St. Louis Research Department during the initial continuous production of each product or whenever sojourn time for any Aroclor is initially changed.

TOXICITY AND HAZARDS

Chlorine - Chlorine is an extremely toxic gas. The allowable concentration for an eight hour day is reported to be from 0.35 to 2 parts per million. High concentrations causes pneumonitis and edema of the lungs. An exposure of 1000 ppm is rapidly fatal. However, sufficient warning of its presence is given since the gas is detectable by odor at a concentration of 3.5 ppm, and 15.1 ppm gives throat irritation. Respiratory equipment should be available to those working on chlorination equipment.

Reference: Sax, N. I., "Handbook of Dangerous Chemicals", Rheinhold Publishing Company, New York, 1951, p. 93.

Biphenyl - Large concentration of biphenyl vapors causes intoxication. Respiratory equipment should be worn when working in contact with its vapors. The material is flammable and should be kept away from areas of acute fire hazard.

Reference: Opus Cit., p. 151.

Chlorinated Biphenyl (Aroclors) - Aroclors can give rise to dermatitis when contacted with the skin. Inhalation of vapors is usually followed by systemic poisoning. The liver is affected by serious exposure to vapors. Toxicity increases with increasing degree of chlorination. The proper protective clothing should be worn when handling Aroclors. Respiratory equipment should be used when vapor contact is anticipated.

WATER_PCB-SD0000025971

6.

Reference: Opus Cit., p. 92

These materials have been handled for many years in Monsanto so no difficulty is expected in the operation of this process.

R. A. Simone

Approved: A. M. Ellenburg

dm
3-28-56

STR 005256

WATER_PCB-SD0000025972