THE DOW CHEMICAL COMPANY

MIDLAND DIVISION
MIDLAND, MICHIGAN 48640
P. O. Box 1706

February 24, 1970

FEB 26

Dr. Matthew Meselson
Harvard University
16 Divinity Avenue
Cambridge, Massachusetts 02138

Dear Dr. Meselson:

We have your letter inquiring about the composition of agents Orange and White. The information given in the Midwest Research Institute report, entitled, "Assessment of Ecological Effects of Extensive or Repeated Use of Herbicides: Final Report", gives a description of these agents. A copy of p. 119 from this report is enclosed. A somewhat similar statement of composition is given in Dr. Fred Tschirley's article in SCIENCE, 21 February 1969. These composition figures cover the government requirements. The actual specifications provide a slight range to cover variations in manufacturing and analyses.

There appears to be a slight misprint in the Midwest Research report in the column titled "Lb/Gal AE for Orange", as the military specifications are based on a 50-50% by volume mixture of the technical n-butyl esters of 2,4-D and 2,4,5-T. Based on the specifications of The Dow Chemical Company for the esters this is equivalent to 4.4 lb acid equivalent of 2,4,5-T as the n-butyl ester instead of the 3.7 as shown, and 4.1 lb acid equivalent of 2,4-D as the n-butyl ester.

The manufacturing specification followed by The Dow Chemical Company for the manufacture of the n-butyl ester of 2,4-D is 98.8%. The specification for the n-butyl ester of 2,4,5-T is 97.5%. These specifications are based on a method which determine ester by saponification and back titration.

The impurity that has received attention is 2,3,7,8-tetrachlorodibenzo-p-dioxin. The process employed by The Dow Chemical Company in the manufacture of 2,4,5-T is designed to eliminate this and related compounds

from 2, 4, 5-T. Our specification for 2, 4, 5-trichlorophenoxy acetic acid stipulates that by analysis there shall be less than 1 ppm of the 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin in 2, 4, 5-T. This 1 ppm is the approximate sensitivity of the assay method.

The enclosed label for TORDON 101 Mixture shows the ingredient statement for agent White. The inerts in this formulation include water, isopropanol, surfactants and sequestering agents.

Yours truly,

J. H. Davidson

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Agricultural Department

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Encl.