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LOCKHEED AIRCRAFT CORPORATION
CALIFORNIA DIVISION BURBANK, CALIFORNIA

October 25, 1956

U.S. A.E.C.
Isotope Extension
Division of Civilian Application
P.O. Box E
Oak Ridge, Tennessee

Dear Sir:

We are at the present time considering the use of Radioactive Tracer Method to evaluate metalcleaning. This method entails essentially the application of a radioactive tagged soil of known activity on a metal surface and measuring the residual activity after attempting to remove the soil in an aqueous alkaline cleaning solution. The object of the test is to evaluate the performance of a cleaning solution and to determine the degree of surface cleanliness of the metal.

The following are some references on the Tracer Method in evaluating metal-cleaning:

Hensley, "Plating," September, 1955.

Harris, "Application of Radioactive Tracer Technique to Metal Cleaning" ASTM Bulletin No. 158, May, 1949, pp 49-52.

Harris, "Improved Radioactive Tracer Carrier for Metal Cleaning Studies" ASTM Bulletin No. 170, December 1950, pp 82-83.

Previous investigators have used C^{14} in an organic form for their work. For reasons of economy and safety we are considering the use of P^{32} and S^{35} as well.

Our studies will be divided into two distinct phases: Phase One will be confined to laboratory experiments and Phase Two to Process Control in production.

Phase One: Laboratory

Our laboratory is a medium sized industrial process control laboratory equipped to perform organic and inorganic analyses and metallurgical testing. Personnel responsible for the Tracer work will be a graduate Chemist or Chemical Engineer with training in nuclear physics and radiochemistry but with no practical radiation-lab experience as such. Equipment used will be a thin-wall mica window of 2.0 mg/cm^2 max. and approximately one inch in diameter from which a sensitivity of less than 0.1 uc/cm^2 is expected.

To: U.S. A.E.C., Isotope Division October 25, 1956

Tracer compound will be a long-chain hydrocarbon derivative of low volatility with C^{14}, P^{32} or S^{35} as a radioactive element. The amount of radioactive material on hand at any time will not be in excess of one millicurie at a concentration of no higher than 30 microcuries per gram of oil-base material. This artificial soil material will be purchased from a commercial firm in a made-to-order ready-to-use form and will be stored in a thick-wall air-tight glass container within a metal container.

Experiments will be performed in a hood with forced ventilation. Briefly, the test procedures will be as follows: Apply 1 uc of radioactive soil to an area of 1 sq. in. on the aluminum panel. Take initial counts with Geiger. Immerse soiled panel in a one-liter solution for ten minutes. Rinse and air dry panel. Take residual counts. Cleaning solution shall be discarded after each use; so the activity of the used solution drained to the sewer will always be considerably less than 10^{-3} uc/cc which is below the permissible limit set by National Bureau of Standards in Handbook 52. Also, no more than 12 panels (approximately 12 uc used) will be prepared and tested in any one day. The total material required to complete the experiments will not be over two millicuries.

Phase Two: Process Control

Using the same artificial soil as described in Phase One and added precautions, once every month two panels of 1 uc/sq. in. of soil will be prepared and tested in a 16,000 gallon cleaning solution in a production process line. Level of radioactive contamination in the cleaning solution is estimated to be less than 2×10^{-8} uc/ml from each monthly test. This concentration is below the maximum permissible limit of 10^{-7} uc/ml for use of B-emitter beyond control area as given in National Bureau of Standards Handbook 52. The total material required will not be over one millicurie per year.

Please review the above descriptions of the radioactive work we plan to undertake and give us your advice and recommendations, particularly on the following points in question:

1. Your opinions of safety in regards to isotopes C^{14}, P^{32} and S^{35}.
2. Your approval for the use of one or all of the isotopes mentioned.
3. Your advice in safe-handling during each phase of testing.
4. Your approval of the procedures in each phase of testing with any comments.
5. Regulations governing the usage of radioactive isotopes.

Approved: R B Scott
R. B. Scott, Supervisor
Manufacturing Research

Very truly yours,

LOCKHEED AIRCRAFT CORPORATION
CALIFORNIA DIVISION

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