PRELIMINARY REPORT ON THE LOS ALAMOS INCINERATOR EFFLUENT COLLECTOR PERFORMANCE

Industrial Hygiene Group

Los Alamos Scientific Laboratory

Introduction

The general purpose of the Los Alamos incinerator is the reduction of bulk by incineration of combustible laboratory wastes which are contaminated with radioactive materials. The waste may contain all known types of active materials and the effluent from this operation must be controlled in order to protect the surrounding area. The three general functions of the operation are: (1) incineration of waste materials; (2) decontamination of effluent; (3) storage of contaminated ash.

The Los Alamos incinerator is operated by the Engineering Division of the Los Alamos Scientific Laboratory. The responsibility for evaluating the incinerator effluent collectors has been assigned to the Industrial Hygiene Group of the Laboratory.

Incineration of Waste Materials

The contaminated combustible laboratory wastes are received at the incinerator packed in cardboard boxes 13" x 13" x 24½". Each box weighs between 8-20 pounds. The boxes are stacked together into a charge of a given number of boxes and introduced into the incinerator through the charging lock. The outer door is closed, the inner door opened, the charge is mechanically pushed on to the firing grate, the charging carriage is then returned and the inner door closed. In this way it is possible to charge the incinerator with part of the previous charge still burning.

After the combustion of the charge is completed, or at the end of the day, the ashes and residue of the firing grate are dumped in the ash hopper by manually rotating the grates. The unburned material such as laboratory glassware, miscellaneous iron pieces, et cetera, are caught on a small grizzly in the hopper and the free ashes dumped into the receiving and holding tank. The incombustible material is removed and packaged for burial in the contaminated dump.

Decontamination of Gaseous Effluent

The effluent, with the combustion gases, is drawn through the air cleaning equipment by a blower and discharged into a stack fifty feet high. The effluent collecting system consists of the following equipment in order: cyclone dust collector; spray cooler; Pease Anthony Venturi scrubber with its separator and a 2-stage, deep pocket, dry, fiberglas filter (FG #25 followed by FG #50).

Preliminary tests on effluent performance, as of September 1, 1952

Preliminary tests with limited charges have been made on the incinerator. These tests were made with a short-lived, beta-active material introduced into clean laboratory waste. Air sampling locations to determine the efficiency of the various units are located at the following points:

1. incinerator outlet
2. cyclone collector outlet
3. Venturi scrubber outlet
4. dry filter interstage
5. dry filter outlet
6. stack

To date, the air samples have been collected on a Whatman #41 filter paper or on a porous metal disk of equal efficiency. The sampling rate is approximately 1 c.f.m., with proper orifices being installed at the end of the sampling tube pointed upstream to give isokinetic sampling. The filters are then counted for activity.

When the incinerator is operated at full capacity, it is anticipated that the temperature of the combustion gases at the incinerator outlet will be approximately 1500°F. The spray cooler was designed to lower the temperature of the combustion gases from 1500°F. to 300°F. by spraying water into the gas stream. The quantity of water is automatically controlled by a temperature valve with a thermal bulb in the downstream end of the spray cooler. The preliminary operations with small charges give a temperature (in the incinerator outlet) of 800°F. At this temperature, the spray cooler cools the gases to only 400°F. with higher temperatures in the stack than anticipated. The deep bed fiberglas filter and the stack, in effect, are acting as condensers to cool the gas, and water droplets condense out with the effluent discharged through the stack. This complicates the sampling procedure when determining the particulate matter concentration.

Summary of Results

Four runs made with one quarter the rated capacity gave a maximum incinerator outlet temperature of 500°F. The average penetration through all the effluent collections was 0.005% based on activity measurements. When the charge was increased and the incinerator outlet temperature raised to 800°F., the Whatman filter paper used on the stack testing was wetted and was thus useless. The moisture exists as water droplets in the stack air stream. At the time of this preliminary report, the stack sampling method is being modified in order to collect, first, the water droplets and then the particulates. Activity measurements will then be made on both fractions.