BROOKHAVEN AIR CLEANING OPERATIONS

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Nature has been kind to the Brookhaven area of Long Island by providing an unusually clean atmosphere. In 1949 continuous tests were run by the Meteorology Group to determine the dust loading over a period of six months from March to September. Fiberglas No. 25 and 50 and CWS paper filters were used with flow rates of .75 cfm and .375 cfm, respectively. A total of 200,000 cu. ft. passed through the fiberglas and 100,000 through the paper. The total weight of material collected on the fiberglas was only .2114 grams and on the CWS paper .1300 gms. Analysis showed the particulate material to be quartz grains, pollens, spores, a few salt crystals and considerable unidentifiable material, probably clay and humus.

This light loading of the atmospheric dust gives filters an extraordinarily long life. The cooling air intake filters at the Pile, for example, have been used about 3 years. Tremendous volumes of air have passed through them and still they show only slight loading.

The laboratory policy at Brookhaven states that there shall be no undesirable accumulation of contamination. The discharge of radioactive particulate contamination is to be avoided by the use of appropriate filters or suitable experimental techniques. For operations likely to involve serious air contamination, such as machining active metals or chemical processing of highly active materials, the use of dry boxes with suitable filters and ventilating blowers is required. As a result of this policy most lab hoods, where there is a chance of radioactive particulate being generated, are equipped with the CWS-6 type filters. These areas include Chemistry, Biology, Medical, Cyclotron Target Lab, Hot Labs, Hot Machine Shop, Metallurgy Labs, Nuclear Engineering Labs and Pile Labs. A total of 215 of

this type of filter is presently in use at BNL. Air conditioning at the Pile, Hot Lab, etc. are presently using American Air Filter Co., Air Mat material.

Of course, the greatest air cleaning operation at Brookhaven is in connection with the cooling air at the Pile. To cut down on particulates entering the Pile via the cooling air, two banks of deep pocket FG-25 and FG-50 filters are provided for precleaning. Each bank has 4350 sq. ft. of effective surface, to handle a design load of 140,000 cfm, which results in a face velocity of 32 ft/min. This face velocity gives an initial resistance of 1 inch of water. The efficiency of these filters is widely known.

The exit air from the Pile contains only those particles passed by the intake filters, undoubtedly a small amount of graphite dust and other impurities picked up by the scrubbing action of the air stream, and an amount of radioactive argon gas. This air is pulled along through two ducts, 10 ft. by 14 ft. each, by as many as five 1500 H.P. fans. The exit filters are made of glass fiber cloth known by the trade name "Glastex" manufactured by the Dollinger Corp. They were selected mainly because of low resistance and their ability to withstand temperatures to 500° F. The cloth was chosen because of the possibility of bonded materials failing under prolonged high temperatures and causing voids. The filtering efficiency is not high as compared to the intake filters. They are of the deep socket type, 10 ft. high, 4 ft. wide and 4" thick. Each panel weighs 450 lbs. in its frame, and there are 32 panels in each duct to satisfy 750,000 lbs. of air per hour at 347° F.

After leaving the effluent filters, the air is passed through a heat exchanger and then discharged from a stack about 320 feet high. The dilution of the atmosphere is sufficient to handle the activated argon whose half-life is only 110 minutes. Monitoring stations in the area have shown that there has been no significant rise in background due to Brookhaven operations.

Since the main concern is the prevention of radioactivity from getting into the environment, it seems appropriate to describe briefly certain safety devices that have been installed to show up any possible equipment failures. Less hazardous conditions such as excessive stack air activity, loss of battery-charging current, etc. actuates an alarm and an annunciator drop which shows the cause of the alarm at the control panel.

Beta-gamma monitors are installed at various points in the Pile building to monitor for external radiation from possible shield leaks or from high-level contamination. The readings are recorded by an 8-point recorder which gives an alarm above a certain radiation level.

In each duct, between the Pile and the exit air filter, a sample of the cooling air is drawn through a filter by a pump and then returned to one of the ducts. The filter is situated in an ionization chamber which is connected to a sensitive d.c. amplifier. The activities on the filter are recorded locally by a 2-point recorder, as well as remotely in the control room. Excessive activity activates the alarm system.

Immediately in front of the exit air filters are openings into the ducts. Long steel rods, with oily adsorbent material attached to the end, are extended through these openings into the air stream. The adsorbing material tends to collect particulate material. Periodically, these probes are removed and checked by some type of survey instrument. This gives an estimate of possible particulate contamination.

The final stack air is monitored for argon activity. A portion of the effluent flows continuously from a tap on the discharge duct, through a large ionization chamber (Kanne air chamber) and back into the suction duct. The chamber is

connected to a sensitive d.c. amplifier whose output is recorded both locally in the fan house and in the control room. Excessive argon or particulates actuate the alarm system.

Air samples are taken continuously in those places where air contamination is possible. Whenever assays show airborne contamination to be above the maximum permissible allowable, the worker is required to wear respiratory equipment that will reduce the breathing hazard to complete safety.