COO-3049-6

MANAGEMENT OF GASEOUS RADIOACTIVE WASTES

Progress Report

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September 1, 1974 - August 31, 1975

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PREPARED FOR THE U. S. ENERGY RESEARCH AND DEVELOPMENT
ADMINISTRATION UNDER CONTRACT AT(11-1)-3049

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Technical Progress Report

Harvard University School of Public Health

Contract No. AT(11-1) - 3049

September 1, 1974 - August 31, 1975

ABSTRACT

Proceedings of the 13th USAEC Air Cleaning Conference, CONF-740807, Volumes I and II were edited, published, and distributed. Multi-ply absolute filter units were manufactured and are undergoing tests for penetration, loading, and heat resistance characteristics. All-metal fiber prefilters are under test with salt aerosols to investigate their particle retention characteristics at elevated temperatures and ability to protect downstream absolute filters from fire and smoke damage.

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The scope of the work under this contract consisted of investigations of the management of gaseous and airborne radioactive waste and was divided into three specific tasks:

Task A. 13th USAEC Air Cleaning Conference

Proceedings of this conference that took place 12-15 August 1974 have been numbered CONF-740807, Volumes I and II. This publication has been edited, published, and distributed to attendees, ORNL, NTIS, and to other interested parties.

Task B. Air and Gas Cleaning Program

During the past nine months, manufacturers of air and gas cleaning equipment have produced nothing of note in the way of innovative devices or systems and few, if any, new demands have been made on them by official agencies or commercial interests to produce new or improved items.

Although there was a great deal of interest in innovative methods at the 1974 Air Cleaning Conference and although there were a number of reports of new devices and systems, progress since then has been notably lacking. This seems to have been a reaction to two factors: (1) reorganization of the AEC during this period has occupied the attention of the official agencies with administrative matters to an unusual degree and (2) cutbacks in the civilian nuclear power program have made equipment manufacturers reluctant to commit funds and manpower to innovative programs that have less than usual prospects for an early payoff. It seems probable that incentives for major improvements in equipment design by manufacturers are likely to be minimal until NRC develops a method or program that makes it possible for sites to obtain greater credit for improved designs than is possible under existing regulations, i.e., quid pro quo.

Nevertheless, long standing needs remain for gas cleaning devices that have greater service life, have greater resistance to fire and chemicals, and perform with higher efficiency for selected contaminants such as radioiodine and plutonium. For the longer range, the LMFBR program will require many types of special air and gas cleaning equipment that are not yet commercially available or in the planning stage.

Task C. Heat and Smoke Resistant Absolute Filters and Prefilters

1. High temperature filter studies require the use of temperature resistant aerosols. Sodium chloride aerosols have been the most widely used for this purpose and the most successful. Initially, small salt particles were generated from the dried residues of dilute brine mists but the high relative humidities that resulted from this method were objectionable. More recently, very satisfactory salt aerosols, with respect to size ($\sim 0.1\mu\text{m}$) and loading (up to 1 gm/m^3), have been generated by vaporizing salt in a flame and chilling the vapor to supersaturation with the addition of ambient air. A metalizing gun with an oxygen and acetylene

flame makes an excellent salt aerosol generator but the output isn't as steady as one would like for careful measurements of low penetrations. An improved apparatus was described by British investigators at the latest Air Cleaning Conference and a duplicate aerosol generator (with the kind donation of drawings and critical parts from Mr. Richard Dorman, Porton, England) has been constructed at HACL and is now undergoing initial testing. It appears capable of giving a more uniform and more controllable salt aerosol for test purposes. It will be used during the remaining contract period to test all-metal fibers in graded density layers for removal of high concentrations of fine particles in high temperature fire situations to protect absolute filters used as a final air cleaning stage. Filter packs will be tested clean and dirty over a range of temperatures and air velocities for air flow resistance and penetration.

2. Experimental filters that contain (a) two layers and (b) three layers of absolute filter paper pleated together and packed into a single frame have been purchased from a commercial source. The manufacturer's standard DOP test apparatus was not sufficiently sensitive to detect penetration through either type of filter. Therefore, they have all been sent to Mr. C. Skaats, who operates the Rocky Flats filter test station, for additional testing at his excellently equipped facility. If his tests confirm the low penetration results reported by the manufacturer, Mr. H. Ettinger, at LASL, will be asked to perform plutonium penetration tests on some of the units and the remainder will be tested for pressure drop and dust loading characteristics at HACL. Informally, Mr. Ettinger has indicated a willingness to perform the plutonium test. Finally, the temperature resistance of loaded filters will be compared with the temperature resistance of identical filters containing a single layer of paper.

3. A search for new superfine fibers having significantly greater heat resistance than glass has failed to turn up anything new that is sufficiently promising to warrant production of hard sheets for testing. Up to this time, heat shrunk quartz fibers have most closely approached the desired performance characteristics but paper prepared from them does not equal the flexibility and high efficiency of paper made from glass fibers.

4. Discussions have been underway with Dr. D. Zeigler at Rocky Flats regarding the design and testing of improved high temperature resisting filters capable of performing satisfactorily and reliably on the effluent gases from the fluidized bed incinerator currently operating in pilot plant scale and projected for full scale construction in 1976. Agreement has been reached on a short range and a long range development program at HACL that can begin immediately and extend into the next contract year. Details of the proposed R & D are contained in the Renewal Proposal submitted with this Technical Progress Report.