

AEROJET ENERGY CONVERSION COMPANY  
MOBILE VOLUME REDUCTION SYSTEM

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ABSTRACT

Over the past few years, rapidly increasing costs for the disposal of low level radioactive waste (LLW) have generated the need for utilities to volume-reduce their LLW prior to shipment and burial. Incineration systems have been selected by several utilities to fulfill this need for maximum volume reduction.

Until recently, all of the incineration systems selected by utilities were designed to be housed and operated in a facility erected by the utility. Now, however, lack of capital and rising design/erection costs are causing utilities to reevaluate their plans for purchasing incineration systems to process their LLW. The result is a growing demand for incineration services.

Once again, Commonwealth Edison Company (Com-Ed) is leading the industry with an ongoing program to utilize incineration services provided by Aerojet Energy Conversion Company (AECC) for the Dresden, Quad Cities, LaSalle, and Zion Nuclear Stations. At the stations, combustible dry active waste and contaminated oil will be processed in a Mobile Volume Reduction System (MVRS) designed and fabricated by AECC.

The MVRS is a totally self-contained system consisting of a controlled-air incinerator and a liquid off-gas cleanup system. No buildings are required to house the system, and the MVRS achieves volume reduction factors similar to systems currently available for permanent in-plant installation. The result is an option for the utility having the benefits of volume reduction without the capital commitment normally required by the utility.

INTRODUCTION

In the spring of 1982, Com-Ed instituted a study to determine the availability of mobile incineration services for their nuclear power plant sites. After a review of the data packages submitted by several interested incinerator vendors, Com-Ed issued a formal request for proposal to procure the mobile incineration services. In June 1983, Com-Ed awarded a mobile services contract to AECC to process the dry active waste and contaminated oil produced at the Com-Ed nuclear plants.

Since that time, AECC and Com-Ed, together with Commonwealth Research Corporation, Gilbert Associates, Inc. and United Minerals & Energy, Inc., have worked with the Nuclear Regulatory Commission, the Department of Transportation, and various state and local agencies to define the design, operating, and licensing requirements of the MVRS. The preliminary design of the MVRS was completed in mid-October, 1983, with the final design expected to be completed by April 1, 1984. The MVRS is scheduled to be delivered to the Dresden Nuclear Station on or before December 15, 1984. Commercial operation is scheduled for March 15, 1985, following a series of check-out, verification, and licensing tests.

DESIGN

The AECC MVRS utilizes a waste preparation/packaging trailer, an incinerator trailer and a filter trailer to house a two-stage incinerator, a liquid off-gas cleanup system and a HEPA/Charcoal/HEPA filter system for processing low level dry active waste and contaminated oil. The incinerator is designed to process approximately 350 pounds of DAW or 15 gallons of contaminated oil per hour.

Refer to Figure 1 for a simplified schematic of the MVRS. Packaged waste is delivered to the waste preparation/packaging trailer by the utility, where it is weighed and checked with a radiation monitor. The MVRS is designed to process waste packages with defined weight and dose rate limitations. Waste packages not meeting the defined requirements are returned to the utility for repackaging or alternate processing.

Acceptable waste is fed into the primary combustor via an air lock by the trash ram. During the combustion process, a large majority of the ash remains in the primary combustor. The rest of the ash exits the primary combustor with the gas stream, which passes through the secondary combustor before entering the quench pipe. The quench pipe drops the temperature of the gas stream prior to the inlet of the venturi scrubber system. The venturi system, operating as a caustic scrubbing system, removes the flyash and acidic gases produced during the combustion process.

After passing through the induction fan, the gas stream is filtered through the HEPA/Charcoal/HEPA system prior to being exhausted into the atmosphere. The total decontamination factor through the MVRS is expected to be about  $10^6$ .

The ashes produced during the combustion process exit the far end of the primary combustor and are transferred to a storage hopper on the waste preparation/packaging trailer. The ash is then densified prior to packaging in a 55-gallon high integrity container (HIC). The HIC is stored on the waste preparation/packaging trailer prior to pickup by the utility.

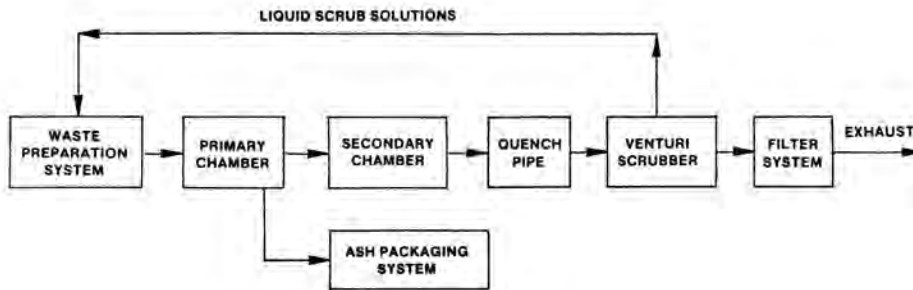


Figure 1. MVRS Schematic

The MVRS is designed to be totally independent of site buildings and other structures requiring a large utility capital commitment. Interface requirements consist of a pad for locating the system, an electrical supply and a water supply. Filled containers and exhaust gases are the only products that leave the MVRS trailers.

Calculations performed on the system off-gas cleanup system utilizing both generic and site specific radionuclide distributions indicate that the exhaust from the MVRS is well below the 10 CFR 20 and 40 CFR 190 limitations for radioactive emissions.

#### LICENSING

Licensing of the AECC MVRS is being approached from two fronts. AECC is preparing a Topical Report on the MVRS and is scheduled to submit the completed Topical Report to the Nuclear Regulatory Commission for review in the near future. Approval is expected by January, 1985.

In parallel with that effort, Commonwealth Research Corporation, with Gilbert Associates', Inc. assistance, is scheduled to submit a Safety Evaluation Report on the MVRS to the NRC by May, 1984. In addition, documentation is being prepared to meet the state and local licensing requirements for the MVRS. United Minerals & Energy, Inc. is assisting in the licensing of the MVRS by defining the licensing criteria established by the NRC, EPA, and other agencies.

#### BENEFITS

Since DAW constitutes a major portion of the waste volumes shipped by utilities each year, the utilization of a system that provides a substantial volume reduction of shipped DAW is extremely beneficial to utilities in reducing their annual waste disposal expenditures. Although many options are available today for utilities to pursue this goal (compactors, supercompactors, shredder/compactors, etc.) no option comes close to the volume reduction factors attainable through incineration. Hence, cost benefit analyses performed comparing incineration to competing technologies show the significant advantage incineration systems have over other systems for utilities looking for maximum financial savings.

Until recently, utilities wanting the benefits of incineration had to make a large financial commitment to install and operate an incinerator on their site. Now, with the emergence of mobile incineration, utilities can contract to have incineration services on their site on an "as-needed" basis, while eliminating the need for an incineration facility and a group of workers specially trained to operate and maintain an installed system.