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U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 3.2

EFFICIENCY TESTING OF AIR-CLEANING SYSTEMS CONTAINING DEVICES FOR REMOVAL OF PARTICLES

A. INTRODUCTION

10 CFR Part 20, "Standards for Protection Against Radiation", specifies permissible concentrations in air and water above natural background in restricted and unrestricted areas which may result from the possession, use and transfer of licensed radioactive material by any licensee. It also provides that licensees, in addition to complying with the requirements set forth in Part 20, make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as far below the limits specified in Part 20 as practicable (§20.1(c)).

High efficiency particle filters and other types of air-cleaning devices are installed in the air-cleaning systems of nuclear facilities to remove particulate matter from process air or gas streams. In order to ensure that the requirements of 10 CFR Part 20 are met, users of these systems should assess the performance of installed filters, or more specifically, of the entire system and locate damaged filters or other leakage paths. This regulatory guide describes a method of assessing the overall efficiency of air-cleaning systems containing devices for removal of particles acceptable to the AEC regulatory staff.

B. DISCUSSION

Subcommittee N101-7, Radiation Waste Management, of the American National Standards Institute Standards Committee on Atomic Industry Facility Design, Construction, and Operating Criteria, N101, has developed a standard presenting a test method to provide a uniform basis for assessing the filtration efficiency of systems containing one or more particulate air-cleaning devices.

The in-place test method measures the particle-removal efficiency of the system. The installed air-cleaning device, or devices when more than one is used in a system, is confronted with an aerosol of DOP (dioctyl phthalate) of proper particle size. The concentration of the aerosol is measured before and after the device(s) by means of light-scattering, photometric or other suitable techniques. The overall system filtration efficiency is then calculated from the two aerosol concentration values. The purpose of the test is to determine the efficiency of the system in such a manner that any penetration of the test aerosol through the device(s) or any leakage of the test aerosol around the device(s) is included in the results. The standard does not specify performance criteria for the purpose of evaluating systems for specific service conditions. This standard was approved by the American National Standards Institute (ANSI) on February 16, 1972 and designated ANSI N101.1-1972.

C. REGULATORY POSITION

The test method contained in ANSI N101.1-1972 "American National Standard - Efficiency Testing of Air-Cleaning Systems Containing Devices for Removal of Particles,"¹ constitutes a generally acceptable procedure for assessing the filtration efficiency of systems containing one or more particulate-air cleaning devices.²

¹ Copies may be obtained from the American Institute of Chemical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

² In equations 3 and 5, X_1 should be corrected to X_2 and in equation 5, the entire expression on the right hand side of the equality sign should be raised to the one-half power instead of the first power.

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