

CRITICAL REVIEW OF DOE'S
VENTILATION AND FILTRATION STANDARDS

by
Roger W. Zavadoski

These words are written from the perspective of 30 plus years of experience with nuclear ventilation and filtration systems in the United States and abroad at both the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE) facilities. Please note that these words are the author's own personal opinions and views and do not reflect those of past or current employers. This perspective also includes joint authorship of the original Regulatory Guide 1.52 with a distinguished gentleman in the audience, Mr. Humphry Gilbert. Finally, field reviews at scores of commercial power plants and dozens of Defense Nuclear Facilities on three continents have tempered my perspectives and views.

From the above perspectives and points of view several thoughts run through my brain. There is the constant refrain from the DOE community that goes something like this: "We do not have high energy systems like reactors. Therefore, we don't need as robust ventilation and filtration systems. So why apply those standards to us?" This half an argument. Let me explain.

When one only considers the energetics of a Loss of Coolant Accident or a Main Stem Line Break Accident, it is easy to see that such forceful events are not often duplicated at defense nuclear facilities (explosion potential is a concern at some DOE facilities!). Therefore, the design and lessons learned applicability of commercial power plant in-containment filtration systems is limited in so far as Defense Nuclear Facilities are concerned. Fortunately, there are not very many of these systems in the commercial world. That being said, the direct applicability of such operating, relatively low energetic systems as Control Room, Fuel Handling Building, Stand-By Gas Treatment, and Shield Building Ventilation systems is difficult to deny. At commercial power plants, these systems were designed to standards like ASME N509 and tested in accordance with ASME N 510 - and it is clearly visible just by looking at them. The application of the standards is spelled out in safety documentation, i.e. the Safety Analysis Report (SAR). The SAR contains the commitments made to following the guidance documents, i.e. Regulatory Guide 1.52.

At DOE facilities the safety class or safety significant ventilation or filtration systems are documented in their SARs. When SARs are not up-to-date or completed this information is found in the Basis for Intermittent Operations (BIO). In DOE space the requirements listed in the SARs have been called different things at different times. At the time Regulatory Guide 1.52 was first written there were a Chapter Manual (Number 6301) which covered ventilation and filtration requirements. DOE Orders (6430.1A and 420.1) followed. For older facilities, it is nearly impossible to reconstruct just what requirements or provisions of a Manual Chapter or Order were applicable at a particular point in time.

Further, there is another complication. Chapter Manuals and Orders are not the same as regulations - they are negotiable items for a contract between the DOE and the facility operator. One may argue, and indeed it has been argued, that in a similar fashion Regulatory Guides are negotiable between the NRC and the facility operator. In practice, the commercial power plant owners took few exceptions taken to the provisions of Regulatory Guide 1.52 (and hence most of the filter systems at commercial power plants look strangely familiar). Although 1.52 is called a "guide" it becomes binding when the provisions in it are accepted in the SAR because the SAR is directly tied to Regulations (i.e. 10 CFR 50) which are not negotiable. In a similar fashion the

25th DOE/NRC NUCLEAR AIR CLEANING AND TREATMENT CONFERENCE

filter systems are tied to specific Technical Specifications which again are linked to Regulations.

We are not through with negotiations yet. In the DOE there are SARs and Operational Safety Requirements (OSRs - DOE's equivalent of commercial Technical Specifications). They are both required by Orders and, hence, subject to contract negotiations. As with any contract these contracts are periodically updated and renegotiated. The results are not a foregone conclusion.

In the thirty years of evolution between the Manual Chapter and the 420.1 Order, the biggest change in so far as ventilation and filtration is concerned, lies in the initial mandatory requirement for a safety class filtration ventilation system for certain high hazard facilities, with the number of stages of filtration subject to analysis, to the present scheme in which analysis alone dictates the classification of a particular ventilation system. Thus, it is quite possible today to have a large plutonium facility with only stand-by power, and not emergency power, or one which can not meet single failure criteria, as their commercial counterparts would, e. g. see Regulatory Guide 3.12. Such an outcome is possible with considerable pencil sharpening and relatively great distances to the site boundaries involved. There's more on the site boundary issue in a little bit.

Beyond the Regulation vs. Negotiation, Mandatory vs. Analyzed Safety Features differences, there is also considerable differences in review, interpretation and enforcement in the NRC and the DOE. In the NRC scheme of things, there is a detailed Review Plan, with Branch Technical Positions, that are used to review each segment of an SAR. I know of no DOE counterpart to this that even comes close. Interpretations of requirements or SAR technical positions at the NRC are generally carried out at headquarters under a rather legalistic framework. At DOE, interpretations of requirements have typically been done at the field offices with varying degrees of legalistic rigor. Enforcement at the NRC has been active from the beginning of power plant regulation ensuring that the positions taken in the SARs and Technical Specifications are being met, as required by Regulation. Enforcement at DOE is in its infancy and is not on a firm footing as NRC Regulations.

When you roll all these differences together, what you get is something like the following. Facilities which are custom designed, analyzed and built on a case by case basis to negotiated requirements which are subject to periodic revision, local interpretation and, until recently, local enforcement may not bear much similarity to facilities which you are familiar. When budget is such a constraining issue it is difficult to understand why someone would want to go down such a costly path. Hasn't experience taught us the rudiments of what ventilation wise constitutes a safe facility? Why reinvent the wheel as we are currently doing?

In the rush to put DOE facilities under NRC Regulation this whole situation may become real complicated sooner, rather than later. Recently the NRC Commissioners concurred in their staff's opinion which stated that co-located workers should be treated as members of the general public, just as commercially workers at a fossil fueled plant, which is located next to a nuclear unit, are. For DOE facilities this interpretation could have significant implications for design, implementation and, above all, cost. The site boundary for DOE facilities, which, for all practical cases, currently is at the end of the owner controlled area, would shrink to the nearest facility with co-located workers. This would probably make the safety significant classification meaningless - and most ventilation and filtration systems would be reclassified upwards as safety class, in the NRC's sense of the word - something many are not currently. If this comes to pass, expect a large scramble of activity at DOE facilities. In the interim, just remember there are large differences between filtration units at NRC and DOE and why.