The Secretary of Energy
Washington, DC 20585

March 15, 1996

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004

Dear Mr. Conway:

This is in response to your June 15 and July 21, 1995, letters requesting an evaluation of the design, construction, operation, and maintenance of ventilation systems for plutonium. Enclosed is the Plutonium Ventilation System Study Report.

This report notes several areas where we require strengthening our safety practices, including:

- Maintenance and operating practices
- Form management
- Ventilation filter leakage testing
- Safety analysis

Section 6 summarizes the commitments made in response to report findings.

We look forward to working with the Board to implement the commitments contained in the report. This information is unclassified and suitable for placement in the public reading room.

Sincerely

Hazel R. O'Leary

Enclosure

Plutonium Ventilation System Study Report

FEBRUARY 1996

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1.0 Executive Summary

In a letter to the Secretary of Energy on June 15, 1995, the Defense Nuclear Facilities Safety Board (DNFSB) forwarded their report entitled, *Overview of Ventilation Systems at Selected DOE Plutonium Processing and Handling Facilities (DNFSB/TECH-3)*. *DNFSB/TECH-3* noted a number of deficiencies in the ventilation systems at the sites reviewed in the report and requested that the Department prepare a report to evaluate the design, construction, operation, and maintenance of ventilation safety systems at DOE's plutonium processing and handling facilities in terms of applicable DOE and consensus standards.

The Department selected eleven facilities located on five of the Department's major plutonium handling and processing sites as subjects for the report. The sites selected were: Rocky Flats Environmental Technology Site (RFETS), Savannah River Site (SRS), Hanford Reservation, Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL). The facilities began operation between 1949 and 1980.

DNFSB/TECH-3 compares the facilities reviewed primarily to the requirements of DOE Order 6430.1A, *General Design Criteria*, which was issued in 1989. As noted in *DNFSB/TECH-3*, some of the requirements of DOE 6430.1A are also contained in earlier standards, beginning with AEC Manual Chapter 6301, issued in 1963. DOE 6430.1A and predecessor documents are, in general, applicable to the design of new facilities and modifications to facilities existing when the given standard was issued. They were not made retroactive.

Except for modifications made after its issuance in 1989, DOE does not require the application of DOE 6430.1A to existing facilities. Instead, DOE uses a disciplined safety analysis process culminating in a Safety Analysis Report (SAR) and DOE safety evaluation report to ensure that judgements regarding the need for and adequacy of potential safety-related structures, systems and components (SSCs) are made in a structured manner subject to DOE approval. This process begins with a comprehensive hazard analysis and a selective accident analysis, based on which the determination of "safety-class" SSCs and the need for certain safety management programs, e.g., radiation protection, training, maintenance, is made. To facilitate making the safety-class designation DOE uses a deterministic dose guideline of 25 rem Total Effective Dose Equivalent (TEDE) at the site boundary.

The goal of the two approaches is the same: to ensure that our facilities protect the public, workers and the environment from the hazards inherent in the facilities and in their operation. This report reviews the status of the facilities relative to their safety analyses and compares the facilities to the requirements of DOE 6430.1A. It is organized to facilitate comparison with the Board report and the July 21, 1995, letter on Rocky Flats building ventilation systems. Responses to the specific comments of *DNFSB/TECH-3* are contained in Appendix D.

The degree of compliance with current DOE safety analysis requirements varies among the facilities. At some facilities a modern SAR reflecting the current mission has been approved by DOE. At others preparation of a current SAR is not yet complete. There are similarities in fundamental approach to safety, however.

- All systems are designed to ensure that the air flows toward the source of greatest potential contamination.

- Emergency power and redundancy are provided for active, safety-class components, although the emergency power systems do not necessarily meet current design requirements for safety-class SSCs.

- Operator action is not required to accomplish the safety functions of the safety-class systems, but operator access during and after accidents is provided either by recirculating type ventilation for control rooms or self-contained breathing apparatus, depending on the system design.

There are also the following weaknesses, which are being addressed as discussed in the report.

- Further action is required to ensure that all bypass leakage paths around the High Efficiency Particulate Activity (HEPA) filters have been identified and that testing for bypass leakage is sufficiently comprehensive (see section 3.2.8).

- Rigorous single-point failure analyses have not been performed for the reviewed facilities and should be considered (see section 3.2.2).

- Maintenance and operations practices at some sites need strengthening, most notably at Rocky Flats. This action is ongoing, but additional emphasis has been placed on it as a result of the sites' investigations to assist in preparing this report (see section 3.2.7).

- Configuration management, including the preparation of as-built drawings, is not yet at the required level in some areas. This is recognized and is being addressed (see section 5.2).

DNFSB/TECH-3 raises the question of whether DOE should apply a specific quantitative criterion for allowable accident dose to the public at the point of nearest public access onsite. As part of this report DOE reviewed approaches taken by each facility with respect to dose at the nearest point of public access. The approaches varied. Some sites consider onsite dose as part of the safety analysis process and use contractor-imposed risk assessment guidelines as part of their assessment. Others do not include onsite dose as part of their safety analysis process. DOE has concluded that it is appropriate to assess our policy regarding dose at the nearest point of public access to determine if changes are warranted (see section 5.1.2).

2.0 Introduction

2.1 Background

From the beginning of defense-related nuclear programs, the United States has handled and processed plutonium and other nuclear materials in special facilities. These facilities have been designed and operated to minimize the risks of exposure to the workers and the public and contamination of the environment. Key parts of the strategy to minimize risks are confinement of hazardous materials to the facilities and segregating contaminated areas from clean areas within the facilities. This is generally achieved by making the structures robust, by managing air flow and differential pressures between areas of differing levels of contamination, and by filtering exhaust streams to remove radioactive particulates.

As best we can determine, the above principles were applied to all DOE plutonium handling and processing facilities. Collectively, the facilities represent a physical record of the evolution of nuclear air cleaning system design from its beginning. This design development is documented in DOE and DOE predecessor organization publications AEC 6301, DOE 6430.1, ORNL/NISC-65, and ERDA 76-21 and its revision. These documents form the foundation of ANSI N101.1-1972 and ASME N509 and N510 national consensus standards on nuclear air cleaning system design and testing.

Because the facilities were constructed against this evolving backdrop of air cleaning system design over the past four to five decades, the facilities are not built to a single set of standards. Instead, design of individual facilities reflects the best engineering judgement of the time. For continued assurance of system performance and protection of workers, the public and the environment, each facility uses the DOE Safety Analysis Report (SAR) process to assemble a collection of engineering and administrative controls that provide the level of performance and protection appropriate for the site and the facility mission. This is discussed in detail in section 2.5.

Recognizing that the ventilation systems at these facilities are important to the health and safety of the public and workers, the Defense Nuclear Facilities Safety Board (DNFSB) undertook a review of the design, construction, maintenance and operation of ventilation systems in DOE's plutonium processing facilities. Following staff visits to several Department of Energy sites over a 2-year period, the Board issued a report entitled, *Overview of Ventilation Systems at Selected DOE Plutonium Processing and Handling Facilities (DNFSB/TECH-3)*.

In the June 15, 1995, letter to the Secretary which forwards the Board's report, the Board states that the functions performed by ventilation systems in plutonium processing facilities are vital to the protection of the worker, the public and the environment and that a number of deficiencies exist in the ventilation systems at the sites reviewed, including the ability of the systems to:

- meet a "single failure" design criteria;

- operate under a loss of electrical power;

- provide adequate protection for control room personnel; and

- withstand design basis accidents.

Implicit in the Board's report appears to be an assumption that the ventilation systems at our plutonium facilities are safety-class systems and must therefore meet, for example, the criteria summarized above.

Based on the report's observations the Board questioned DOE's methods of analysis, maintenance and configuration management of important safety systems in these facilities and asked that the Department provide by December 15, 1995:

- a report that evaluates the design, construction, operation, and maintenance of ventilation safety systems at DOE's plutonium processing and handling facilities in terms of applicable DOE and consensus standards; and

- subsequent to the above review, a plan that details any corrective actions deemed necessary by DOE, and the results of USQ review where this is found to be appropriate.

Subsequent to the above report, the Board, on July 21, 1995, issued a letter to the Assistant Secretary for Environmental Management regarding ventilation-related issues specific to Rocky Flats Environmental Technology Site facilities. This letter requested that answers to those issues be included in the final study report that DOE would provide in response to *DNFSB/TECH-3*. The Department agreed to undertake the study and the Secretary designated the Office of Environmental Management as lead.

2.2 Facility Selection

Since DOE has numerous facilities that fit the broad *DNFSB/TECH-3* definition of "plutonium processing and handling facilities", and since many of them present little risk to workers, the public, and the environment, the team decided to limit the study to selected facilities. These were chosen based on factors such as plutonium inventories, future missions, known vulnerabilities, and risk. The goal of these selections was to apply the focus of the study where it might be of the most benefit. The facilities included in the study are as follows:

FACILITY	LOCATION (INITIAL OPERATIONS DATE)
Savannah River Site	F-Canyon (1954)/FB-Line (1960)
Rocky Flats Environmental Test Site	Bldg. 771/774 (1953) Bldg. 776/777 (1957) Bldg. 779 (1965) Bldg. 707 (1970) Bldg. 371/374 (1980)
Los Alamos National Laboratory	CMR (1952) PF-4 (1978)
Lawrence Livermore National Laboratory	Bldg. 332 (1960)
Hanford Site	PFP (1949) Bldgs. 234-5Z, 236-Z, 242-Z

2.2.1 Savannah River Site (SRS): F-Canyon/FB-Line

The F-Canyon is a large reinforced concrete structure located in the F-Area of SRS and completed in 1954. F-Canyon's primary activity until recently was recovering plutonium and uranium from irradiated reactor targets and spent fuel via the plutonium uranium solvent extraction (PUREX) process. FB-Line, which began operation in 1960, took the plutonium solution product from the F-Canyon PUREX process and converted it into a metal form suitable for storage or shipment to other DOE sites.

F-Canyon and FB-Line performed their primary missions until recent world changes reduced our need for plutonium. The current mission of these facilities is to stabilize surplus plutonium and transplutonium solutions and solids to meet DNFSB Recommendation 94-1 (Improved Schedule for Remediation) objectives.

2.2.2 Rocky Flats: Buildings 371, 707, 771, 776, 779

These facilities are all large reinforced concrete structures containing a variety of chemical and radiological material and processing equipment.

Building 371, completed in the late 1970s, is the most modern of the RFETS facilities in this study. Its original mission was to recover plutonium-239 from residues and convert it into plutonium metal. A secondary mission was to recover americium-241 and convert it to an oxide product.

Building 707, built in 1970, originally provided casting, fabrication, assembly, and testing of plutonium and non-plutonium parts. Currently, portions of Building 707 provide support for Recommendation 94-1 activities while other portions are being deactivated.

The original mission of Building 771, which began in 1953, was development of processes for recovery of plutonium and americium, plutonium chemistry research, and radiochemical analyses. Currently, Building 771 activities are related to stabilization and removal of the plutonium inventory. The original, and current, mission of Building 774 was to remove radioactive and chemical contaminants from aqueous process effluents.

Buildings 776/777, with initial operation in 1957, performed special production and research activities prior to curtailment of plutonium operations at the site. Current operations continue to support safe storage of plutonium, including repackaging plutonium that is currently packaged in contact with plastic and venting of storage drums.

Building 779, which became operational in 1965, performed research in metallurgy, chemistry, joining coatings, and machining. The facility is not currently operational and is awaiting deactivation.

2.2.3 Los Alamos National Laboratory: PF-4 and Chemistry and Metallurgical Research (CMR) Building

The PF-4 facility is a large reinforced concrete structure located in Technical Area-55 of Los Alamos National Laboratory (LANL). Construction was completed in 1977 and operations began in 1978. The historic and current mission is to perform basic and applied special nuclear material research to develop, demonstrate, and exchange technology and to provide production support for national defense and energy programs.

The CMR facility is a large multi-user facility that serves several scientific divisions. The facility was constructed in 1949. Its mission has been predominantly research, development, and testing support for the Office of Defense Programs.

2.2.4 Lawrence Livermore National Laboratory Building 332

The Plutonium Facility, Building 332, is a large reinforced concrete structure located within the Superblock high security area of Lawrence Livermore National Laboratory (LLNL). It became operational in 1961. Its original mission was to conduct research and development (R&D) in the chemical, metallurgical, and physical properties of plutonium. In 1977, the capability to develop plutonium device parts in support of LLNL's weapons testing program was added. In the early 1980s, the Special Isotope Separation program began research that resulted in construction of the Engineering Demonstration System for the Atomic Vapor Laser Isotope Separation (AVLIS) process. With the cessation of weapons testing programs, the Building 332 mission has shifted towards R&D related to weapons dismantlement, pit assembly and disassembly, and pit reuse.

2.2.5 Hanford Site: Plutonium Finishing Plant (PFP)

The PFP was designed in 1947 and began operating in 1949. Its original mission was to convert plutonium solutions from the site's processing plants to a metal and then fabricate it into weapons components. Due to mission changes, the fabrication capability was eliminated in the early 1960s and an enhanced scrap recovery capability was added in 1964. In the 1970s, an enhanced storage role resulted in the addition of the Plutonium Storage Complex. The current mission of these facilities is to stabilize surplus plutonium solutions and solids to meet Recommendation 94-1 objectives.

2.3 Review Method and Team Composition

The Secretary of Energy assigned responsibility for the study to the Assistant Secretary for Environmental Management (EM). The Assistant Secretary selected the Office of Nuclear Material and Facility Stabilization (EM-60) to form a team and conduct the study. EM-60 led the formation of the study team comprised of representatives from DOE headquarters, field office program organizations, and site prime contractors, including staff from two national laboratories. Team members are listed in Appendix A. The team subsequently designed and implemented the study. The blueprint for the study called for affected sites to perform self-assessments for the selected facilities to answer questions designed by the team to be responsive to the issues raised in *DNFSB/TECH-3*. On-site reviews were held at each site, with follow up reviews as required.

2.4 Report

This report is designed to fulfill the original request by the Board that DOE perform the study and issue a report to the Board, followed by corrective actions. To the extent that they are available, corrective actions have been included in the report. We will provide a more detailed corrective action plan to the Board by May 30, 1996.

2.5 Provision of Safety Assurance by Facility Authorization Basis

This section contains a description of how the Department currently determines that our facilities are safe to perform their assigned missions. It is included to avoid a misunderstanding regarding the role which DOE 6430.1A, *General Design Criteria*, and its predecessor documents play in that determination. Specifically, we note that while *DNFSB/TECH-3* evaluates Departmental facilities against the requirements of DOE 6430.1A and its predecessor documents, the Department depends on an approved authorization basis for ensuring that facilities are safe to perform their assigned mission. This includes dependence on the hazards safety analysis in combination with the safety evaluation report, which are key elements of the authorization basis.

Plutonium handling and processing facilities, like all radiological materials handling and processing facilities, have the potential to release radioactive materials in limited quantities during normal operation and in larger quantities in the aftermath of accidents. A principal objective in the design and operation of such facilities is to prevent the uncontrolled release and dispersal of radioactive materials. Release of radioactive materials is typically controlled by one or more confinement barriers and related systems, which successively restrict releases of radioactive material to the environment or into areas occupied by facility personnel.

Ventilation systems are important to safety as they serve as principal confinement barriers in a multiple confinement barrier system. As such, it has been the practice at DOE plutonium facilities to require that at least part of the ventilation system, which is part of the overall confinement system, should perform its safety function(s) under normal, abnormal and accident conditions. This practice is embodied in AEC Manual Chapter 6301, issued in 1963, as well as in DOE 6430.1A, issued in 1989. DOE 6430.1A includes more specific design requirements on confinement/ventilation systems for plutonium facilities. The order applies to the design and construction of new facilities and modifications to existing facilities, subject to the clarifications in section 0101, "Criteria Purpose and Application", of the Order and when the Order is included in the facility operations and maintenance contract. Initial construction of most DOE plutonium facilities predates the order, but it would be applicable to modifications to those facilities made after 1989.

For existing and new facilities, DOE has mandated the use of a disciplined safety analysis process culminating in a Safety Analysis Report (SAR) and DOE safety evaluation report to ensure that judgements regarding the need for and adequacy of potential safety structures, systems, and components (SSCs) are made in a structured manner subject to DOE approval. This process, which is described in detail in DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Non-reactor Nuclear Facility Safety Analysis Reports*, begins with a comprehensive hazard analysis and selective accident analysis. Based on these analyses the selection of safety-related SSCs and the need for certain safety management programs, e.g., radiation protection, training, maintenance, is made. There are two categories of safety-related SSCs: safety-class for public protection and safety-significant for worker protection and defense-in-depth. Failure of the safety function provided by a safety-class SSC could result in unacceptable consequences during the postulated design basis accident (DBA) or surrogate evaluation basis for existing facilities, sometimes referred to as the Evaluation Basis Accident (EBA). To facilitate making the safety-class designation, DOE uses a deterministic dose guideline of 25 rem Total Effective Dose Equivalent (TEDE) at the site boundary. This guideline is also proposed in section 4.1 of the Implementation Guide for DOE Order 420.1, *Facility Safety*. The guideline is predicated on the siting criteria in 10 CFR 100 and that used by the AEC and the NRC although it is more conservative in that the 50-year committed dose typically does not relate to a prompt effect. The approach proposed in the Implementation Guide for DOE Order 420.1 is also consistent with the approach used in current safety evaluations of our facilities. This process is followed by systems evaluations to determine specific performance criteria for the identified safety-class SSCs to ensure that their design, operation and maintenance are consistent with the facility safety analysis.

The safety analysis process described in DOE-STD-3009 also emphasizes the importance of the defense-in-depth philosophy in its evaluation methodology for determining safety SSCs. Safety issues related to ventilation systems are an important component of the evaluation. The standard specifically notes in discussing safety-significant SSCs related to defense-in-depth that "the major features of defense in depth typically comprise the outer or predominant means of mitigating uncontrolled release of hazardous material (e.g., ventilation system directing airflow to HEPA filters, building structure)..." For DOE plutonium processing and handling facilities, the process has identified ventilation systems as, at least, safety-significant SSCs.

Based on the results of the above safety analysis, pertinent operating limits and administrative controls are derived and specified as a part of the Authorization Basis in the Technical Safety Requirements (TSRs) much like the Technical Specifications required by the NRC for commercial nuclear power plants. The operability requirements in the TSRs for safety systems will typically include surveillance and test requirements in addition to normal maintenance requirements imposed by the maintenance program at a facility. TSRs are established to assure that parameters affecting key assumptions in the SAR accident analyses remain within acceptable limits.

The safety of DOE facilities with regard to the public, worker, and the environment has been, and continues to be, of the highest priority. New initiatives within DOE have resulted in a number of commitments to enhance and streamline the facility safety process. One of these initiatives is for DOE facilities to provide upgraded Authorization/Safety Bases. A well documented and maintained Authorization Basis is essential to ensuring facility safety.

The principal elements of an authorization basis for safe operation of a nuclear facility with a long-term mission consists of the following items: (1) a Safety Analysis Report produced in accordance with DOE Order 5480.23 and DOE-STD-3009; (2) its associated Safety Evaluation Report; (3) Technical Safety Requirements produced in accordance with DOE Order 5480.22; (4) a functioning Unreviewed Safety Question process in accordance with DOE Order 5480.21; and (5) a functioning configuration management, or change control, program. Once a nuclear facility has been designed and constructed, and authorized by DOE to operate, then the safety basis and configuration of the facility is controlled through a change control process and application of the unresolved safety question determination (USQD) requirement of DOE Order 5480.21. Depending on the nature and safety significance of the changes the SAR and TSR may be also be updated. DOE approval is required prior to implementing changes that resolve a positive USQ. All TSR changes require DOE approval. This process will ensure maintenance of a current DOE-approved authorization basis consistent with actual facility configuration.

In actuality, the ability to apply the change control process described above is a function of the degree to which the actual configuration of the facility is known, i.e., the degree to which the facility has "as-built" documentation. Such documentation must be developed by physical observation and maintained thereafter through use of configuration management. Section 5.2 of this report discusses this subject in more detail.

Until the components of the Authorization/Safety Basis are fully developed, interim safety bases are needed. These consist of SAR and TSR implementation plans with an associated graded Basis for Interim Operation (BIO) prepared in accordance with DOE-STD-3011-94, and a functional USQ program. The SAR and TSR implementation plan identifies the path forward for developing the upgraded documentation. The BIO provides a graded and integrated approach where potential deficiencies in existing elements of the Authorization/Safety Basis are identified and mitigated by compensatory measures.

DOE is in the process of implementing the above approach and has not yet completed an updated integrated safety analysis to determine the safety functions which should be assigned to ventilation systems for all facilities. It may be that future implementation of the above approach will identify ventilation system deficiencies that are not known or recognized today. Our review has been undertaken with the recognition that this is an evolving process and that unnecessary corrective actions not integrated with the overall safety improvement process could result in unnecessary delays to that process.

To use available resources cost-effectively it is critical to use the graded approach recommended in the DOE safety management hierarchy in application of these elements. For example, in providing guidance for SAR development, DOE-STD-3009 has promoted moving away from absolute expectations. The standard specifically states, "The graded approach applied to SAR preparations and updates is intended to produce cost-efficient safety analysis and SAR content that provides adequate assurance to the DOE that a facility has acceptable safety provisions without providing unnecessary information." This philosophy requires avoiding blind application of regulatory guidance and precedents to every facility and instead promotes using experience with facility operations combined with the knowledge of the intent of a particular regulatory requirement to determine what activities actually provide real safety benefit. DOE Orders have generally been prepared to address the set of safety requirements applicable to a Hazard Category 1 nuclear facility. These Orders acknowledge this fact by promoting a graded approach to implementing their requirements. Implementation of all requirements to all facilities would result in programs and requirements above those needed to ensure the safety of the public and workers and protection of the environment and would in fact have adverse effects by diverting resources from their most effective usage. All nuclear facility SSCs are to be designed, fabricated, installed, operated, tested, and maintained to meet standards that are commensurate with the importance of the safety function to be performed. Costs and efforts that are excessive given the significance of the hazards involved must be avoided.

3.0 Requirements

3.1 General *(relationship to AEC Manual and DOE 6430.1A)*

The eleven facilities reviewed as part of this report were brought into operation in the following sequence:

1. PFP (Hanford)	1949
2. CMR (LANL)	1952[1]

[1] Except for the plutonium storage vault constructed in 1986, to which DOE 6430.1 applies.

3.	Building 771/774 (Rocky Flats)	1953
4.	F-Canyon (SRS)	1954
5.	Building 776/777 (Rocky Flats)	1957
6.	FB-Line (SRS)	1960
7.	Building 332 (LLNL)	1960
8.	Building 779 (Rocky Flats)	1965
9.	Building 707 (Rocky Flats)	1970
10.	PF-4 (LANL)	1978
11.	Building 371/374 (Rocky Flats)	1980

Although exact information was not solicited on the design schedule for the facilities, it is assumed that the general design requirements would have been those in effect a few years prior to each facility's date of initial operations.

Ventilation systems in plutonium facilities designed prior to 1963 (facilities 1-8 above) were designed using the building codes in effect at the time and in accordance with the engineering judgement of the responsible design professionals. In 1963, AEC Manual Chapter 6301, Appendix 6301, General Design Criteria, was first published and made available for the design of new buildings and facilities, and modifications to existing buildings and facilities. It contained very general requirements for ventilation systems with the caveat to conduct studies to determine what special ventilation system requirements might be needed for areas subject to contamination by toxic, noxious, or explosive materials. In March of 1971, a document entitled "Criteria for Plutonium Storage Facilities" was made effective for existing and proposed plutonium storage facilities by a memorandum from the AEC Deputy General Manager to the Managers of Field Offices. In April of 1971 a document entitled "Minimum Criteria for New Plutonium Facilities" was circulated for review and comment. After modification in response to comments received, these criteria were incorporated in September of 1974 into AEC Manual Chapter 6301 as Part II, Section I, of Appendix 6301. Hence, Appendix 6301 of AEC Manual Chapter 6301 and associated documents governed the design of plutonium ventilation systems built from 1963 to 1983. From 1983 to the present time, DOE 6430.1 (issued 12-12-83) and DOE 6430.1A (issued 4-6-89) entitled "General Design Criteria" and NRC Regulatory Guide 3.12 (invoked by reference in DOE 6430.1, dated August 1973), have governed new construction of and significant modifications to ventilation systems in the Department's plutonium facilities. A table summarizing the key plutonium ventilation system design features contained in Appendix 6301 of AEC Manual Chapter 6301, AEC Regulatory Guide 3.12, and DOE 6430.1A is provided in Appendix B of this report.

Although most of the Department's plutonium ventilation systems were not originally designed using criteria comparable to those contained in DOE 6430.1A, they have been evaluated in varying degrees against modern design criteria. A comparison of the facilities evaluated in this report against the more significant criteria contained in DOE 6430.1A for plutonium ventilation systems is provided in Appendix C and can be summarized as follows:

- All systems are designed to ensure that the air flows toward the source of greatest potential contamination.

- Emergency power and redundancy are provided for active, safety-class components. The emergency power systems do not necessarily meet current design requirements for safety-class SSCs.

- The most consequent accident initiator is a seismic event since most of the facilities considered in the report do not fully meet the current design (or evaluation) basis earthquake requirements. Vulnerabilities are known to DOE and have either been accepted or are being addressed.

- DOE needs to take action to verify bypass leakage assumptions made as part of the safety analyses at several facilities (see section 3.2.8).

- Operator action is not required to accomplish the safety functions of the safety-class systems, but operator access during and after accidents is provided either by recirculating type ventilation for control rooms or self-contained breathing apparatus, depending on the system design.

- Rigorous single-point failure analyses have not been performed for the reviewed facilities (see section 3.2.2).

Most of these comparisons were done in response to DOE 5481.1B, *Safety Analysis and Review System*, which required a comparison to current design criteria for existing facilities as part of the safety analysis process. DOE 5480.23, *Nuclear Safety Analysis Reports*, has since superseded DOE 5481.1B for nuclear facilities.

As noted in the discussion of section 2.5 regarding authorization basis, the vehicle used to ensure that the facilities are safe to operate and to support the technical oversight function is not pure compliance with DOE 6430.1A or its predecessor documents. It is the facility authorization basis described in section 2.5. It is DOE's position that approval of the facility authorization basis, including the SAR, effectively comprises approval of deviations from the requirements of the original design requirements. Table 3.1-1 summarizes the facility authorization bases for those facilities reviewed in this report.

Table 3.1-1
Facility Authorization Bases

Facility	Authorization Basis	Comments
PF-4 (LANL)	1978 FSAR, 1988 OSRs.	Draft FSAR and TSRs prepared to Order 5480.22, DOE 5480.23, and DOE STD 3009-94 have been commented upon by DOE. Final action scheduled for June 1996.
CMR (LANL)	1992 Interim Safety Analysis Report and JCO.	Draft FSAR and TSRs prepared to Order 5480.22, DOE 5480.23, and DOE STD. 3009-94 are being reviewed by DOE. Final action scheduled for June 1996.
Building 332 (LLNL)	Approved DOE 5480.22 and 5480.23 SAR and TSRs.	
Buildings 707, 771/774, 371/374, 776/777, 779 (Rocky Flats)	707: Approved SAR of 1987, OSRs approved 1988; revisions approved since. Other buildings: Approved SAR of 1987, OSRs approved *1988, with change in 1995 affecting ventilation.	707: SAR does not meet 5480.23; update of 1991 provides additional details. BIO approved 8/94. Other buildings: Same as above except not updated in 1991. JCOs specify safety authorization basis for specific activities when not in compliance with OSRs.
F-Canyon and FB-Line (SRS)	1986 SAR with 2 addenda; 1995 OSRs and BIO.	Documentation reflects current mission. 5480.22 TSRs and 5480.23 SAR will be completed by 9/30/97.
PFP (Hanford)	Approved 1995 FSAR; approved 1994 5480.22 OSRs.	Documentation reflects current mission; no intention at this time to update SAR and TSRs to meet 5480.22/.23 due to limited expected facility life.

Based on the safety analyses, not all parts of the ventilation systems at the reviewed facilities were deemed to be safety-class. For example:

- At PF-4 at LANL, only the passive part of the confinement system is safety-class. (Safety analysis is under review by DOE.)

- At CMR at LANL, the only part of the facility that is safety-class is the new plutonium vault. (Safety analysis is under review by DOE.)

- At PFP at Hanford, only the passive part of the system and the seismic ventilation shutdown switch are safety-class. (Safety analysis was approved by DOE in January 1995.)

The Department is not satisfied with the state of the facility authorization bases for buildings 771/774, 371/374, 776/777 and 779 at Rocky Flats, as they do not reflect the current mission(s) for those buildings. Actions are underway to revise the authorization bases for those buildings through the use of Bases for Operation (BFO). Section 4.1 addresses this program.

3.2 Results of review of detailed requirements

This section addresses concerns raised by *DNFSB/TECH-3* regarding compliance with specific requirements of DOE 6430.1A. The requirements are discussed only for those facilities where the hazard category of the facility causes a given requirement to be invoked.

In some cases further action is committed to by DOE to resolve comments made in *DNFSB/TECH-3* or developed as part of this review. In other cases an explanation is provided as to why DOE is taking the approach it is even though that may differ in part from the comments in *DNFSB/TECH-3*. In most cases this difference relates to our use of an evaluation basis in combination with the safety analysis to ensure that a facility is safe as opposed to the prescriptive application of DOE 6430.1A or predecessor requirements. We have consolidated our responses to specific *DNFSB/TECH-3* comments in Appendix D, where they are organized by facility.

3.2.1 Operability during Design Basis Accidents (DBAs)

Section IV.A of *DNFSB/TECH-3* raises concerns regarding the acceptability of passive confinement/ventilation system designs for meeting the requirements of DOE 6430.1A section 1300-1.4.2, *Accidental Releases*. The DNFSB report quotes most of section 1300-1.4.2 and interprets it to require: (1) at least one confinement system to continually operate (meaning to have an operational filtration system and enclosure which continues to function up through the DBA stage), and (2) a public dose limit of 100 mrem. The report states: "The passive safe shutdown concept does not meet the DOE *6430.1A* operability requirements of one fully functional confinement system with no unmitigated leakage ...," and raises concern over the failure to file for and approve deviations from the DOE 6430.1A requirements. The report also quotes certain criteria from section 1550-99.0.1 of DOE 6430.1A concerning the design of ventilation system safety-class items, raises concerns regarding control room staffing, and concludes by stating: "In summary, there are some DOE plutonium facilities where the operability requirements contained in DOE Orders for personnel and functioning safety equipment are not being met."

Based on the above, and other sections of *DNFSB/TECH-3*, e.g., section IV.C, *Emergency Power*, which states: "Section 1300-1.4.2 requires the confinement system to remain fully functional, i.e., maintain the controlled air flow and negative pressure...", clarifications appear to be required concerning the safety function and operability requirements of plutonium facility confinement/ventilation systems. These are discussed below. Clarifications regarding the public dose limit at the nearest point of public access during a design basis accident, and the applicability of DOE 6430.1A to existing facilities are addressed in sections 3.1 and 5 of this report. Sections 3.1 and 5 note that the facilities covered by this review were all constructed prior to issuance of DOE 6430.1A and thus whether or not the order requires, for example, a forced ventilation system to operate during and after a DBA, is not relevant to the basic design requirements for those facilities.

The safety function of the confinement/ventilation system with respect to accidents, in accordance with section 1300-1.4.2, is to **"preclude offsite releases that would cause doses in excess of** the DOE 5400 series **limits for public exposure**" (emphasis added). The requirement for "at least one confinement system to remain fully functional following any credible DBA" is interpreted to refer to the system remaining capable of performing its safety function, e.g., limiting public exposure to acceptable levels. Section 1300-7, *Confinement Systems*, contains statements which are subject to interpretation as to whether or not DOE 6430.1A requires a forced ventilation system be operative during and after a DBA. It contains, for example, a general requirement to maintain "...controlled, continuous airflow pattern from the environment into the confinement building..." It also has a requirement to consider NRC Regulatory Guide 3.12, which requires forced ventilation systems as part of confinement. On the other hand, DOE 6430.1A notes that, "For a specific nuclear facility, the number and arrangement of confinement barriers and their required design features and characteristics shall be determined on a case-by-case basis." DOE 6430.1A has been interpreted to mean that the specific confinement/ventilation system equipment and components required to accomplish this safety function for accident conditions, and whether their design is active or passive, are not specified by requirement.

Clearly, the portions of the confinement/ventilation system required to accomplish the public protection safety function must be designated as safety-class. Section 1550-99.0.2, *Confinement Ventilation Systems*, of DOE 6430.1A states:

> *A safety analysis under DOE direction shall establish the minimum acceptable performance requirements for the ventilation system and the response requirements of system components, instrumentation, and controls under normal*

operations, anticipated operational occurrences, and DBA conditions. The safety analysis shall determine system requirements such as the need for redundant components, emergency power for fans, dampers, special filters, and fail-safe valve/damper positions. The safety analysis and the guidelines provided by the cognizant DOE authority shall determine the type of exhaust filtration required for any area of the facility during normal operations, anticipated operational occurrences, and DBA conditions.

In addition to DBA-specific operability requirements, the importance of a continually operating forced air confinement system during normal operations is recognized as part of normal operating requirements, e.g., for worker exposure, contamination control, and defense-in-depth considerations. Therefore, the system will be recognized as at least safety-significant by the safety analysis process. A forced air flow confinement system during normal operations is required on all facilities reviewed as part of this report. It is also typical that active ventilation systems remain operable during minor incidents, e.g., small spills, to minimize exposure to workers and to mitigate the spread of contamination inside the building.

Although certain fire scenarios may be an exception, there are potential advantages concerning reduced public dose if the forced air flow confinement system remains operable during DBA conditions. However for many of our older facilities, confinement system modifications to enable forced ventilation during all accident conditions is not practical. The safety analysis for those facilities is used to determine whether or not for a small set of accidents, a passive confinement system is acceptable. It is our position that passive confinement is not precluded by DOE orders if the facility specific safety analysis adequately demonstrates the acceptability of the design to perform the required safety function. For example, safety analyses have been performed for PFP at Hanford and PF-4 and CMR at LANL as support for conclusions that the passive confinement approach at those facilities provides adequate protection against releases during accident conditions. This is also true for F-Canyon at Savannah River, where only an evaluation basis earthquake could create a condition requiring reliance on passive confinement. The LANL analyses are under review now, and a number of review questions are specifically directed toward justification for the leak rate calculational assumptions. Action on the CMR and PF-4 SARs is scheduled for June 1996. If a TSR cannot be defined which adequately tests leakage assumptions, the potential exists for disallowing use of the passive confinement concept. The PFP and F-Canyon analyses have been approved as part of the SAR/BIO approval actions.

DOE recognizes that the assumptions made in these analyses are critical to the determination of the adequacy of the passive ventilation system. This applies in particular to the assumed source term and leakage rate. To help ensure the adequacy of SAR reviews, including the conservatism of assumptions made in the safety analyses, DOE has under preparation documents which provide guidance to assist those reviewing and preparing SARs. By March 31, 1996, DOE will draft guidance which will caution the reviewer to ensure that:

- source term assumptions are conservative and, where practical and necessary, are supported by test data;
- bypass leakage rate assumptions, e.g., around penetrations and door seals, are supported by test data or other DOE-approved methodology; and,
- compliance with the above assumptions is part of the facility TSRs.

The guidance must receive review equivalent to that which a standard receives and thus will not formally be issued until September 30, 1996.

The preceding discussion describes DOE's understanding of the requirements of DOE 6430.1A relative to system operability during DBA's, why we believe that a passive confinement system is acceptable under certain circumstances and what we are doing to ensure the conservatism of such analyses. DOE is aware of the Board's concern with reliance on passive ventilation systems to mitigate the consequences of accidents. The Board's views will be further considered as DOE finalizes the Implementation Guide for DOE 420.1.

Appendix C to this report shows in matrix format how the characteristics of the facilities reviewed compare to the requirements of DOE 6430.1A.

3.2.2 Single Failure and Redundancy

DNFSB/TECH-3 raises the issue of single failures and redundancy requirements for special safety equipment which typically includes ventilation systems. Single failure criteria are fundamental to all modern standards related to design and construction of nuclear facilities.

Specifically, section 1300-3.3 of DOE 6430.1A states that:

> *The design shall ensure that a single failure does not result in a loss of capability of a safety system to accomplish its required safety functions. To protect against single failures, the design shall include appropriate redundancy and shall consider diversity to minimize the possibility of concurrent common-mode failures of redundant items.*

Single failure and redundancy requirements are also included in AEC Manual 6301 under the General Design Criteria for Plutonium Facilities sections 6, e, (2), (d) and (e) which state:

> *(d) Sufficient redundancy and/or spare capacity shall be provided to assure adequate ventilation during normal operations and DBA conditions.*
>
> *(e) Failure of any single component or control function shall not compromise minimum adequate ventilation.*

Similarly DOE 420.1 requires that safety-related SSCs shall, commensurate with their safety functions, be designed so that they can reliably perform their safety functions when called upon to operate. The DOE 420.1 draft implementation guide requires that the single failure criterion, requirements and design analysis identified in ANSI/IEEE 379 be applied during the design process as the primary method of achieving the required reliability. In the past the Department identified no standardized method for performing the necessary analysis.

The DOE 6430.1A criteria specifically apply to safety systems, which is interpreted to mean safety-class systems. The criteria in AEC Manual 6301 that refer to "adequate ventilation" and "minimum adequate ventilation" are again interpreted to apply to safety-class systems using present terminology. The design and construction of all of the facilities in this study predate DOE 6430.1A and some predate AEC Manual 6301. Nevertheless, DOE 5480.23 requires that safety analyses be performed to identify safety-class SSCs. The safety analysis is the vehicle which is used to determine if the systems are adequately designed to protect the worker, the public and the environment.

If the requirements of DOE 6430.1A or AEC Manual 6301 apply to a facility, the safety analysis must include single failure and redundancy considerations. Any single failure points, or lack of adequate redundancy must be remedied unless justification is provided in the SAR and a deviation or waiver is approved by DOE.

The following table gives the status of single failure analyses (SFA), the DOE 5480.23 safety analysis report or basis for interim operation (SAR/BIO) and whether or not the facilities meet the single failure criterion *for safety-class systems*. The safety analyses are utilized to ascertain the consequences of the limiting accidents, with appropriate consideration of single failures and their effects.

Table 3.2-1
Single Failure Analyses (SFA)

Contractor/ facility	Safety-class SSCs	Design Requirements (DOE 6430.1A or AEC Manual 6301)	SFA Performed	DOE 5430.23 SAR/BIO Prepared	Vent System Meets Safety-Analysis Requirements
LANL PF-4	PF-4 structure, HEPA filter plenums, and ductwork from plenums to structure.	Yes, AEC Manual 6301	No (Failure Mode and Effects Analysis [FMEA] performed)	BIO. SAR under review by DOE	Yes
LANL CMR	None	No	No	SAR under review by DOE	Yes
Hanford PFP	Final HEPA filters, seismic ventilation cutoff switch.	No	No	Yes	Yes
LLNL Bldg 332	B332 structure, room ventilation, glovebox ventilation, down draft ventilation, final HEPA stages, emergency power, fire protection	Increments 1 and 2: No. Increments 3 and 4: Yes, AEC Manual 6301	Yes (partial - Emergency power automatic transfer switch does not meet SFA criteria.	Yes	Yes

Contractor/ facility	Safety-class SSCs	Design Requirements (DOE 6430.1A or AEC Manual 6301)	SFA Performed	DOE 5430.23 SAR/BIO Prepared	Vent System Meets Safety-Analysis Requirements
RFETS 371/374	Ventilation ducts, HEPA filter plenums, fans, zone barriers (glove boxes, rooms, building), emergency power, fire detection/ alarm/ suppression	No	No (FMEA performed)	No - BFO planned	Yes
RFETS 707	Same as above.	No	No (FMEA performed)	Approved BIO.	Yes
RFETS 771	Same as above.	No	No (FMEA performed)	No - BFO planned	Yes
RFETS 776/777	Same as above.	No	No (FMEA performed)	No - BFO planned	Yes
RFETS 779	Same as above.	No	No (FMEA performed)	No - BFO planned	Yes
SRS F-Canyon	Active ventilation for non-seismic DBAs. Ventilation not operable following DBE.	No	No (equipment reliability study performed)	Yes - BIO approved.	Yes

The following is a facility-specific discussion of the table contents.

Bldg 332, LLNL.

Bldg 332 at LLNL has performed a study to determine if potential single failures exist for the emergency power system, which supports the safety-class ventilation system. This study, "Fault Tree Analysis of Building 332 Emergency Power System" UCRL-ID-118275 by Lychin Chang, May 1995, identified one potential single failure, namely the emergency power automatic transfer switch. This situation was considered in the DOE-approved Bldg 332 authorization basis, which includes DOE 5430.23/22 compliant Safety Analysis Report/Technical Safety Requirements.

F-Canyon/FB-Line, SRS

The F-Canyon/FB-Line at SRS has not done a formal SFA. However, a safety system reliability study has shown that assumptions used are adequate to support the DOE-approved authorization basis.

PFP, Hanford

PFP has not done a formal SFA. In the case of the PFP ventilation fans noted in *DNFSB/TECH-3* the components in question are not, according to the PFP authorization basis, safety-class and thus protecting against common mode failure is not a requirement.

PF-4, LANL

PF-4 at LANL has performed an FMEA which has identified no potential single failures in safety-class systems. In the case of the PF-4 single-point failure noted in *DNFSB/TECH-3*, the PF-4 SAR currently under review recommends that the inlet butterfly dampers, which are not safety-class and thus are not required to meet the single-failure criterion, be locked open. This is considered the mode which would result in minimum particulate release during an accident. Internal building pressurization with the dampers open would result in a higher proportion of leakage exiting through the HEPA-filter in the ventilation supply line as opposed to through unfiltered paths such as door seals.

CMR, LANL

The CMR facility at LANL has not identified any safety class SSCs in their draft SAR and therefore single failure criteria do not apply. The SAR is currently under review by DOE.

Rocky Flats

The facilities at Rocky Flats have performed failure modes and effect analyses (FMEA) that do not include rigorous single failure analyses. The data from these FMEAs have been factored into the facilities' safety analysis reports.

Future DOE Action

Together, DOE 420.1 and its draft implementation guide provide the basis and a strong requirement for use of a single failure criterion during the design of safety SSCs for new facilities. Further, the draft implementation guide requires the use of a proven industry standard to meet this requirement. Combined with the better understanding of facility safety provided by SARs prepared in accordance with DOE 5480.23, facility designers have both the impetus and the tools required to apply a single failure criterion to new designs.

For existing facilities, a rigorous single failure analysis is also an important element of the facility safety analysis both because of the need to ensure reliable performance of important safety functions as well as to ensure that modifications are made only where it has been determined, through safety analysis, that the situation poses unacceptable risk. DOE, therefore, will consider the need for more explicit requirements to perform reliability analyses, such as single failure analysis to the industry standard on this subject. The need to establish such requirements will be determined by March 31, 1996.

3.2.3 Emergency Power

The DNFSB evaluation of the need for emergency power cites two specific requirements from DOE 6430.1A. In addition, the evaluation points out that PF-4 at TA-55 does not have emergency power as defined in the order and that no deviation or exception has been approved by the DOE.

The first example cited in *DNFSB/TECH-3* is from section 1161-4 which states, "Safety-class items of the ventilation system shall be supplied with emergency power". Thus, any active components of the ventilation system requiring electrical power that have been determined to be safety-class shall have an emergency power source.

The second example is from section 1300-1.4.2 which states, "Release of hazardous materials postulated to occur as a result of DBAs shall be limited by designing facilities such that at least one confinement system remains fully functional following any credible DBA, i.e. unfiltered/unmitigated releases of hazardous levels of such materials shall not be allowed following such accidents". Further, discussion with DNFSB staff indicates that the DNFSB has interpreted this guidance to mean that the one confinement system that remains functional following this DBA should be composed of "active" components to be considered a "system".

Section 3.2.1 provides the rationale for not requiring forced ventilation systems as the only means of attaining acceptable confinement during and after an accident. As discussed in the PF-4 SAR now under review by DOE, PF-4 does not have a safety-class forced ventilation system and therefore emergency power is not considered to be required. The PF-4 diesel-generator, which is remotely started by manual computer commands on loss of normal power, does provide backup or standby power for safety-significant systems, including the ventilation system, on loss of off-site power. To ensure continuous power for the zone 1 (glovebox) exhaust system, a system change is planned to provide an Uninterruptable Power Supply (UPS) for the zone 1 exhaust fans. This will ensure their continued operation upon a loss of normal power until the diesel-generator can be started. The diesel-generator will provide power, by charging the UPS, for the zone 1 exhaust fans while simultaneously directly powering the zones 2 and 3 fans after they have been manually loaded onto the diesel-generator bus. New air compressors will also be provided, for a more reliable instrument air supply.

These changes are considered a cost-effective addition to improve "defense in depth" and help ensure functioning of the safety-significant forced ventilation system during a power outage.

Table 3.2-2 provides a summary of the emergency power situation at the facilities reviewed.

Table 3.2-2
Emergency Power Requirements

Contractor/Facility	Active Safety-class System Installed	Needs Emergency Power	Has Emergency Power	Standby Power[1] Required
LANL PF-4	No	No	No	Yes - remote manually-started DG. UPS connected to zone 1 is being added.
LANL CMR	No	No	No	No
Hanford PFP	Yes - Seismic shutdown switch	No	No	Yes - steam-powered fans and DG's
LLNL Bldg 332	Yes	Yes	Yes	No
RFETS 371/374	Yes	Yes	Yes[2]	No
RFETS 707	Yes	Yes	Yes[2]	No
RFETS 771	Yes	Yes	Yes[2]	No
RFETS 776/777	Yes	Yes	Yes[2]	No
RFETS 779	Yes	Yes	Yes[2]	No
SRS F-canyon	Yes	Yes	Yes[3]	No

[1] Power in addition to that required for safety-class systems.

[2] Emergency power is capable of meeting load requirements, but it does not meet safety-class reliability standards and is not seismically qualified.

[3] As part of canyon exhaust system upgrade project now underway normally-running diesel-generator will be removed, leaving two offsite power sources and two emergency diesel-generators to supply safety-class and safety-significant systems. New diesel-generators are scheduled to be installed by August 1998.

In summary, the facilities reviewed use either passive or active safety-class ventilation/confinement systems and justify that action through the safety analysis reports. Emergency power is provided for those active systems which must function during and after an accident. The degree of detailed compliance with DOE 6430.1A varies among facilities due to their age, but the safety analysis considers the facilities as they are and is used as the vehicle to determine if the installation is satisfactory given the current facility mission.

If there are no active safety-class components, there is no need for emergency power, e.g., at LANL (PF-4 and CMR). However the presence of *standby* power, such as at PFP and PF-4 and as is being evaluated for the upgrade to CMR, provides further "defense in depth". We believe that the proper action in the near term is to ensure that the safety analysis reports are prepared, appropriately reviewed, and acted upon expeditiously to confirm that the current operating conditions are sufficient to meet evaluation guidelines. This is underway as summarized in Table 3.1-1, *Facility Authorization Bases*.

3.2.4 Control Room Protection

The *DNFSB/TECH-3* raises the issue of control room habitability as a specific requirement of DOE 6430.1A. The Board report cites two sentences from section 1550-99.02 of DOE 6430.1A that pertain to this particular issue:

> *Where spaces, such as a control room, are to be occupied during abnormal events, safety-class filtration systems shall be provided on the air inlets to protect the occupants.*
>
> *Stack location and height shall also consider intakes on the facility and adjacent facilities to preclude uptake.* (See section 3.2.5 for response to the recirculation/stack height question.)

Although the above philosophy does represent modern thinking with respect to protecting facility control room operators, it is not the philosophy that was predominantly applied when the Department's plutonium facilities were built. It should be noted that the concept of a single central control room, such as at a reactor, is not valid for some of these facilities. Required actions during or after abnormal events are often expected to be performed at local stations, including where the facility process operations are being performed. The ventilation system itself is controlled automatically and thus in case of an accident the immediate operator action would be to evacuate. Recovery actions which might require manipulation of the ventilation system would be performed after donning protective equipment. Following is a summary of the control room protection provided at each of the facilities studied.

The PF-4 facility protects control room operators from airborne contamination by using HEPA filters on the operations center air intakes and by providing the capability to manually convert to 100 percent recycle of air during abnormal events. The contractor has proposed that the combination of these two protective features is adequate for the protection of operators even though the exhaust discharge location is on the same side of the building as the control room air inlets. This conclusion is under review as part of the DOE review of the proposed SAR.

The CMR Laboratory has no areas which require operators to be present during abnormal events. Effectively, they have no control room.

Building 332 at LLNL has a video control area which is not part of the radiological materials area and from which panels in the nearby control room are monitored. Respirators are available for use by operators during abnormal events to protect them temporarily while performing any required actions, whether inside or outside the video control area.

Control rooms in the Rocky Flats buildings are provided with filtered air. In addition, the air supplied to the control rooms is under positive pressure relative to adjacent areas. These two measures provide adequate protection for facility operators during normal operations and abnormal events.

SRS FB-Line/F Canyon operators are protected by isolation from most abnormal events by the canyon structure, maintenance of positive pressure differentials between occupied areas and process areas, and by the use of an elevated exhaust stack to disperse effluents. When actions are required in a potentially contaminated area, respirators are supplied to provide temporary protection.

The PFP processing and storage facilities house facility operators in a common ventilation control room. Air for this room is filtered and maintained at a positive pressure relative to the processing and storage areas.

A tabular summary of control room protection provided at the facilities reviewed is contained in Table 3.2-3.

Table 3.2-3
Control Room Protection

Contractor/ Facility	Operator Action	Control Room Operator Protection	Safety-class
LANL PF-4	No operator response required to mitigate accidents below Evaluation Guidelines (EGs).	Intake HEPA filtered. Operations Center ventilation system can be switched to 100% recirculating.	None
LANL CMR	N/A - no control room	N/A	N/A
Hanford PFP	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
LLNL Bldg 332	No operator response required to mitigate accidents below EGs.	Respirators provided for control room and other operators.	None
RFETS 371/374	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
RFETS 707	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
RFETS 771	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
RFETS 776/777	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
RFETS 779	No operator response required to mitigate accidents below EGs.	Control room air supply is filtered and maintained at a positive pressure with respect to processing areas.	None
SRS	No operator response required to mitigate accidents below EGs.	Intake air filtered but not by HEPA filters. Self-contained breathing apparatus (SCBA) provided for operators.	None

In summary, none of the current DOE plutonium facilities have design basis or evaluation basis accidents that require control room operators to take any action to maintain off-site doses below evaluation guidelines. Operators can evacuate control rooms during potential accident situations and off-site doses will not exceed evaluation guidelines. Safety-class ventilation systems are, therefore, not required for control rooms in the plutonium facilities reviewed.

3.2.5 Stack Height/Elevated Release

As the DNFSB evaluation points out, the current criteria contained in DOE 6430.1A and related documents require the use of elevated stacks for exhaust discharge from plutonium facilities. NRC 3.12 and DOE 6430.1A both contain design criteria regarding discharging filtered air to an elevated stack. DOE 6430.1A also requires: (1) provisions for an alternate discharge path and maintaining sufficient distance from nearby safety-class items in the event of stack failure, or a stack design that remains functional following all credible natural phenomena and man-made events; and (2) precluding unnecessary uptake by workers through proper consideration of the location of facility ventilation intakes when determining stack height and location.

Although use of the above criteria is considered prudent practice by today's standards, the design criteria under which most of the Department's plutonium processing and handling facilities were designed, i.e., building codes and AEC Manual Chapter 6301, do not require them. The use of elevated stacks for exhaust discharge was left to the discretion of the engineering professionals who designed such facilities. Furthermore, the results of the safety analyses done to justify and authorize continued operation of the Department's plutonium facilities have not concluded that there is a need to backfit elevated stacks for those facilities which do not have them. The specific rationale used to support current designs with respect to exhaust discharge considerations is contained in the paragraphs that follow. For additional information regarding control room protection, see section 3.2.4.

The PF-4 facility at LANL does not take credit for having an elevated stack; it has an eight foot sheet metal extension on top of the building. The model used to calculate offsite doses from an accident at PF-4 takes no credit for an elevated release and calculated doses using this model are well within the 25 rem offsite evaluation guideline. In addition, although the operations center ventilation intakes are on the same side of the building as the exhaust discharge point, the ventilation system for the operations center has a HEPA-filtered intake and has been modified to allow for manual conversion to 100 percent recirculation mode following a potential release from the north exhaust stack.

The CMR facility at LANL has 65-foot stacks that are not seismically qualified. No credit is being taken for an elevated discharge when calculating offsite doses for the evaluation basis seismic event or for any other evaluation basis accidents. The worst-case calculated offsite doses contained in the accident analyses use the assumption of a ground-level release and do not exceed the 25 rem offsite evaluation guideline. The prevalent wind direction is not toward the ventilation intake and the exhaust discharge point and air inlet are separated by over 250 feet. Hence the potential for exhaust-to-intake recycling of air is minimal.

Building 332 at the Lawrence Livermore National Laboratory has 6 to 8 foot stacks. No credit has been taken for elevated releases in the accident dose calculations, i.e., a ground-level release was assumed for the unfiltered case. Based on criteria in chapter 14 of the 1989 ASHRAE Handbook concerning airflow around buildings, it has been concluded that the location of the exhaust discharge is sufficiently remote from the building air intakes to minimize exhaust recycling.

Plutonium facilities at Rocky Flats have all been evaluated with respect to stack height and location of exhaust discharges from facility ventilation systems. The results of this evaluation indicate that all of the Rocky Flats plutonium facilities' discharge heights and locations are adequate with respect to maintaining doses below offsite evaluation guidelines. In addition, based on a drawing and prevailing wind review by qualified engineering personnel, the current discharge configurations do provide assurance that exhaust discharge is not reintroduced into ventilation system intakes.

The FB-Line and F-Canyon plutonium facilities at Savannah River exhaust filtered air through a common elevated (about 200 foot) stack. An analysis of this stack indicates that the main structure will withstand the evaluation basis earthquake; however the stack liner will not. To compensate for the potential loss of an exhaust path in the event that the liner collapses, emergency response procedures are in place to provide an alternate exhaust path. In addition, for the evaluation basis earthquake, dose calculations contained in the authorization basis accident analyses take no credit for an elevated release and fall within Westinghouse Savannah River Corporation (WSRC) offsite and onsite evaluation guidelines. Furthermore, exhaust discharge via the stack is approximately 700 feet from ventilation system intakes, the predominate wind directions are not toward the intakes (from the stack), and the canyon structure is between the stack and the intakes. Hence, the potential for recycling exhausted air to the intakes is minimal.

The main PFP process buildings at the Hanford site exhaust filtered air to a single elevated (200 foot) exhaust stack. Analysis of potential accidents for this complex shows that the on-site and off-site dose consequences do not exceed evaluation guidelines. Analysis also indicates that the stacks meet current seismic requirements. In addition, the 200 foot stack is located about 500 feet from the air intakes and only the least prevalent winds would carry the plume toward these intakes. Furthermore, the discharge height is over 150 feet above the intake height resulting in an exhaust plume that passes well above the intakes. Hence, there is minimal potential for recycling exhausted air to the ventilation system intakes.

In summary, although the exhaust stack designs and exhaust/intake relationships for the plutonium facilities reviewed in this report do not all meet the requirements which would be required for a new facility, they are consistent with their safety analyses and do not pose an unacceptable risk to the public or workers.

3.2.6 Seismic

Although *DNFSB/TECH-3* did not single out seismic-related design issues with respect to the ventilation systems at the Department's plutonium facilities, seismic safety is recognized as a generic design issue and was evaluated as part of this study. It is intended that safety-class SSCs shall be designed and constructed to withstand the effects of natural phenomena, including seismic events. The specific seismic requirements for ventilation systems are dependent on the safety function assigned to those systems based on the hazard and accident analysis. Table 3.2-1 provides a list of safety-class SSCs identified in upgraded SARs, where available, for the subject facilities. Systematic assessments of non-safety-class ventilation systems for seismic ground motion have not been completed for all facilities. Seismic vulnerabilities were discussed in the DOE Plutonium Working Group Report on Environment, Safety and Health Vulnerabilities Associated with DOE's Plutonium Storage (DOE/EH-0415, 11/94).

The task of assessing the seismic capacity for existing facilities is dependent on the original seismic design. There is a wide variation in the original seismic design of DOE facilities. Some facilities were designed without any consideration of specific seismic criteria, some were designed to the seismic requirements found in model building codes at the time of their construction, and a few were designed to stringent seismic requirements for nuclear facilities. To quantify the seismic performance for existing facilities, DOE establishes an Evaluation Basis Earthquake (EBE) and determines if safety-class SSC's can meet the EBE while maintaining the SSC safety function. The summary provided below presents the status of seismic assessments for safety-class SSC's.

The EBE for the PF-4 facility at Los Alamos is defined as a peak ground acceleration of 0.30g. Safety-class SSC's for PF-4 include the PF-4 structure, filter plenums and the ductwork from the plenums to the structure. The PF-4 structure and filter plenums have been found to have a high confidence of surviving a 0.44g peak ground acceleration or larger, while the ductwork from the glovebox exhaust filter plenum to the structure has a high confidence of surviving a 0.28g peak ground acceleration. The seismic capacity for safety-significant SSC's is variable, with a number of components having seismic capabilities significantly lower than would be required to meet the EBE. While the accident analysis included in the draft SAR indicates that the risk of an EBE is acceptable, DOE has decided to upgrade by September 30, 1996 the seismic resistance of twelve glove boxes, which contain over 50% of the PF-4 source term. Another fifty glove boxes are being evaluated for possible upgrade. The schedule for any additional upgrades will be developed by June 30, 1996, after the specific gloveboxes to be modified have been identified.

The EBE for the CMR facility at Los Alamos is also a peak ground acceleration of 0.30g. The CMR facility was built to the requirements of the 1949 Uniform Building Code which did not include specific seismic requirements. Current seismic evaluations have demonstrated that the CMR structure would not survive the EBE, and as a result administrative material inventory limits are in place such that the total off-site dose would be less than 25 rem at the site boundary. The CMR special nuclear materials storage vault was designed to meet the DOE 6430.1 seismic requirements which are about equal to current requirements for the EBE. A line item project that includes seismic upgrades to the CMR *structure* is currently underway, with completion scheduled for November 1999. This upgrade will increase the seismic capacity of the CMR structure to the above-discussed EBE.

The EBE for Building 332 at LLNL is 0.57g. Analysis indicates that the Building 332 structure can withstand the EBE; however, the stacks are still being evaluated with respect to their ability to survive at EBE. A seismic assessment of the entire set of safety-class SSC's was recently completed. The results are under review by DOE.

The EBE for Rocky Flats has recently been defined as a peak ground acceleration of 0.12g on bedrock. Building 371 is being assessed as part of responding to DNFSB Recommendation 94-3 (Rocky Flats Seismic and System Safety). Current findings are that the building structure, with minor modifications, can withstand the EBE. The seismic evaluation of Building 371 systems and components is complete. One non-ventilation-system seismic upgrade is in progress. Others await a cost/benefit analysis to determine whether to proceed. The seismic capability and consequences of Building 707 was assessed as part of the SAR re-baselining effort, with the finding that the Building 707 risk envelope was approximately equal to that found in the approved SAR. A modern seismic assessment has not been completed for the remaining buildings at Rocky Flats: these buildings may or may not survive the EBE. Current plans are to consolidate the material into Building 371 which is the most seismically robust building on-site, or to build a new storage vault.

The EBE for Savannah River is 0.20g. Older seismic evaluations indicated that the F-Canyon and FB-Line structures were capable of withstanding the EBE without collapse. Recent seismic assessments completed as part of the Basis For Interim Operations indicated that the F-Canyon, including the FB-Line penthouse would meet a "no-collapse" earthquake defined as a peak ground acceleration of 0.30g. However, the canyon exhaust system (CES) stack liner may collapse during a 0.04g seismic event, resulting in the loss of a discharge path for exhausted air. To compensate for this potential seismic vulnerability, an alternate emergency exhaust path has been provided.

In addition, a new seismic qualification program has been initiated to determine if structures, systems and components, including the ventilation systems, meet current seismic design requirements. Safety documentation will be updated when the new seismic information becomes available in July 1996.

The current EBE for the Hanford site is 0.20g. The structure of all PFP process buildings are expected to survive the EBE. PFP systems and components were also assessed as part of the Final SAR. Bounding consequences from the EBE were based on determining which systems and components would not survive the EBE. Seismic improvements were made to selected components. The risk associated with the EBE was shown to be acceptable based on Westinghouse Hanford Corporation's (WHC) risk acceptance guidelines.

3.2.7 Operations/Maintenance

The DNFSB asked the Department to provide an evaluation of the operation and maintenance of ventilation systems at plutonium facilities. In *DNFSB/TECH-3*, it was noted that DOE 6430.1A "requires that 'adequate instrumentation and controls shall be provided to assess ventilation system performance and allow the necessary control of system operation.' These requirements presume the presence of trained personnel to intervene as conditions warrant, and are only two of many that demand some degree of assessment and manipulation of controls." Additionally, in its July 21, 1995, letter to Assistant Secretary Grumbly, the Board forwarded a trip report identifying significant issues related to the operation and maintenance of ventilation systems at Rocky Flats.

The major requirements for maintenance and operation of ventilation systems are encompassed in the following DOE Orders:

> DOE Order 4330.4, *Maintenance Management Program* (superseded by DOE Order 430.1, *Life Cycle Asset Management*, dated October 26, 1995)
>
> DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*
>
> DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*

Many assessments of maintenance and operations programs have been conducted at DOE defense nuclear facilities by both the Defense Nuclear Facilities Safety Board and the Department of Energy. Some facilities have undergone recent Operational Readiness Reviews. The condition of maintenance and operation programs varies widely, and in general, is related to the level of facility activity and future mission. For example, those facilities with active material stabilization efforts have more highly developed maintenance and operations programs.

Determining the appropriate level for a facility's maintenance and operations programs has to take into account many factors including facility hazards, level of operational activity, facility mission, and future facility uses. The idea of a "graded approach" to operational discipline was addressed in the Department's implementation of DNFSB Recommendation 92-5, Discipline of Operations at DOE Defense Nuclear Facilities. The principal features expressed by the Board in Recommendation 92-5 can be paraphrased as follows: (1) that facilities to be used in the longer term in defense nuclear missions or in cleanup from previous defense nuclear activities should be operated according to a superior level of conduct of operations, (2) that certain safety practices be followed at defense nuclear facilities being restarted after a long period of idleness, and (3) that defense nuclear facilities designated for various other kinds of use, such as standby, should be subject to a graded approach of safety criteria and requirements to be developed.

With the exception of some of the Rocky Flats facilities, all of the facilities involved in the ventilation system review have the potential to continue operations for at least the next 5-10 years. Conduct of operations should be maintained at a superior level for those facilities.

To evaluate the conduct of operations at EM facilities, assessments are accomplished on a two-tiered basis. Operations Offices are required to conduct complete, formal facility operations assessments biennially, and conduct partial assessments of each facility at least every 6 months. Headquarters assessment teams normally participate in selected, scheduled assessments and audit the records of all formal operations assessments performed by the Operations Offices.

For DP facilities, assessment of conduct of operations is the responsibility of the Facility Representative. At LANL, the Facility Representatives complete an annual appraisal matrix covering the various chapters of DOE 5480.19. At LLNL the DOE safety envelope oversight plan was completely revised as part of the October 1995 readiness assessment. Much of the oversight involves the operation and maintenance of the ventilation system.

A thorough, comprehensive evaluation of the operations and maintenance programs at each site was deemed beyond the scope of this report. Those types of evaluations are completed during Operational Readiness Reviews and Readiness Assessments. During this review the team attempted to answer the following questions:

- How do we ensure the ventilation system is safely operated under normal conditions?

- How do we ensure the ventilation system is safely operated during off-normal conditions?

- Are the ventilation systems maintained in a way which ensures they can provide their safety functions?

A group of key indicators was evaluated in answering the above questions. The chart which follows summarizes the results.

Table 3.2.7-1
Operations/Maintenance Summary

	Operations Procedures	Alarm Response procedures	Alarms/day managed by vent system operators	Training Program	Qual Program per DOE 5480.20	Maintenance Records	Outstanding maintenance	Recent operations assessment
LANL - PF-4	Yes	Yes	less than 1	Yes	No, program implementation by 12/96	Yes	No problem noted	Readiness Assessment
LANL - CMR	No, TSR Implementation Plan being reviewed by DOE	No, TSR Implementation Plan being reviewed by DOE	less than 1	Yes	No, program implementation by 12/96	Yes	No problem noted	Facility Rep surveillance
LLNL - Bldg 332	No, DOE reviewing procedure development plan	No, DOE reviewing procedure development plan	less than 1	Yes	No, training plan being reviewed by DOE	Yes	No problem noted	Readiness Assessment
Rocky Flats Bldg 707	Yes	Yes	100 per day	Yes	Yes	Yes	(see note)	ORR
Rocky Flats Bldg 771/774	No	No, will be evaluated in BFO	18 per day	Yes	No, will be evaluated in BFO	Yes	(see note)	EM CONOPS scheduled for 1st half of CY96
Rocky Flats Bldg 371/374	No, upgrade in progress	No	2000 per day	Yes	Yes	Yes	(see note)	EM CONOPS
Rocky Flats Bldg 776/777	No, will be evaluated in BFO	No, will be evaluated in BFO	15 per day	Yes	No, will be evaluated in BFO	Yes	(see note)	EM CONOPS scheduled for 2nd half CY96
Rocky Flats Bldg 779	No	No	3 per day	Yes	No, will be evaluated in BFO	Yes	(see note)	EM CONOPS
Savannah River	Yes	Yes	3 per day	Yes	Yes	Yes	No problem noted	ORR
Hanford - PFP	Yes	Yes	50 per day	Yes	No	Yes	No problem noted	EM CONOPS

Note: Individual building values not readily available for this report. Rocky Flats buildings 771, 776 & 779 have a backlog of ventilation system maintenance. Alarm statistics for Rocky Flats facilities other than Building 371 were not available for this report, but are to be evaluated under the contractor's action plan. See section 4 for more information on Rocky Flats operations/maintenance.

3.2.7.1 Savannah River

The current mission of the F-Canyon facilities is to stabilize stored plutonium, uranium, and other transplutonium solutions; to dissolve and stabilize materials extracted from remaining irradiated depleted uranium targets; and to assist DOE in the disposition of other surplus Pu-bearing materials presently stored onsite and offsite. The FB-Line vaults currently store various special nuclear materials, some of which are to processed through the FB-Line. Based on the extensive amount of material processing occurring in the F-Canyon, the maintenance and operations programs should be well established and meet the applicable DOE Orders and standards. The active portions of the facility ventilation systems are safety-class.

Implementation of Conduct of Operations

General management policy for SRS F-Area establishes that administrative and procedural controls delineate clear lines of responsibility and methods for safe operations under normal and emergency conditions. Management policies are implemented through written procedures approved by WSRC management. A formalized system of normal/emergency procedures is employed to ensure the facility is operated per the Operational Safety Requirements (OSR) and Technical Safety Requirements (TSR). To meet the requirements of DOE 5480.19, Conduct of Operations at F-Area is implemented through formal procedure manuals. Facility operations and support personnel are responsible for knowing and adhering to the requirements contained within.

Implementation of Training and Qualification

Personnel at F-Area receive training in the safety aspects of jobs with periodic retraining in certain areas. Personnel also receive training in emergency actions. Personnel involved in operations affecting nuclear safety are trained in their tasks prior to assuming responsibilities of the position. Training and retraining of qualified ventilation system supervisors and operators is carried out by formal classroom instruction and on-the-job experience. Initial ventilation system operator qualification is based on demonstrated acceptable level of competence and performance and depends on satisfactory completion of comprehensive examinations and operating evaluations. Requalification is conducted biennially.

Maintenance

Maintenance is performed per DOE 4330.4A, *Maintenance Management Program*. Assessments of the program have been conducted, and plans and schedules for achieving full compliance, even with non-mandatory Order statements, are being satisfactorily implemented. No maintenance backlog exists on the safety-related portions of the ventilation system.

Recent Assessments of Operations

A full Operational Readiness Review was conducted at F-Area, and DOE approved restart of the facility in February 1995.

3.2.7.2 Hanford

The current mission of the Plutonium Finishing Plant (PFP) is to stabilize and store plutonium metal, oxides, residues, and solutions. Currently, the inventory at PFP is slightly over 4 metric tons of plutonium that range from very lean to nearly pure plutonium solutions and powders, product oxide and metal, and mixed oxide fuel components ranging from pins to finished assemblies. This inventory is held in over 8,000 containers, most of which are in vault type storage. Based on the extensive amount of material stabilization occurring at PFP, the maintenance and operation programs should be well established and meet the applicable DOE Orders and standards. The active portions of the facility ventilation systems are safety-significant, not safety-class, except for the seismic cutoff switch, which is safety-class.

Implementation of Conduct of Operations

On September 8, 1995, the Board issued a report on the status and use of technical procedures at Hanford. The Board noted that despite eighteen months of effort, technical procedure deficiencies remained a severe endemic problem. The deficiencies noted by the Board were also found at PFP during recent assessments by Richland conduct of operations assessment teams.

The process used to validate operating documents, such as procedures, is detailed in WHC-CM-5-8, section 13.5. Per this procedure a documented assessment of an operating document is made to confirm its accuracy related to the intended usage. The validation method may include a final read-through and/or walk-through by the cognizant engineer and a certified operator, or may involve the preparation and performance of an Operability Test Procedure (OTP). To document and record preliminary review, an Operating Document Preliminary Review Form is used. For final acceptance and validation, a Document Acceptance Review Form is completed by the cognizant engineer and the certified operator.

PFP management has recently undertaken a major effort to improve procedure quality and use. Guidelines have been established which define routine versus non-routine work and define the required degree of procedure compliance. Operators and managers are working together to review all procedures for completeness, correctness, and user friendliness. Procedure program improvements are expected to be completed by the end of March 1996. The Richland Operations Office is following progress of the program and evaluating its effectiveness.

Implementation of Training and Qualification

The operators of the ventilation systems receive formal training. PFP Power Operator Plant Specific Qualification course 200580 was established to ensure understanding of the bases and increase Power Operator's knowledge of procedures and requirements. This course is conducted in accordance with Westinghouse Hanford Company's safety practices and compliance with DOE orders. A formal qualification program meeting the requirements of DOE 5480.20 does not exist for the Power Operators as the current agreement with the worker union does not allow for qualification testing. Nonetheless, operators are given an in-plant performance evaluation by the training department to evaluate their readiness to stand watch. Remedial training is given to those operators who do not meet the minimum expected performance. Operators must be recertified by the training department every two years. Westinghouse Hanford Corporation is committed to full implementation of DOE 5480.20 at PFP. Present contract negotiations with the worker union include provisions which would allow formal testing of workers and a qualification program.

Response to alarm conditions is included in the training and in operating procedures, but a rigorous drill program to exercise operator knowledge is only now being implemented. Each annunciator panel has an Alarm Response Procedure (ARP). The ARP's are prepared and validated per the *PFP Administration Manual*, WHC-CM-5-8, section 13.5.

Maintenance

As part of its overall thrust to improve maintenance procedures, the plant has recently assembled a Joint Review Group of senior managers to review the quality of all radiological work packages. Only those packages approved by the Joint Review Group can be executed. The group will continue to perform this function until work package quality improves to an acceptable level.

Although maintenance technicians have no specific qualification program, they are trained in work control and have all reached journeyman status, i.e., have completed their apprenticeships. The maintenance crews are supervised by a Person-in-Charge (PIC). Maintenance PICs must complete a training program, but do not undergo qualification interviews with plant management (Note, this is different from the operations PICs who must pass an oral interview with plant management).

Maintenance of the ventilation system is prioritized by its impact on safety. At present, there is no outstanding maintenance on the safety-related portions of the ventilation system.

Recent Assessments of Operations

In the Spring of 1995, PFP underwent a full operations assessment review by the Richland Operations Assessment team. The plant received a satisfactory rating. Deficiencies were noted in the procedure program and the emergency drill program, and the plant is taking the corrective actions described in the previous paragraphs.

3.2.7.3 Rocky Flats

The missions of the plutonium facilities at Rocky Flats are related to deactivation and stabilization. Building 371 will have the function of being a plutonium repository until offsite disposition is available. Building 707 processes plutonium oxides and may in the future process plutonium residues. Fissile solutions (plutonium nitrates) are processed in Building 771. It will be deactivated when this activity is completed. Building 776 reduces and compacts fissile (TRU) waste, and has a deactivation mission. Building 779 will be deactivated as soon as fissile material can be removed. The ventilation systems for these facilities are designated Vital Safety Systems (VSS), a term used only at Rocky Flats and which includes detection and mitigation systems identified in the OSRs. In general, these systems are comparable to safety-class and safety-significant systems at other facilities.

Implementation of Conduct of Operations

Rocky Flats procedures are often not in compliance with the specifications required by site-wide implementation procedures. In Building 371, procedures suffer from significant inaccuracies. A procedures upgrade program is in progress. In Building 776/777 there are no compliant procedures. The operating contractor will be submitting a revised conduct of operations matrix to DOE-RF at the end of February 1996. This matrix is required by DOE 5480.19, and describes the application of the graded approach of the order to the various facilities and operations. The approach is to use an activity-based analysis for the matrix.

Stationary Operating Engineers operate and maintain the ventilation within OSR requirements, and take corrective measures when required. Any failure or inability to operate within specifications is required to be reported to management immediately. There are no emergency procedures except in Building 707.

There is an ongoing assessment program for conduct of operations by the contractor. Partial assessments have been completed or are scheduled for each of the five facilities. The Department's Facility Representatives routinely observe conduct of operations during walkthroughs, assessments of facility operations, and observations.

Qualified Facility Representatives are assigned to all five facilities, for a total of ten Facility Representatives.

Building 371 continues to experience about 2000 "alarms" per day average on work days. The alarm rate drops by factor 6-7 on weekends and other non-working days. This condition is not considered acceptable. Ongoing corrective action is described in section 4.2.

Implementation of Training and Qualification

Each of the facilities has a training and qualification program although only the qualification programs for Buildings 707 and 771 are in accordance with the requirements of DOE 5480.20. For Buildings 776/777 qualification is via the Stationary Operating Engineer's (SOE) apprenticeship program. Building 779 training is not in accordance with the Site Training User's Manual. The other three buildings do have qualification programs in accordance with the Site Training User's Manual. In Building 371, a qualification program upgrade is in progress.

Requalification is on a two year cycle. Operators are tested on knowledge of emergency operations on initial qualification and upon requalification.

As described in section 4.1, Rocky Flats is evaluating, using a Basis for Operation (BFO) document, what requirements should apply to specific facilities and facility systems given the change in facility missions. A determination as to whether further action is required for operator qualification at those facilities which do not meet the requirements of DOE 5480.20 will be part of the BFO process.

Maintenance

Preventive maintenance (periodic, predictive, performance monitoring, calibration) is performed in all five facilities. Active components in the ventilation systems are visually inspected and felt for temperature and vibration periodically. Instrumentation and controls are calibrated to metrology standards. Fan vibration analysis is performed in Buildings 371, 707, 779, 776, but not in 771. Fan currents are measured and trend evaluation performed.

Funding has not constrained corrective maintenance on safety systems in any of the five facilities. Availability of personnel is also not limiting, although sustaining qualification and training has been difficult as a result of personnel downsizing. Trend information on backlog and on expenditures for maintenance is not maintained by facility, only sitewide. Low priority maintenance that had no realistic prospect for accomplishment has been removed from the backlog, so meaningful analysis of the maintenance backlog is not practical at this time.

For more information on status and corrective action regarding facility maintenance at Rocky Flats, see section 4.2.

Recent Assessment of Operations

All of the facilities at Rocky Flats are evaluated as part of the EM Conduct of Operations program. Additionally, Building 707 underwent an ORR, and DOE approved facility restart in April 1995.

3.2.7.4 LLNL Building 332

LLNL is located in a light industrial and residential area in California's Livermore Valley. The laboratory uses plutonium in research, development, and testing programs. LLNL maintains the ability to process plutonium and has approximately 400 kilograms of plutonium, mostly in the form of metal. The facility is an important Defense Program asset for conducting weapons research and will remain so for the foreseeable future. Based on the level of activity in Building 332, the plutonium inventory, and the proximity of the plutonium to the public, it is expected that the maintenance and operation programs would be well established and should meet the requirements of applicable DOE Orders and standards

The active portions of the facility ventilation systems are safety-class.

Implementation of Conduct of Operations

In April 1995, activities at Building 332 were placed in standby as management evaluated the facility conduct of operations. Some significant shortcomings were identified and corrective actions taken. The major activity was the development of written surveillance procedures for each of the TSRs. Plant operators and maintenance technicians were then trained on the new procedures.

Following significant improvement in the facility conduct of operations, a readiness assessment was conducted in September 1995, and DOE approved resumption of activities in October 1995. As a next step in improving the procedure program, the contractor submitted a plan to DOE in December 1995 for developing operating procedures for all safety class and safety significant systems. DOE is currently reviewing the plan for approval.

To ensure adequacy of contractor implemented programs, DOE developed an oversight plan in August 1995. The plan provides periodic oversight of parameters such as Limiting Conditions of Operations, TSR/OSR surveillance requirements, performance measures, and the contractor self assessment program.

Implementation of Training and Qualification

The operation of the facility's ventilation systems and their support systems is the responsibility of the Facility Operators. To date, their training on these systems has been on-the-job training. A plan was submitted to DOE in December 1995 to formalize the training program for Facility Operators in compliance with DOE 5480.20. A Training Implementation Matrix describes how operators will be trained, qualified, and requalified.

During off-shifts and weekends, the Plutonium Facility is not manned. Alarms are monitored from the continuously-manned site security station. Ventilation system operations, such as starting and stopping fans when required by instrumentation signals, is automatic. The facility is also toured every two hours by a maintenance mechanic. Since April 1995, these individuals have received training on the SAR, TSRs, and ventilation system surveillance requirements. Additional improvements in the training of the maintenance mechanics were submitted in the Training Implementation Matrix and are being reviewed by DOE.

Maintenance

Work performed on the ventilation systems and their support systems to verify and maintain operability is done on a periodic basis. The maintenance program includes both preventive and predictive maintenance actions. Those tasks that are associated with the Building 332 TSRs are controlled and monitored by the Weekly Surveillance Requirement Reminder. The records for the completed work are now maintained in the Facility Coordinator's office. Since this work is required for compliance with the TSRs, the "Work Scheduled Versus Work Accomplished" is at a 100% completion status.

Journeyman personnel are provided by plant engineering to perform ventilation system maintenance. These personnel have received building specific training, which allows them to perform maintenance work in Building 332. Maintenance technician training includes a course on the Building 332 SAR and TSRs.

Recent Assessments of Operations

The operations of Building 332 were evaluated in a recent Readiness Assessment, and DOE concurred in facility restart in October 1995.

3.2.7.5 LANL - PF-4

The mission of the plutonium facility at Technical Area-55 is to perform basic and applied Special Nuclear Material research to develop, demonstrate and exchange technology and to provide production support for national defense and energy program requirements. The inventory at PF-4 is approximately 2.5 metric tons in various chemical and physical forms including plutonium metal, plutonium compounds and alloys, and a spectrum of process residues. Based on the large inventory of plutonium and the role of the ventilation system in protecting the worker from inadvertent exposure, the maintenance and operation programs should be well established, meeting the applicable DOE Orders and standards. The active portions of the facility ventilation systems are not safety-class but are safety-significant.

Implementation of Conduct of Operations

Written OSR surveillances, system operating procedures, and alarm response procedures exist for the ventilation system. All of these were in place and being used prior to DOE approval of the PF-4 Readiness Assessment in June 1994. Procedures will be revised after approval of the new SAR to reflect the new TSRs.

A conduct of operations matrix per DOE 5480.19 has been approved by DOE and will be implemented by April 30, 1996.

Implementation of Training and Qualification

The ventilation system is monitored by the operations center operators. A formal qualification program which meets the requirements of DOE 5480.20 is expected to be in place by December 1996. However, the operations center operators do have a qualification card and testing program. Final qualification is determined by Deputy Facility Manager. The qualification process takes about 4 months with a requalification required every two years. Much of the existing program to meets the intent of DOE 5480.20.

Maintenance

PF-4 has a maintenance implementation plan approved by DOE. It includes preventive and predictive (vibration analysis) maintenance actions. Corrective maintenance is performed using independently reviewed and approved work packages. For ventilation system maintenance, each work package is screened for its effect on configuration management and a USQD is performed. Maintenance is performed by journeyman and certified mechanics. Area Work Supervisors review the maintenance and ensure it is performed properly.

No backlog of ventilation system maintenance exists at PF-4.

Recent Assessments of Operations

The operations of PF-4 were evaluated in a recent Readiness Assessment, and DOE concurred in facility restart in July 1994.

3.2.7.6 LANL - CMR

The CMR Facility is a multi-user facility that encompasses operations involving several scientific divisions at LANL. The current programmatic activity in the CMR Facility is predominantly analytical chemistry supporting major experimental programs of interest within the DOE Complex. The plutonium inventory in CMR is small when compared to the inventories found at the plutonium production facilities. The ventilation system is important for the ensuring the safety of personnel as the perform their analyses and is considered safety-significant. Conduct of operations, training and qualification, and maintenance of the ventilation system should meet the DOE Orders and standards.

Implementation of Conduct of Operations

At present there are no procedures for operating the ventilation system or for alarm conditions. CMR uses a highly automated system where operator action is normally only required for system start-up and shutdown. With development of the new SAR, the plant has identified required procedures. Ventilation procedures will be developed by December 1996. The content and dates for these procedures may be revised once the SAR is finalized.

During off shifts, the ventilation system is monitored through the security system. The off shift people have not received detailed on-the-job training on the ventilation system. If an alarm occurs, the duty operations center operator is called in as necessary to investigate.

CMR has completed a Phase I self assessment of DOE 5480.19. Of the 46 non-conformances which were identified, all have been corrected.

Implementation of Training and Qualification

No formal training and qualification program such as that described in DOE 5480.20 exists for operations center operators. Operations center operators learn their jobs through on-the-job training with the facility engineer. For an individual to be allowed to serve as an operations center operator, they must have gained the confidence of the Facility Engineer, Deputy Facility Manager, and Facility Manager. No formal qualification board or certification is required for the operations center operators.

Training and qualification of operations center operators should be formalized to meet the requirements of DOE 5480.20. Facility management has committed to implementing a more formal program of training/qualification of operations center operators in accordance with the approved Training Implementation Plan by September 1997. 50% of the tranining and qualifications were completed by December 1995. Similar to the implementation of conduct of operations requirements, the full implementation of training and qualification requirements may be impacted once the the SAR is finalized.

Maintenance

CMR has both a preventive and predictive (vibration analysis) maintenance program for the ventilation system. Work packages are prepared by the operations center operators and reviewed by plant engineering managers and safety specialists. The operations center operators are responsible for ensuring approved work packages are performed safely and correctly. Maintenance is performed by craft specialists with a journeyman status.

There is no outstanding maintenance on safety-related ventilation systems.

Recent Assessments of Operations

There have been no recent independent assessments of operations at CMR.

3.2.7.7 Operations/Maintenance Summary

The operations and maintenance of those facilities which have undergone recent operations assessments were considered adequate (LANL PF-4, LLNL Bldg 332, Rocky Flats Bldg 707, and SRS F-Canyon). Detailed evaluations of operations and maintenance programs were conducted by independent teams and facility start-up was approved by DOE. No additional action is planned for these facilities regarding maintenance and operation.

For the Hanford PFP, the largest concern is the adequacy of procedures. This has been a problem noted by both the DNFSB and DOE-RL conduct of operations experts. The site-wide procedure upgrade efforts being implemented at Hanford are being accelerated at PFP and are expected to be completed by March 1996.

For CMR at LANL, normal operating and alarm procedure development and improvement should continue. Ventilation procedures at CMR will be developed upon approval of the TSRs, which are currently being reviewed by DOE. Dates will be in the TSR implementation plan, which will be submitted by February 29, 1996. Training and qualification of operations center operators needs to be formalized to meet the requirements of DOE 5480.20. A more formal program of training/qualification of operations center operators is being established. Per the approved Training Implementation Plan, the training and qualifications are underway and will be completed by September 1997.

The Rocky Flats facilities vary widely in the condition of the operations and maintenance programs. In general, when a facility has a clearly defined mission and is not being deactivated in the short term, the operations and maintenance programs are planned for upgrade. Specific actions related to the operations and maintenance of Rocky Flats plutonium facilities can be found in section 4 of this report.

The number of alarms per day monitored by ventilation system operators was only deemed excessively high at Rocky Flats Building 371. Corrective action is underway for this problem (see section 4.2). The number of alarms did vary from site to site depending on the other duties and responsibilities of the operator, and therefore drawing conclusions based on an numerical comparison between facilities is considered inappropriate. For example at PFP, the watchstander responsible for the ventilation system also monitors the electrical distribution system, air and vacuum service systems, steam systems, and fire alarms. Not all of the 50 alarms per day received at PFP are related to the ventilation system, and not all of the alarms require any immediate operator action, e.g., a door opened for a longer than normal period could cause a dip in building pressure differential; when the door is shut, the alarm clears.

3.2.8 Periodic Testing (Bypass Leakage)

The DNFSB evaluation notes that protection of the worker, the public and the environment is dependent on ventilation system filtration efficiency and that system filtration efficiency cannot be assured unless the system is field tested on a frequent basis. *DNFSB/TECH-3* refers to sections 10, 12 and 13 of ASME N510-1989, *Testing of Nuclear Air Treatment Systems*, for in-place HEPA filter testing requirements, duct damper bypass testing requirements and system bypass testing requirements, respectively. The specific sections on bypass leakage testing in ASME N510 were added in 1989, after DOE 6430.1A was issued and well after all of the facilities in question were constructed. The following discrepancies relative to filter testing are noted in *DNFSB/TECH-3*:

> At Rocky Flats some facilities, e.g., Building 707, are required to test each HEPA filter bank in the exhaust stream while others (Buildings 771 and 371) only test one HEPA filter bank of the three or four exhaust HEPA filter banks. (This situation has been resolved by a USQD evaluating the number of HEPA filter banks required for each facility and instituting a test program consistent with the USQD.)
>
> At PF-4 at LANL leakage past the supply duct butterfly valves could release contaminated air filtered by only one HEPA inlet filter to the environment.
>
> Because of its routing, leakage into the FB-Line room exhaust duct at Savannah River could lead to an unmitigated release path to the environment.

In conclusion, *DNFSB/TECH-3* states that the requirements for bypass leakage in DOE 6430.1A and ASME N510-1989 are not being addressed by the periodic HEPA filter testing performed at DOE plutonium facilities.

The specific examples noted above at Savannah River and LANL are addressed in Appendix D. In brief, the Savannah River FB-Line room exhaust duct has been re-routed, eliminating the potential for an unmitigated leak; and the supply damper situation at PF-4 has been evaluated in the proposed PF-4 SAR with the conclusion that the best approach to minimizing unfiltered leakage from the facility during an accident is to lock open the supply dampers. DOE is presently reviewing the proposed PF-4 SAR.

DOE agrees with the Board that periodic leak testing is essential. It should be noted that since the systems in the reviewed facilities reflect engineering principles in effect at the time of system design, direct application of all of the requirements of ASME N510-1989 may not be practical. Current in-place HEPA filter testing procedures attempt to balance constraints of these designs with up-to-date in-place HEPA filter testing practices. The procedures are designed to provide performance assurance equivalent to that provided by the ASME N510, section 10 tests.

To assess the adequacy of bypass leak testing, a comprehensive review of the facilities covered by this report was performed. The results are discussed in the following two sections.

3.2.8.1 Bypass Duct Damper Leak Testing

Damper bypass leakage testing is designed to measure leakage through closed dampers or valves intended to eliminate flow through a bypass duct.

Bypass duct systems are a common feature of emergency air cleaning systems, which remain in standby status until they are needed to mitigate aerosol emissions from an off-normal event. While emergency systems are in standby status, air flow is diverted around the system to preserve HEPA filter aerosol loading capacity and reduce operating costs. Only in responding to specific off-normal events is air flow directed through the HEPA filter system. In contrast, at DOE plutonium facilities HEPA filter systems are used to control both routine and off-normal aerosol emissions. Thus they must operate continuously, and there is no benefit or need to divert air flow around the HEPA filter systems.

The survey confirmed that the facilities reviewed have no bypass duct systems. Consequently, bypass duct damper leak testing specified in section 12 of N510 has no application to HEPA filter systems at these plutonium facilities. As a benefit from the *DNFSB/TECH-3* comment, it should be noted that some of the facilities have highlighted bypass ducting in design reviews as an unacceptable feature for HEPA filter systems in plutonium facilities.

3.2.8.2 System Bypass Testing

System bypass leakage testing is testing designed to determine the amount of leakage around the HEPA filters resulting from leaks which are not deliberate bypass lines. Section 13 of N510 requires additional testing where existing tests do not adequately include potential system bypass leakage paths. An example of such a potential path would be a leak through the diaphragm in a differential pressure gauge around a HEPA filter train.

Three types of tests of HEPA filter systems are currently being performed at the reviewed facilities:

Whole bank testing (some systems at Savannah River, Rocky Flats, LANL and Hanford; none at LLNL). Whole bank testing tests for all bypass leakage paths that: 1) are adequately challenged by the test per section 13.3.2 of ASME N510-1989, and 2) have an outlet sufficiently upstream of the downstream sample location to allow adequate mixing.

Shroud testing (some systems at Rocky Flats and LLNL). Shroud testing tests the individual filters and requires access to the inside of the filter plenum. It does not test for all possible system bypass leakage paths.

Tests using "testable filter housings" (some systems at Savannah River, Rocky Flats, LANL, LLNL and Hanford). Testable filter housings test leakage past the filter and the filter housing but not potential system bypass leak paths such as the one noted above.

The conclusion from the review was that all parties are aware of the need to be sensitive to the potential for system bypass leakage and to the limitations of existing tests for determining such leakage. The methodology used varies between facilities and is a function of physical restrictions and engineering judgement regarding the consequences of a leak from a particular potential bypass leakage path. For example, whole bank testing is not possible with large numbers of filters in a bank due to the required aerosol generating capacity. ERDA 76-21, the Nuclear Air Cleaning Handbook, recommends against whole bank testing with a flow greater than 30,000 cfm, which translates to about 30 filters. Rocky Flats has some filter banks with more than 600 filters. Savannah River examines their differential pressure gauges daily to check for bypass leakage; Rocky Flats examines them monthly. Some facilities have assessed the consequences of a diaphragm leak in a gauge connected by 1/4" tubing around a 100,000 cfm capacity filter bank as insignificant in their context and thus do not directly test for such leakage. In contrast, LLNL has installed filters on the upstream pressure tap lines for differential pressure gauges so that if there were a diaphragm or other type of leak, such leakage would be filtered.

Other aspects of this situation are that systematic physical walkthroughs focused on potential system bypass leakage paths have not been performed at every facility, and we do not have as-built drawings for all facilities. Therefore it is possible that some potentially significant paths, e.g., electrical conduits which connect across filter banks, may exist without our being aware of them.

In addition to the above, DOE recognizes the need to ensure that total leakage from the confinement system during and after an accident is consistent with the assumptions made in the facility safety analysis. This form of system bypass leakage could include leakage paths through door seals, for example, and is discussed in section 3.2.1.

Finally, many HEPA filter systems at the DOE plutonium facilities were put into operation well before the issuance of ASME acceptance testing procedures needed to validate results of in-place HEPA filter tests. Design of the systems often precludes full post-operational application of these acceptance test requirements. DOE is developing a statistical method to evaluate test results on such systems. The objective of the method is to demonstrate that tests on the DOE systems provide performance assurance equivalent to tests on systems that meet the ASME requirements. Equivalency to the ASME requirements is determined through off-set of acceptable test result limits from performance acceptance limits by a differential that accounts for design constraint effects on test result uncertainty. Results of post-operational acceptance tests are used to quantify the design constraint effects.

Based on the review summarized above, DOE concludes that we should perform a more detailed assessment of ventilation system bypass leakage and acceptance testing for safety-class ventilation systems, which will include the following elements:

> As part of the configuration management activities being undertaken, ensure that walk-throughs of the confinement systems are performed to uncover any potential bypass leakage paths. Such walkthroughs should include non-ventilation system leak paths such as, but not necessarily limited to, door seals when those seals are relied upon in the safety analysis.
>
> Analyze the potential bypass leakage paths and either take action to ensure that leakage testing includes these paths or document why the facility would remain within its authorization basis if such leakage testing were not performed.
>
> As part of the above analysis, assess whether mitigative actions, such as installing filters on bypass lines as has been done at LLNL, are appropriate.

Direction to the field to perform these assessments will be issued by March 31, 1996.

4.0 Response to the July 21, 1995, Letter on Rocky Flats

The letter requests, ***"As part of the report requested by the June 15, 1995, Board letter, DOE is requested to specifically address the concerns noted in the enclosed report."***

The trip report which was enclosed with this Board letter identified the specific concerns itemized and addressed in section 4.2.

4.1 Evaluation of Ventilation Maintenance

Maintenance

Rocky Flats is experiencing difficulty maintaining ventilation systems as required by Operational Safety Requirements (OSRs). The OSRs for the five plutonium facilities at Rocky Flats contain provisions for terminating affected operations when safety systems are "inoperable". This is described at Rocky Flats as an "out-of-tolerance" condition, and terminating operations was considered to be safe based upon the presumption that the risks from a non-operating facility were lower than the risks from the facility when operating and that inoperable safety systems would be promptly restored to full operability.

Because of the number and duration of out-of-tolerance conditions, the adequacy of the above presumption was challenged, and a USQ was declared (USQD-RFP-94,1186-QRD). The risks associated with the current conditions, including degraded safety systems, were accepted by the Department. Public risks associated with storage of plutonium for periods permitting potentially significant oxidation of plutonium metals were also estimated in response to USQ-RFP-93,1170-TLF. These increased risks are considered to have been very conservatively estimated, and a program to inspect and repackage metal parts and stabilize oxides was undertaken both to correct the problem and to refine risk estimates. A re-evaluation of estimated risk is expected in 1996, and this USQ remains open.

Some progress has been made in the correction of ventilation system functional deficiencies at Rocky Flats, but more action is required. An increased level of management attention at Rocky Flats is apparent. Although the resources available to restore safety systems to full functionality is considered to be adequate, greater management attention to restoring safety systems is required. Rocky Flats does have tracking information on outstanding maintenance requirements on a facility basis, but improvement is needed in trending backlog information to make this tool available to management. Plutonium facility maintenance backlog remains about constant according to contractor managers, but priority is given to restoring safety systems, so safety system backlog is decreasing. Justifications for Continued Operations have been used to evaluate and accept risks of continuing specific operations with related safety systems inoperable, but excessive use of this approach has the potential to undermine the safety culture by reliance upon work-arounds rather than establishment of the authorization basis. DOE has recognized this and RFFO has tasked the site contractor to prepare a corrective action plan to improve maintenance performance. The plan is to be provided to the Department by March 15, 1996.

The safety authorization bases for Rocky Flats plutonium facilities other than Building 707 are not yet consistent with current facility deactivation missions. The Department is revising the safety authorization basis system used to support the current deactivation mission at Rocky Flats. The new system is presently under development and will use a Basis for Operations (BFO) document as the safety authorization basis for planned operations. New TSRs will be developed based upon the hazard assessment for the BFOs. RFFO will obtain DOE headquarters approval for any exemptions considered necessary from the requirements of DOE Orders 5480.23 and 5480.22 and Price Anderson Amendment Rules, 10CFR830.

4.2 Specific concerns from the DNFSB staff report

"Building 371 has deteriorated to an unacceptable level of maintenance. A plan has been developed to work the facility out of the present difficulties. Implementation of the plan is ongoing...."

DOE concurs with this judgement. Major components of the ventilation system were restored to full functionality on September 30, 1995.

The significance of concerns over safety system status has been reduced by maintenance activity since the Board staff review. Work processes have been strengthened in Building 371 and made more efficient. Work on Vital Safety Systems (VSS) receives priority, including ventilation. The backlog of VSS work has been reduced by 16% in the last year. Fifty-five ventilation system work orders were completed in the last 5 months.

Reduction in site risks by material processing and packaging are in progress, but are projected to take a considerable period of time. Site risk is more rapidly reduced by consolidation of plutonium storage in Building 371 or a new storage facility. A schedule for deactivation of plutonium facilities and material consolidation will be completed in March 1996. The first facility to be deactivated is Building 779.

Determination of what upgrades will be performed to Building 371, including upgrades to the ventilation system, will follow a decision on whether to build a new storage facility at Rocky Flats, projected to be made in March as part of the Department's response to DNFSB Recommendation 94-3. Only the most important structural upgrade (the basement column T joint connections) is currently scheduled. Actions to improve the maintenance of Building 371 will be addressed as part of the corrective action plan described in section 4.1.

"The facility contractor has found Building 776 to be outside its authorization basis. At present it is not clear how the basis is to be reestablished."

The facility OSRs have been revised to correctly reflect the existing safety systems configuration. A Justification for Continued Operation (JCO) has been approved to accept the risk of specific operations with temporary non-compliances. Work has been initiated to install ventilation fan interlocks. The facility is in compliance with its temporary authorization basis, e.g. OSRs as temporarily modified by JCO.

"Considerable effort in the past...e.g., Buildings 707 and 559, has been done at the detriment of maintenance at other facilities, e.g., Buildings 371 and 776."

DOE does not ascribe current deficiencies in maintenance of some facilities to be a result of maintaining others. The Department believes safety system maintenance is adequately funded for the current mission of all facilities. For example, under the current contractors for the period September to November, funds expended for preventive and corrective maintenance in all five facilities were less than budgeted. Responsibility for efficiently employing resources to achieve department priorities rests with the site contractors as directed by the Manager of the DOE field office. The current contract arrangement is intended to allow the contractor flexibility in satisfying those priorities. The field office is expected to provide reasonable incentive to the contractor to assure that the safety-first priority is implemented by contract as well as by policy. It is acknowledged that the previous contractor did not apply the provided resources efficiently in this connection.

"According to the contractor's representatives, Building 371 has not received an adequate share of maintenance attention."

DOE concurs that Building 371 has not received adequate maintenance attention in past years, although that is not necessarily related to its share of maintenance funding as compared to that allocated to other facilities. The contractors are expected to apply adequate attention to all facilities. DOE notes that the amount of management attention and the quality of management personnel assigned to Building 371 have improved somewhat since the new contractor took control. While management attention, like other resources, should be applied in proportion to risk-based priority, DOE considers that all of the facilities reviewed are of sufficient priority to warrant prompt repair of safety systems. RFFO has asked for a corrective action plan from the contractor by March 15, 1996, to improve building maintenance performance (see section 4.1).

"The present program appears to be less than aggressive in the trending and tracking and categorization of all outstanding work."

An assessment of these programs is in progress, but from preliminary information, maintenance tracking programs appear to be adequate. Trend analysis and work prioritization are being evaluated but the evaluation is not yet complete. Preliminary information indicates that trend analysis is insufficient, both because trend information on backlog and on expenditures for maintenance is not maintained by facility and because low priority maintenance has been removed from the backlog, making meaningful analysis of the maintenance backlog impractical. The contractor has been tasked to institute a maintenance management program with adequate detail and flexibility to support improved maintenance performance. This program is to be in place by March 31, 1996.

"Another important manifestation of the unacceptable level of material condition of Building 371 is the frequency of alarms received in the building...currently in excess of 2400. An acceptable level has not been established.

Building 371 receives about 2000 alarms each work day, and about six or seven times fewer alarms on non-work days. This is an unacceptably high figure and compares poorly with experience at other facilities as noted in Table 3.2.7-1. A number of actions have been taken to attempt to remedy this situation, including modifications to data gathering and alarm system software. These actions were not successful. Therefore the contractor was tasked to produce a coherent plan of action to correct this problem and to specify the appropriate maximum number of alarms considered reasonable for all the nuclear facilities at the site. A general corrective action plan for investigating this situation has been prepared by the contractor. The action plan establishes alarm-reduction targets. The targets are to reduce the number of OSR-compliance alarms to less than 25 per day by March 1, 1996, and to reduce the number of all alarms to less than 50 per day by December 1, 1996.

"The contractor speculated that whoever wrote the OSR LCOs (in 1988) did not physically verify the presence of the instrumentation and controls. Such flaws in the OSRs bring into question an important part of the authorization basis for the facility. The contractor stated the belief that there were approved Building 776 Justifications for Continued Operations (JCOs) for each of the cited deficiencies. However, no Department of Energy approved JCOs could be found. In its present configuration, the vast majority (several hundred) of the instrumentation and controls in the Building 776 control room are out of service. The few instruments (roughly 20) that remain in-service are marked

with calibration stickers. Operational fan controls appear back lighted. The out-of-service instrument display is not clearly identified as useable. Unlike in Building 371, the status of maintenance, alarms and facility modifications was not readily apparent for Building 776. Also, a plan to firmly establish the authorization basis and its supporting documentation is not available at this time."

RFFO has approved JCO-95.0056-776/777-MAD for continued operation of Building 776. The out-of-service instrumentation and controls observed in the control room do not pertain to safety systems. They are related to material process functions and equipment that are out-of-service and are not required for current Building operations. The out-of-service displays have been marked with out-of-service identifiers. Adequate programs to track and display the status of maintenance and alarms in Building 776 are now in place. The authorization basis for this facility will be revised as addressed in section 4.1 above.

5.0 Management Issues

Section IV of *DNFSB/TECH-3,* "Management Issues", discusses the following three Board concerns:

- Order Compliance, i.e., compliance with requirements of DOE 6430.1A including approval of deviations.
- Configuration Management, i.e., lack of controlled ventilation system design/configuration.
- Technical Oversight, i.e., diminished DOE technical oversight capabilities.

These issues and the DOE responses are discussed below.

5.1 Order compliance

DNFSB/TECH-3 compares existing plutonium facility ventilation system designs to the requirements of DOE 6430.1A. DOE 6430.1A was issued in 1989 but contains requirements similar to those of the older AEC 6301 and NRC 3.12 documents. The Board report notes a number of areas where the facilities reviewed do not appear to comply with the requirements of DOE 6430.1A. *DNFSB/TECH-3* also notes the requirement in DOE 6430.1A for approval of deviations from the Order's requirements and further notes that no evidence of such approvals were found. It concludes that deviations from DOE 6430.1A represent a serious weakness in safety practices at plutonium facilities and that there is no organization within DOE responsible for assuring compliance with DOE 6430.1A or to ensure uniform practices across the complex.

DNFSB/TECH-3 raises the issue of what the correct basis is for determination of safety-class SSCs and what should be the assumed location of the public for dose during and after an accident.

Determination of the safety category of a system (safety-class, safety-significant or neither) is currently accomplished through the safety analysis and authorization basis process described in section 3.1 of this report. The key to determining that a system is safety-class is whether loss of the system function would cause the off-site dose during or after an evaluation basis accident to exceed 25 Rem TEDE.

DNFSB/TECH-3 raises the question of whether DOE 6430.1A and its reference documents effectively require that DOE design its facilities to limit the accident dose to the public at an onsite location, i.e., the "nearest point of public access", to a small value (100 mrem).

In an attempt to be as responsive as practicable to the Board, this report responds in two parts to the comments of *DNFSB/TECH-3* in this area. Section 5.1.1 provides DOE's interpretation of the requirements of DOE 6430.1A and DOE 5400.5 as they relate to dose to the public during and after an accident. Section 5.1.2 explains what actions DOE is taking regarding the dose to the public at the nearest point of public access during and after an accident.

5.1.1 Formal interpretation of DOE 6430.1A and DOE 5400.5 requirements as regards dose to the public

DOE 6430.1A requires clarification as regards the maximum dose to the public during and after an accident, both as to dose and location of the public.

Section 0200-1.3 of DOE 6430.1A identifies as the siting guideline a maximum dose of 25 rem to off-site individuals from a design basis accident. Off-site individuals are defined as persons outside the boundary controlled by the site. The basis referenced, Los Alamos National Lab report LA-10294-MS, clearly identifies traditional 10 CFR 100 concepts as the source of this guideline.

On the other hand, section 1300 of DOE 6430.1A refers to the DOE 5400 series orders for offsite dose limits during an accident. The dose limits in DOE 5400.5, the relevant DOE 5400 series order, are 100 mrem/year at the nearest point of public access, which could be *on*site. DOE 5400.5 further states that the dose limit is applicable only to routine activities, not to accidents.

The two orders are inconsistent. As part of the effort to respond to *DNFSB/TECH-3* an interpretation of the Orders was requested from the Office of Nuclear Safety Policy and Standards within the Office of Environment and Health. Critical points made by that response (see Appendix E) are provided below:

> *...neither DOE 6430.1A nor 420.1 (the successor order) require backfit of existing facilities to their requirements. DOE approval of an updated SAR to the requirements of DOE 5480.23 constitutes approval of the design safety basis. ...these criteria [radiological criteria for new facilities] do not constitute requirements for existing facilities.*
>
> *Because of these internal inconsistencies and the availability of updated Orders and guidance, it is recommended that DOE 6430.1A not be used as a reference for radiological criteria for safety design and that DOE 420.1 and its Implementation Guides be used instead. In that regard, 25 rem DBA dose at the site boundary and as a criterion for identification of safety-class*

structures, systems, and components is adopted in the updated guidance.

The above citations confirm that DOE should use the model of a safety analysis performed in accordance with current guidance that assesses existing facilities, as they are, to identify safety-class SSCs. That process uses a dose guideline comparable in value and receptor location to traditional site selection assessments. The extensive analyses and reviews performed by DOE to date indicate that reasonable results can be obtained with such a model, particularly when the class of safety-significant SSCs exists to augment the more mechanical process of safety-class SSC selection.

DOE 420.1 and its implementation guide (now in interim form) replaces DOE 6430.1A and removes the ambiguity that exists between DOE 6430.1A and DOE 5400.5.

5.1.2 Dose at nearest point of onsite public access

DOE orders do not require that the dose at the nearest point of onsite public access be calculated or be part of the authorization basis process for a facility. Thus this parameter does not necessarily influence the determination of which SSCs are safety-class or what administrative controls should be imposed on the facility, e.g., on plutonium inventory. These determinations are required to be affected by the dose calculated at the site boundary. The site emergency response plan is the vehicle by which DOE determines what actions are required to protect the onsite and offsite public in case of an accident.

To be fully responsive to *DNFSB/TECH-3*, however, DOE examined the approach taken at each of the facilities reviewed relative to the accident dose at the nearest point of onsite public access. No uncontrolled public access is allowed at the Rocky Flats site so it was not included. As noted below the approach varied among sites.

At PFP a contractor risk assessment guide of allowable accident dose versus probability of event is used as part of the SAR process to assess whether a system is to be safety-class. Onsite dose is calculated as part of this assessment. The highest allowable dose is 25 rem for an event probability of 10^{-6}. The limiting dose of 15.2 rem proved to be for an onsite individual located 550 meters from PFP. The dose was also evaluated at the nearest point of public access, which is a public highway, and was within the risk assessment guidelines.

At PF-4 and CMR at LANL and Building 332 at LLNL the dose at the nearest point of public access is not included as part of the SAR process.

At SRS an approach similar to that used at PFP is taken, with the dose calculated at 640 meters from the source and compared to a Risk Assessment Guide which is a function of event probability and worst-case accidents in each probability "bin".

In summary the approach taken for onsite dose calculations varies among sites. DOE has concluded that it is appropriate that the DOE policy regarding dose at the nearest point of public access should be assessed to determine if changes are appropriate. The degree of coordination between the site emergency response plans and the safety analyses will be part of this assessment. We expect that the assessment will be completed by August 15, 1996.

5.2 Configuration Management, including as-builts

DNFSB/TECH-3 states that although the configuration of ventilation systems at DOE plutonium facilities has changed over the years, the facilities cannot show continuing conformance to or approved deviations from requirements in either DOE 6430.1A or predecessor documents applicable to the facility design. *DNFSB/TECH-3* also claims that the requirement to apply DOE 6430.1A to ventilation system modifications is not being followed, and that the lack of a controlled ventilation system design/configuration for DOE plutonium facilities increases the risk of operating these facilities.

As described in section 2.5 of this report, the ability to operate our facilities safely is determined on a case-by-case basis using the authorization basis process. Because this process does not depend on a detailed comparison to DOE 6430.1A or its predecessor documents, DOE did not attempt to determine as part of this review whether the reviewed facilities have maintained conformance with their original design requirements. Nor did we determine whether written deviations from those requirements have been obtained where they might have been required.

We agree that an essential element of the authorization basis upgrade process is maintaining the facility safety basis, including controlling the ventilation system design/configuration. The USQ process and configuration management, i.e., Change Control and Document Control, play important roles in maintaining the facility safety basis.

Operational configuration management is a formal way of doing business that establishes consistency among the requirements for SSCs, the facility physical configuration, and the associated documents, and maintains this consistency throughout the operational life of the facility, particularly as changes are being made. The Change Control process maintains consistency by ensuring that changes are properly identified, managed, reviewed, coordinated, integrated, and communicated among the organizations involved. The SSC requirements may involve design or other engineering requirements, or functional requirements developed from the safety analysis process. The Configuration management practices of Change Control and Document Control provide the tools and information necessary for coordinating and integrating activities that help ensure cost-effective accomplishment of mission objectives and safe operation consistent with the facility authorization basis. An important part of change control is to assure that appropriate Unreviewed Safety Question actions are performed at the appropriate stages of the process.

Document Control ensures that important facility documents are accessible, properly stored and distributed, that changes are approved and tracked, and that the documents being used to operate the facility are the most recent approved versions. Changes to all facility safety basis documents and the related supporting documents should be controlled. These documents include the SAR, TSRs, the hazards and accident analyses, and related supporting documents, including system design descriptions and other similar documents that contain information that is too detailed for inclusion in the SAR, but which is necessary for facility personnel to understand the design, operation, and maintenance of SSCs with preventive or mitigative safety functions.

Because the facilities are at various stages of developing a complete, accurate, and defendable authorization/safety basis, there are different degrees of implementation of USQ and Configuration management processes. The USQ programs, although mostly implemented, are relatively new programs that have not yet fully evolved; improvements can and are being made as they are identified. The adequacy of USQ programs has been a key focus of DOE oversight and assessment activities.

Graded configuration management practices are applicable to all SSCs that have preventive or mitigative defense-in-depth functions contributing to facility safety as identified by the hazard/safety analysis. The configuration management efforts at many facilities, although often underway, and with significant progress in some cases, are generally lagging behind other authorization basis activities.

DOE agrees that configuration management for the safety-class and safety-significant portions of confinement/ventilation systems cannot be adequately demonstrated for some facilities. There are problems concerning the adequacy of Change Control and Document Control at several of the facilities identified in *DNFSB/TECH-3*, and improvements are necessary. In some cases, e.g., at PFP at Hanford, the time and effort necessary to build a set of as-built drawings has been invested and a disciplined configuration management process is in effect. At other facilities the as-built drawings have not been completed, and the configuration management process is not yet complete. A summary of the status of configuration management at the facilities reviewed is as follows:

PFP at Hanford

Drawings for SSCs within the safety envelope, including process and instrument diagrams (P&IDs) and electrical elementary diagrams; drawings that contain safety boundary identification information; drawings that support performance of the operating, abnormal, off normal, alarm response and surveillance procedures for safety envelope systems; and other drawings listed in WHC-SD-CP-TI-125, *Essential and Support Drawing List* are considered "essential drawings". These have been validated by field walkdowns to ensure that they reflect the as-built conditions of all components within the safety boundary. Drawings for the forced ventilation system are considered essential since the system is safety-significant.

A disciplined procedure based on the USQ process is in effect to ensure that no changes are made to the safety envelope without revising the relevant safety documentation. DOE approval is required for all changes to the safety envelope. The S-RID for PFP has been approved by DOE. The S-RID is not expected to impact the configuration management process now in effect.

PF-4 at LANL

LANL has begun an effort to generate as-built drawings and P&IDs for safety-class SSCs identified by their recent safety analysis (which is under DOE review) as part of the FSAR upgrade program. Initially this has included flow diagrams for each of the PF-4 ventilation subsystems as part of the Phase I system design description. Phase II, which is currently underway, will convert these drawings to P&IDs to show instrumentation, control and interfaces/boundaries with other systems. Phase II will be completed in 1996.

Changes to these drawings and the ventilation subsystems are controlled by the Configuration Management Office at TA-55 using a formal change control procedure which identifies design changes, ensures that the proper reviews are completed, including USQ determinations, and identifies changes to controlled design documents and drawings. DOE approval is required for all changes to the safety envelope.

At the completion of the Phase II LANL effort at PF-4 in 1996, as-built drawings including P&IDs, electrical elementary diagrams and other drawings that contain safety boundary identification information will be available for the ventilation system and supporting safety-class and safety-significant systems. We expect that this material, in conjunction with the configuration management practices in use now at PF-4, will comprise an appropriately disciplined configuration management system.

CMR at LANL

LANL has completed the as-built documentation effort at CMR for all of the facility safety systems. This was accomplished as part of the facility upgrade activities and includes the ventilation system, which is a safety-significant system at CMR. As-built P&IDs and other documentation for the ventilation system that contain safety boundary identification information are now available.

Changes to these drawings and the ventilation subsystems are controlled in accordance with the configuration management procedure in effect at CMR, which requires review of system changes by the Configuration Control Board. The formality of this process requires improvement, and staffing in the area of configuration management for CMR is being increased accordingly. By June 30, 1996, a Configuration Management Office for CMR will be established and a more formal change control procedure will be in effect. This procedure, in combination with the upgraded documentation already available, will provide greater assurance that the proper reviews are completed to identify changes to controlled design documents and drawings, including USQ determinations. DOE approval will continue to be required for all changes to the safety envelope.

Building 332 at LLNL

The Building 332 Quality Assurance Manual (Procedure 4, *Physical Plant and Building Safety Systems Configuration Control*, dated May 1, 1990) requires as-built documentation for building safety systems, which include the ventilation system and emergency power supply. The as-built documentation is under preparation and is scheduled for completion by September 30, 1996. The Manual also includes the procedures to be followed to ensure that system modifications are properly reviewed and that changes are consistent with safety documentation.

We expect that use of these procedures, in conjunction with the as-built documentation now under preparation, will comprise an appropriately disciplined configuration management system.

F-Canyon and FB-Line at the Savannah River Site

When the F-Canyon authorization basis (Basis for Interim Operation) was approved, it was expected that F-Canyon would only operate for about two years. Based on that presumption a design reconstitution effort which included as-built documentation was not required by the governing document, Procedure WSRC-RP-94-1403, *Configuration Management Program Plan for F-Canyon Facility*. Although the operational life of F-Canyon has been extended beyond two years, the program described below, which has been the subject of several DOE readiness reviews, is considered sufficient to maintain acceptable configuration management for safety-class systems.

To accomplish F-Canyon restart, system functional testing was performed, as necessary, to establish a technical baseline for all safety related systems. The purpose of these tests was to verify operation within the requirements of the authorization basis. Surveillance, operability, and post maintenance test requirements have been established for the safety related structures, systems and components. Additionally, applicable drawings were updated as a means to base-line the systems for configuration management purposes.

A disciplined configuration management program is in place to assure that the integrity of the safety-related systems is maintained. Modifications or additions to the systems require approval from a Configuration Control Board. System engineers, using a formal change control process, have been dedicated as the primary means to maintain configuration control. These engineers perform technical reviews of project designs, maintenance and construction work packages, and relevant procedure changes for their assigned systems. These reviews are documented as Design Authority Technical Review Reports and Unreviewed Safety Question screenings (or evaluations if required). A work control system is in place to assure all maintenance, modification and testing is reviewed, approved and performed in a formal and controlled manner. Work control program procedures describe the configuration management requirements applicable to structures, systems and components based on functional classification. These requirements include an as-built drawing process for design changes and routine field activities on safety-related systems.

Rocky Flats Buildings 371, 707, 771, 776, 779

The current documentation for the Rocky Flats facilities reviewed does not necessarily provide an accurate depiction of the as-built configuration of those facilities. Current OSRs for these facilities may contain requirements for systems or hardware that do not currently exist in the facilities. Revision of the OSRs and installation of the equipment required to comply with them are in progress.

The effort required to restore the facilities and systems to fully operable conditions and to determine the as-built facility configurations is significant. The benefit from doing so is a function of the expected mission and mission duration. Many site facilities have a projected lifetime that is relatively short, i.e., a few years, and restoration of facility systems and determination of as-built facility configuration may not be warranted.

The approach being taken to resolve these issues and to provide characterized and controlled facilities, with configuration management, for those facilities where it is warranted is to utilize a graded approach consistent with the hazards from and/or protection provided by the facility or system. Facility BFOs, described in section 4.0, are being prepared to determine the hardware and software requirements, e.g., as-built drawings, appropriate to a given facility considering the currently-projected mission for that facility. Configuration management programs will be developed and applied commensurate with the level of importance of the facility or system, as defined by the hazards and mission duration. Key attributes of this program will be included as part of the facility authorization bases. The configuration management program will include retention of the facility or system characterization information, maintenance of the authorized configuration and update of the characterization information following maintenance activities.

In summary, a disciplined approach to authorizing changes is either in use or, in the case of Rocky Flats, under development, for the above facilities. For those facilities expected to continue in operation indefinitely, as-built documentation has either been prepared or is under preparation. Some of the facilities require further improvement in their configuration management programs, and these actions are planned as noted above. For every site reviewed it appears that the configuration management activities in place or planned are an improvement over previous practices.

5.3 DOE Technical Oversight

The Board report indicates concern over the quality of DOE technical oversight of ventilation systems at DOE plutonium storage and handling facilities, noting in particular the significant role that DOE's predecessor agencies had in development of nuclear air cleaning standards and asserting that these capabilities are greatly diminished as compared to that period. The Board concludes that DOE's technical oversight is weak and needs improvement.

The Department agrees that resources devoted to certain technical activities in the Department have declined in the past decades. At present DOE research and development activities related to nuclear air cleaning are approximately \$6.4 million/year, of which \$6 million is for cleaning and monitoring of effluent from thermal waste treatment systems, including real-time sensing of radionuclides in the effluent and \$400,000/year is for nuclear air cleaning standards development and testing activities.

In large part the shift in application of resources reflects changes in the Department's mission. During the period of DOE's predecessor organizations the commercial nuclear industry was new, and expectations regarding its potential were high. Simultaneously there were significant demands for nuclear technology in defense applications. Many defense and non-defense nuclear facilities were designed and constructed in a short period of time. Significant government research and development resources were made available, including funds for research on nuclear air cleaning.

The maturation of the nuclear power industry, the reduction in nuclear weapons activities and the need to concentrate resources on cleanup of the former nuclear weapons sites has drastically altered this situation. In the civilian arena, the role of DOE and its predecessor organizations in the development of technical standards has been largely adopted by industry professional organizations. The changeover from weapons production to dismantlement has negated the need for many production facilities and created the need to safely decommission these facilities.

DOE has accommodated to these changing demands by shifting to the field much of the detailed technical oversight formerly performed by headquarters and by placing fewer resources on technical development activities related to design and construction of new nuclear facilities. Because DOE is building fewer facilities the type of technical oversight has changed. Revision of standards and guidance documents such as the *Nuclear Air Cleaning Handbook* cited in the Board report is important, but a higher priority might be establishing a technical team on site for overseeing the stabilization of nuclear materials for long-term storage.

An important example of DOE's technical oversight program is completion of detailed authorization bases for all DOE's nuclear facilities. These authorization bases include an updated safety analysis consistent with the new missions for these facilities and accompanying operations and surveillance requirements. The authorization bases and changes thereto receive a detailed DOE technical review and are approved by DOE either in headquarters or in the field, depending on their significance. Of the five sites reviewed in this report, all but one (Rocky Flats) have revised safety documentation either approved or in the process of DOE headquarters review.

In addition, to respond specifically to concern over issuance of the *Nuclear Air Cleaning Handbook,* DOE expects to issue a draft of the latest revision by the end of 1996. Other examples of activity in the nuclear air cleaning area include issuance of four technical standards for the 60-day public comment period:

> DOE-STD-4460-0001 (formerly DOE NE F 3-42), Operating Practices of DOE Filter Test Program
>
> DOE-STD-4460-0003 (formerly DOE NE F 3-43), Quality Assurance Testing of HEPA Filters
>
> DOE-STD-4460-0005 (formerly DOE NE F 3-45), Specifications for HEPA Filters Used by DOE Contractors
>
> DOE-STD-4460-0006 (formerly DOE NE F 3-44), DOE Filter Test Facilities Quality Program Plan

DOE acknowledges that technical oversight needs constant attention to ensure that it is at an adequate level and to accommodate to changes in the type of oversight required. The shift to the field of major manpower resources combined with preservation of a cadre of technical personnel in the Office of Defense Program's Office of Technical Support, which also provides support to the Office of Environmental Management on an as-requested basis, are examples of DOE's recognition of the changing nature of technical oversight. Other actions that we are taking to ensure that the Department has properly trained and qualified personnel are described in the Implementation Plan responding to DNFSB Recommendation 93-3 (Improved Technical Capability).

6.0 Corrective Actions Summary

6.1 Operability During Design Basis Accidents (Section 3.2.1)

6.1.1 Action: Perform safety analyses to support passive confinement approaches for PFP at Hanford and PF-4 and CMR at LANL

Schedule: Complete and approved for PFP. SAR approval scheduled for June 1996 for PF-4 and CMR.

6.1.2 Action: Promulgate guidance concerning source term and leakage rate assumptions.

Schedule: By September 30, 1996

6.2 Single Failure and Redundancy (Section 3.2.2)

6.2.1 Action: Determine need for more explicit requirements to perform reliability analyses, such as single failure analysis, to the industry standard on this subject.

Schedule: Determination to be made by April 30, 1996.

6.3 Emergency Power (Section 3.2.3)

6.3.1 Action: Provide an Uninterruptable Power Supply (UPS) for zone 1 exhaust fans and new air compressors with a 40 minute reserve air tank for the control air supply at PF-4.

Schedule: To be determined after approval of the General Plant Projects (GPP) project now under review by DOE.

6.3.2 Action: Replace the single diesel generator by two diesel generators as part of the canyon exhaust system upgrade at F-Canyon.

Schedule: By August 1998

6.4 Seismic (Section 3.2.6)

6.4.1	**Action:**	Upgrade seismic resistance of 12 glove boxes at PF-4. Evaluate another 50 glove boxes for possible upgrade.
	Schedule:	12 gloveboxes to be upgraded by September 30, 1996. Schedule for remaining glovebox upgrades to be determined by June 30, 1996.
6.4.2	**Action:**	Complete structural seismic upgrades to the CMR building.
	Schedule:	Structural upgrades to be complete by November, 1999.
6.4.3	**Action:**	Complete seismic assessment of safety-class SSCs for Building 332 at LLNL.
	Schedule:	Completed on January 30, 1996. Report under review by DOE.
6.4.4	**Action:**	Complete seismic qualification program for F-Canyon and FB-Line safety-related systems to see if they meet current seismic design criteria.
	Schedule:	By July 1996.
6.4.5	**Action:**	Make seismic improvements to selected components at PFP.
	Schedule:	Seismic improvements have been completed.

6.5 Operations/Maintenance (Section 3.2.7)

6.5.1	**Action:**	Complete procedure program improvements at PFP.
	Schedule:	March 30, 1996.

6.5.2	**Action:**	Submit a revised RFETS conduct of operations matrix to DOE-RFFO.
	Schedule:	February 29, 1996 (DONE)
6.5.3	**Action:**	Complete procedure improvement program plan for developing operating procedures for all safety-class and safety-significant systems at LLNL Building 332.
	Schedule:	Plan submitted to DOE in December 1995 and is currently being reviewed for approval.
6.5.4	**Action:**	Improve training of maintenance mechanics at LLNL Building 332.
	Schedule:	Training Implementation Matrix is currently being reviewed by DOE.
6.5.5	**Action:**	Review and approve new conduct of operations matrix for PF-4.
	Schedule:	Matrix approved. Implementation by April 30, 1996.
6.5.6	**Action:**	Develop new ventilation system operating procedures at CMR.
	Schedule:	Procedures will be developed by December 1996. May be revised based on approved SAR.
6.5.7	**Action:**	Implement more formal training and qualification program at CMR.
	Schedule:	Implementation scheduled for September 1997. May be revised based on approved SAR.

6.6 Periodic Testing (Bypass Leakage) (Section 3.2.8)

6.6.1	**Action:**	Resolve issue concerning leakage past the supply duct butterfly valves at PF-4.
	Schedule:	Evaluation of this issue is in the draft SAR. DOE action on the SAR is scheduled for June 1996.
6.6.2	**Action:**	Resolve issue concerning leakage from the FB-Line exhaust duct at SRS.
	Schedule:	Complete. The FB-Line exhaust duct has been rerouted to eliminate the potential for unmitigated leakage.
6.6.3	**Action:**	Complete more detailed assessment of ventilation system bypass leakage and acceptance testing for safety-class ventilation systems.
	Schedule:	Direction to the field to perform these assessments will be issued by March 31, 1996.

6.7 Response to the July 21, 1995, Letter on Rocky Flats (Section 4.0)

6.7.1	**Action:**	Prepare action plan to improve maintenance performance at Rocky Flats facilities.
	Schedule:	To be provided to DOE by March 15, 1996.
6.7.2	**Action:**	Determine what upgrades are to be made to Rocky Flats Building 371.
	Schedule:	Will follow a March 1996 decision on whether to build a new storage facility.
6.7.3	**Action:**	Take actions to remedy problem with excessive alarms in Rocky Flats Building 371.

Schedule: Several actions were completed by September 1995. However, these actions were not successful. A general corrective action plan for investigating this situation has been prepared by the contractor. The action plan establishes alarm-reduction targets to reduce the number of OSR-compliance alarms to less than 25/day by March 1, 1996, and to reduce the number of all alarms to less than 50/day by December 1, 1996.

6.7.4 Action: Provide an approved justification for continuing operations outside of OSR limits in Rocky Flats Building 776.

Schedule: Complete.

6.8 Management Issues (Section 5.0)

6.8.1 Action: Eliminate current ambiguity that exists between DOE 6430.1A and DOE 5400.5 with respect to accident doses to the public.

Schedule: DOE 420.1 and its implementation guide (now in interim form) replaces DOE 6430.1A and removes the ambiguity that exists between DOE 6430.1A and DOE 5400.5.

6.8.2 Action: Complete assessment of DOE policy regarding dose at nearest point of public access.

Schedule: Will be completed by August 15, 1996.

6.8.3 Action: Generate as-built drawings and P&IDs for safety-class SSCs at PF-4.

Schedule: Phase I of this effort is complete. Phase II is underway and will be completed in 1996.

6.8.4 Action: Provide a Configuration Management Office and a more formal change control procedure for CMR.

Schedule: Establish by June 30, 1996.

6.8.5 Action:		Prepare as-built documentation for LLNL Building 332.
	Schedule:	To be completed by September 30, 1996.
6.8.6 Action:		Reissue an updated Nuclear Air Cleaning Handbook.
	Schedule:	By December 31, 1996.
6.8.7 Action:		Issue new HEPA filter standards.
	Schedule:	By December 31, 1996.

Appendix A

Plutonium Facilities Ventilation Study Team

Headquarters

Study Lead	Edson C. Brolin, EM-60
Assistant/SRS program representative	Raymond Lopiccolo, EM-60
Defense Programs technical representative	Dae Chung, DP-31
Defense Programs technical support participants	Jeffrey Kimball, DP-31
	Rick Kendall, DP-31
	John Fredlund, DP-31
Hanford program representative	Jim Ahlgrimm, EM-65
Rocky Flats program representative	Kurt Juroff, EM-64
LANL and LLNL program representative	Gaffour Kosi, DP-13
Environmental, Safety and Health representative	Darrell Huff, EH-34
DNFSB DR representative	Lee Edwards, 5-3.1

SRS

DOE representative	Karl Waltzer, DOE/SRO
Contractor representative	Larry East, WSRC

RFETS

DOE representative	James Jeffries, DOE/RFFO
Contractor representative	William Coulter

LANL

DOE representative	Liz Roybal, DOE/AL
Contractor representative	Robin DeVore, LANL

LLNL

DOE representative	Doug Eddy, DOE/OAK
Contractor representative	Howard Woo, LLNL

Hanford

DOE representative	Jim McCracken, DOE/RL
Contractor representative	Rich Szempruch, WHC

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
LANL PF-4	Operability	"The passive safe shutdown concept does not meet the DOE 6430.1A operability requirement of one fully functional confinement system with no unmitigated leakage."	DOE considers that passive ventilation is acceptable if supported by a valid safety analysis. The contractor safety analysis of PF-4 indicates that it will remain fully functional and meet mitigation requirements through all design basis accidents.	DOE review safety analysis to determine if contractor proposal is acceptable. Action on SAR scheduled for 6/96. Passive ventilation assumptions are receiving close scrutiny as part of this review.
	Single Failure and Redundancy	"The inlet and outlet butterfly dampers do not meet the single failure criterion."	The inlet dampers were originally designed to fail closed upon loss of power while the outlet dampers were designed to fail open upon loss of power. If the inlet dampers do not fail closed, the leak path will be through a bank of high efficiency particulate air (HEPA) filters. If outlet dampers do not fail open, there are redundant filter trains to provide exhaust paths. A ventilation system model was developed to demonstrate the functional and redundancy requirements of the dampers and testing procedures. This model shows that particulate releases due to a fire during a safe shutdown are smaller if the intake valves are open.	When the 1995 SAR is approved by DOE, these valves will be locked in the open position.
	Emergency Power	"Emergency power requirements for redundancy, testing, and single failure contained in DOE 6430.1A are not being met at PF-4. DOE/HQ has not approved a deviation or exception, although a justification was approved by the DOE field office."	Per the proposed SAR the active portions of the ventilation system are not safety-class and therefore would not require emergency power. TA-55 has a standby power source (diesel generator) and a system change to add an UPS to provide backup power for systems important to safety has been approved. These power systems are used to power the ventilation system in the event of a loss of off-site power. These systems are performance tested on a prescribed schedule to confirm operability.	Review SAR and act on it by 6/96. Install UPS upon approval of GPP project.

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Periodic Testing	"Testing requirements for bypass leakage in DOE 6430.1A and ASME N510-1989 are not being followed."	Facility review indicates no bypass ducts exist. Detailed review of facility to determine potential system bypass leak paths and take corrective action as required (see section 3.2.8) will be directed.	New testing requirements are being defined in the Technical Safety Requirements as part of the Safety Analysis Report and, upon DOE approval, the new testing procedures will be based on appropriate industry standards such as ASME N510-1989. Direct review described in section 3.2.8.
	Control Room Habitability	The single ventilation intake for the control area is on the same side of the facility and in relative proximity to the discharge ductwork.	The ventilation system for the operations center has a HEPA-filtered intake and has been modified to allow for manual conversion to 100 percent recirculation mode following a potential release from the north exhaust stack.	None
	Stack Height	PF-4 has no real stacks, merely extended ductwork above the roof line.	The PF-4 safety analysis does not assume elevated stack release points for dose calculations and thus should be consistent with the stack physical configuration.	DOE act on the proposed PF-4 SAR by 6/96.
	Location of the Public	What is typically not addressed or poorly addressed is the potential public exposure at the "nearest point of public access." Examples include the parking lot and public road in front of TA-55. The limit of 100 mrem was not being applied by any of the facilities reviewed.	As described in section 5.1.2 the DOE safety analysis is currently based on dose at the site boundary, where there is no control by site authorities over the public. Dose at the nearest point of onsite public access is considered on some sites and not on others. DOE commits to assess our policy regarding dose at the nearest point of public access.	By 8/15/96 assess DOE policy regarding onsite dose at the nearest point of public access (applicable to all sites).
LANL CMR	Operability	The passive safe shutdown concept does not meet the DOE 6430.1A operability requirement of one fully functional confinement system with no unmitigated leakage.	Same as PF-4 above.	DOE review safety analysis to determine if contractor proposal is acceptable. Action on SAR scheduled for 6/96. Passive ventilation assumptions are receiving close scrutiny as part of this review.

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Single Failure and Redundancy	(The board specified this was a problem at CMR; however, there is no citation in the text of the report.)	There are no active safety-class systems at CMR per the proposed SAR. DOE is reviewing SAR now.	DOE act on SAR by 6/96.
	Emergency Power	Emergency power requirements for redundancy, testing, and single failure contained in DOE 6430.1A are not being met at CMR. DOE/HQ has not approved a deviation or exception.	CMR does not have a diesel generator and uninterruptable power supply to provide backup power because, per the proposed SAR, there are no active components of the ventilation system required during evaluation basis accidents.	Same as above.
	Periodic Testing	Testing requirements for bypass leakage in DOE 6430.1A and ASME N510-1989 are not being followed.	Periodic testing is performed in accordance with the 1988 Operational Safety Requirements which includes in-place testing of filters, and monitoring of filter pressures. Facility review indicates no bypass ducts exist. Detailed review of facility to determine potential system bypass leak paths and take corrective action as required (see section 3.2.8) will be directed.	Direct review by 3/31/96.
	Stack Height	CMR has no real stacks, merely extended ductwork above the roof line.	Evaluation basis accidents for CMR assume ground level releases because of stack configuration.	None
	Location of the Public	What is typically not addressed or poorly addressed is the potential public exposure at the "nearest point of public access." Examples include the parking lot and public road in front of CMR. The limit of 100 mrem was not being applied by any of the facilities reviewed.	Same as PF-4.	Same as PF-4.

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
LLNL Bldg 332	Operability	Not manned on back shifts. Operators not required to be in the control room. Depend on roving crews and alarms on back shifts.	Control area is manned during off hours if there is facility activity. Control area is not manned during off-hours when there are no activities involving radioactive material. Roving crews and alarms at continuously-manned alarm stations are sufficient to monitor equipment malfunction or fire in the facility. Systems are capable of an automatic restart or fail in a safe configuration.	None.
	Single Failure and Redundancy	No problems noted.	N/A	N/A
	Emergency Power	No problems noted.	N/A	N/A
	Periodic Testing	Not meeting by-pass requirements. Some ductwork has significant corrosion.	Satisfies section 5.6.6.3 of ASME N509-89 that states, " all HEPA filters frame and absorber bed welds which could result in leakage bypassing HEPA filters or adsorber beds shall be shop tested with magnetic particle or liquid penetrant in accordance with the requirements in para. 7.3." In addition, each HEPA and adsorber frame has been leak tested in the shop in accordance with ASME N510, section 7. Leakage was within .1% of rated flow. Action regarding bypass leakage noted above for PF-4 applicable to Building 332 also.	Same as PF-4.
	Control Room Habitability	Video Room used by operators does not have safety-class ventilation systems.	Video Room is not in the Radioactive Material Area and is not part of confinement. Should accidents occur, operators will wear respirators. Therefore, safety-class ventilation system is not required for the Video Room.	None.
	Stack Height	No problems noted.	N/A	N/A

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
Hanford PFP				
	Single Failure and Redundancy	Redundant ventilation fans but not seismic by today's standards.	Ventilation fans are not safety-class since no scenarios identified where continued operation of the ventilation system is essential to prevent unacceptable release. Static air posture was found to be an acceptable facility situation.	None
	Emergency Power	Redundant steam and electric power supplies exist, but not seismic by today's standards.	Electric and backup steam power supplies are available for defense-in-depth. Failure of exhaust fans due to earthquake assumed in safety analysis. Analysis demonstrates loss of operation of exhaust fans in acceptable. Ventilation fans are not safety-class since no scenarios identified where continued operation of the ventilation system is essential to prevent unacceptable release. Static air posture was found to be an acceptable facility situation.	None
	Periodic Testing	Testing requirements for bypass leakage in DOE 6430.1A and ASME N510-1989 are not being followed.	HEPA filters are being tested in accordance with ASME N510-1989. There is only one potential for bypass leakage at PFP that involves leakage of instrument shop room air. Facility review indicates no bypass ducts exist. Detailed review of facility to determine potential system bypass leak paths and take corrective action as required (see section 3.2.8) will be directed.	PFP plans to blank the potential bypass leakage path. Direct review described in section 3.2.8.

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Stack Height	Stack not seismically designed to today's standards.	The main facility 200 foot exhaust stack, 291-Z-1, and the exhaust stack for the storage vault in 2736-ZA were analyzed for seismic loads and meet current requirements. Seismic analyses for the 291-Z-1 stack were done in 1980 and it was found that the stack was over stressed, however, the analyses did not take into account soil structure interaction effects that could reduce the seismic loading at the base of the stack. Additional analyses in 1988 performed by URS/Blume utilized a combination of two and three dimensional models that included soil structure interactions and also accounted for areas of concrete cracking and plastic deformation in the reinforcement. Their analyses and conclusion that the stack would not suffer significant damage and would continue to perform its function were reviewed in detail as part of the DOE-HQ review of the FSAR.	None

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Location of the Public	What is typically not addressed or poorly addressed is the potential public exposure at the "nearest point of public access." Examples include the parking lot and public road in front of TA-55. The limit of 100 mrem was not being applied by any of the facilities reviewed.	Accident analysis at PFP examined potential impacts to workers in the facility, nearby co-located workers on the Hanford Site (450-550 meters away) and public at the nearest site boundary (12.6 kilometers west of PFP) and are included in the FSAR. Dose at the nearest point of public access (highway about 2.5 miles from PFP) was also assessed against site risk acceptance guidelines and found acceptable. The public access roads at Hanford are addressed for emergency planning purposes under DOE Order 5500.3A. Emergency management procedures at Hanford provide the guidance for evacuation and control of these roads, and the procedures are exercised yearly during the emergency management drill. DOE commits to assess our policy regarding dose at the nearest point of public access as noted above for PF-4.	By 8/15/96 assess DOE policy regarding onsite dose at the nearest point of public access (applicable to all sites).
Rocky Flats Bldg 771/774	Operability	None		
	Single Failure and Redundancy	None.		
	Emergency Power	None.		
	Periodic Testing	Testing of filter stages is not consistent with safety basis.	OSRs and testing have been revised to conform to safety analysis except testing is not yet completed for one of two stages of credited filtration in the main plenum.	
	Control Room Habitability	None.		

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Elevated Release	None.		
	Site Boundary Condition	None.		
Rocky Flats Bldg 776/777	Operability	None		
	Single Failure and Redundancy	None.		
	Emergency Power	None.		
	Periodic Testing	Testing of filter stages is not consistent with safety basis.	OSRs and testing have been revised to conform to safety analysis.	
	Control Room Habitability	None.		
	Elevated Release	None.		
	Site Boundary Condition	None.		
Rocky Flats Bldg 371/374	Operability	Excessive alarms are received.	Investigation and correction in progress. Reduction to level of 50/day by end of 1996 is the target.	None provided.
	Single Failure and Redundancy	None	N/A	N/A
	Emergency Power	None	N/A	N/A

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Periodic Testing	Only one filter bank was tested. Filtration system and damper bypass leakage is not tested.	OSRs have been changed to require two banks be periodically tested, consistent with accident analysis credit for filtration and redundancy requirements. The testing has been completed. Inspection of plenum door seals, one logical source of bypass leakage has been instituted as a periodic part of filter testing.	Other building HEPA filter test requirements have been similarly updated.
	Control Room Habitability	None	N/A	N/A
	Elevated Release	None	N/A	N/A
	Site Boundary Condition	None	N/A	N/A
Rocky Flats Bldg 779	Operability	None		
	Single Failure and Redundancy	None.		
	Emergency Power	None.		
	Periodic Testing	None.		
	Control Room Habitability	None.		
	Elevated Release	None.		
	Site Boundary Condition	None.		

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
Rocky Flats Bldg 707	Operability	None		
	Single Failure and Redundancy	None		
	Emergency Power	None		
	Periodic Testing	Testing of filter stages is not consistent with safety basis.	OSRs and testing have been revised to conform to safety analysis.	
	Control Room Habitability	None		
	Elevated Release	None		
	Site Boundary Condition	None		

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
Savannah River FB-Line/ F Canyon	Periodic Testing and Bypass Leakage	The requirements for systems and dampers bypass leakage is not being addressed at DOE Plutonium facilities. .... Still another example is the FB-Line exhaust duct at Savannah River. A portion of this duct passes through the F-Canyon Exhaust Tunnel and is under more negative pressure than the tunnel. The FB-Line exhaust in the F-Canyon Exhaust Tunnel is downstream of its filtration devices, whereas the tunnel exhaust is upstream of its filtration device. Any leakage into the FB-Line exhaust could thus lead to an unmitigated release path. When the exhaust line was recently tested for the first time, it showed a small leak. In conclusion, testing requirements for bypass leakage contained in DOE 6430.1A and ASME N510-1989 are not being followed.	This finding related to the FB-Line *room exhaust* only, the *process cabinet exhaust* system exhausts through the F Canyon sand filter system. Testing and radiological analyses determined that a small leak in the FB-Line (FBL) Room Exhaust Duct was allowing approximately 16 cfm of unfiltered canyon air to be exhausted to the environment. As an interim measure, an Unreviewed Safety Question Evaluation was conducted and a Justification for Continued Operation, which provided certain restrictions on operation, was written. As a permanent corrective action, in May 1995, the FBL air stream was re-routed through the F Canyon sand filter, eliminating this unfiltered release path to the environment.	
	Exhaust Stack	At Savannah River, separate stacks are used for the plutonium processing and handling facilities in the H-Area and F-area. Each stack serves the canyon and the B-Line for its area. Each is a freestanding structure separate from the-facility it serves, but does not meet today's seismic standards.	Seismic analyses have indicated that the exhaust stacks will survive a DBE, however, the stack liners will not. The Stack liners are constructed of acid resistant brick which helps protect the main stack structure from corrosive vapors in the canyon exhaust. Evaluations of the stack liner design have indicated that failure of the stack liner may occur during a 0.04g seismic event potentially causing partial blockage of the ventilation system discharge. A USQ Determination was performed for this event in 1992, and a SAR addendum was written, both approved by DOE. Mitigating Emergency Response procedures are in place to provide an alternate exhaust path in the event the liner has collapsed.	

Response to Board Specific Comments - Appendix D				
Location Facility		**Board Comments**	**Resolution**	**DOE Corrective Action**
	Public Access and Postulated Accident Assessments	What is typically not addressed or poorly addressed is the potential public exposure at the "nearest point of public access" as required by sections 1300-1.4.2 and 1300-3.2 of DOE 6430.IA. Examples include...public access roads at Savannah River ...	The public access roads at SRS have been addressed in the site's emergency planning activities in accordance with DOE Orders. Since the roads can be evacuated and access control established within one hour the roads have not been used when evaluating the consequences of accidental releases. The site boundaries have been used for this purpose. DOE is committed to assess our policy relative to onsite dose at the nearest point of public access.	By 8/15/96 assess DOE policy regarding onsite dose at the nearest point of public access (applicable to all sites).

Appendix E

EFG (07-90)

United States Government **Department of Energy**

memorandum

DATE: October 25, 1995

REPLY TO ATTN OF: Office of Nuclear Safety Policy and Standards:R. Black:903-3465

SUBJECT: Interpretation of DOE 6430.1A and DOE 5400 Series Orders

TO: E. C. Brolin, Associate Deputy Assistant Secretary
Office of Nuclear Material and Facility Stabilization, EM-60

Attached to this memorandum is the response to your September 15, 1995, memo requesting an interpretation and discussion of Order requirements regarding public radiation exposure relating to accident conditions. The response is in the form of a discussion because DOE 6430.1A, which you cite, is not directly applicable to the issues you are addressing and because the Order is internally inconsistent when dealing with the subject of accident dose guidelines for siting and design.

We recommend that the requirements of DOE 5480.23 (Safety Analysis Reports) (SAR) be followed in evaluating the adequacy of the design safety basis of the facilities at issue, and that DOE 420.1 and its Implementation Guides be used as reference material for comparison of the existing designs with current standards. None of the Orders cited above contain a backfit requirement for existing authorized facilities. The decision to modify a facility to improve its safety basis is the responsibility of the Cognizant Secretarial Officer, based on his assessment of the adequacy of the existing safety basis as described in an upgraded 5480.23 SAR or a Basis for Interim Operation submitted as part of a 5480.23 Implementation Plan.

If you have any questions regarding this response, please contact Dr. Richard W. Englehart of my staff at 301-903-3718.

Richard L. Black

Richard L. Black, Director
Office of Nuclear Safety
Policy and Standards

Attachment

cc: Dae Chung, DP-31
John Fredlund, DP-311
Arthur Edwards, EH-9

RADIOLOGICAL DOSE CRITERIA

Regarding your questions on radiological siting, design, and operating criteria, these are three separate topics. Again, DOE 6430.1A applies to design and construction of new facilities and modifications to existing facilities when incorporated into the relevant contracts, and DOE 420.1 contains the latest DOE requirements and would apply when incorporated into the relevant contracts.

Siting Guidelines

An existing facility has already been sited, so the content of 6430.1A in this regard is moot. However, section 0200-1.3 specifies a 25 rem whole body dose (and organ doses) to off-site individuals as the radiological siting guideline. Off-site individuals are defined in 0200-1.3 as persons outside the boundary controlled by the site. This same section refers to LANL LA-10294-MS for further guidance. The LANL document makes clear that the siting guideline of 25 rem has its roots in the precedent of 10 CFR 100, which also specifies a 25 rem criterion. These criteria are applied by analyzing a maximum design basis accident (DBA). Section 0200-1.3 goes on to qualify that 25 rem is not intended to imply that these doses constitute acceptable limits for accident doses to the public, but are reference values that can be used in evaluation of facility design in combination with the suitability of the site.

DOE 420.1, in section 4.1.1.2 deals with facility siting, and the Implementation Guide for section 4.1 provides guidance to use 25 rem at the site boundary as a siting guide for new facilities. Thus, a radiological accident dose criterion of 25 rem, evaluated at the site boundary, has been consistently used for DOE purposes.

Design Guidelines

Design radiological guidelines are somewhat less clear historically. DOE 6430.1A is internally inconsistent in this regard. As described in the preceding paragraphs, 6430.1A, section 0200-1.3, describes that the 25 rem dose, in addition to use as a siting criterion, can also be used to evaluate facility design. LANL LA-10294-MS, referenced in 0200-1.2 of 6430.1A reflects the intent of 6430.1A to use 25 rem at the site boundary "to determine the need during the design phase for engineered safety features and other controls, and to justify that the proposed facility including the ESFs will adequately meet siting guideline doses in the event of a DBA."

Section 1300-1.4 of 6430.1A contains the statement that facility design should include attenuation features for postulated accidents to preclude doses in excess of "DOE 5400 series limits for public exposure." Taken alone, this statement would indicate only that accident mitigation features should not stop at the point that siting guidelines are met, but design should be subject to the ALARA principle, with the goal of limiting site boundary accident doses to 100 mrem. However, in section 1300-3.2 (Safety Class Items), one criterion for the identification of safety class items is "Those whose failure would produce exposure consequences that would exceed the guidelines in Section

1300-1.4, Guidance on Limiting Exposure of the Public" and, then goes on to say, "at the site boundary <u>or nearest point of public access</u>."

There are several problems with this content of section 1300 of 6430.1A:

* The combined content of sections 1300-1.4 and 1300-3.2 indicates effectively that there is a design guide to limit accident doses to normal operational limits (100 mrem). DOE 5400.5 specifically states that its limits do not apply to exposures due to accident conditions.

* The guidance to identify as safety class items all equipment needed to meet normal operational limits during accidents is in conflict with section 0200-1.3 relative to siting acceptability and the evaluation of facility design and engineered safety features (100 mrem vs 25 rem). It is also in conflict in specifying the nearest point of public access as the dose evaluation point for safety class items. DOE 5400.5 would normally be applied at the offsite location of highest public dose rather than an onsite location where a member of the public might be at the time of an accident. The same is true, of course, with the siting and evaluation of facility design guidance of section 0200-1.3.

* Nuclear industry precedent, as reflected by NRC's Technical Specifications Improvement Program, is to limit the designation of "safety class" items to those whose failure during an accident could led to the possibility of deterministic radiation effects to the public (25 rem at the site boundary).

Current guidance in DOE-STD-3009 for SARs for nonreactor nuclear facilities is that an Evaluation Guideline dose at the site boundary should be used for identification of Safety Class Structures, Systems, and Components (SCSSCs). The Implementation Guide for DOE 420.1, section 4.1, specifies that this Evaluation Guideline is 25 rem at the site boundary, for the purpose of design guidance.

In the evaluation of safety basis design adequacy of existing nuclear facilities, the SAR is the operative document. Either 6430.1A or 420.1 can be used as a reference for comparison of the existing design with design guidance for new facilities. However, because of the internal inconsistencies of 6430.1A, it is not certain how to apply that document (for the reasons stated above). Nonconformance of existing design with the design guidance of either Order is not a reason, a priori, for modifying the design.

<u>Operational Radiological Limits</u>

DOE 5400.5 is about to be replaced by 10 CFR 834 with respect to radiation protection of the public. As did 5400.5, the draft rule cautions that dose limits for normal operations should not be used in the context of design guidance for accident dose attenuation.

SUMMARY RESPONSE

DOE 6430.1A is applicable to the design of new facilities and modifications of existing facilities when included in applicable contracts. Evaluation of the design adequacy of existing facilities is required by DOE 5480.23; either 6430.1A or DOE 420.1 can be used as references for comparison of the existing design with current standards. However, neither 6430.1A nor 420.1 require backfit of existing facilities to their requirements. DOE approval of an upgraded SAR to the requirements of DOE 5480.23 constitutes approval of the design safety basis. There are no radiological criteria other than comparison to those that are applicable to new facilities currently in place. However, those criteria do not constitute requirements for existing facilities.

DOE 6430.1A contains siting criteria of 25 rem to be evaluated at the site boundary and to be used in evaluation of the adequacy of the design. In conflict with the siting criteria, 6430.1A guidance for the identification of safety class items refers to an Order applicable for normal operations (5400.5), which itself cautions against such use. Because of these internal inconsistencies and the availability of updated Orders and guidance, it is recommended that 6430.1A not be used as a reference for radiological criteria for safety design and that DOE 420.1 and its Implementation Guides be used instead. In that regard, 25 rem DBA dose at the site boundary and as a criterion for identification of safety class structures systems and components is adopted in the updated guidance (in the Implementation Guide for section 4.1 of DOE 420.1).

The following paragraphs address the issues in your request of September 15, as they relate to DOE 6430.1A and the 5400 series Orders in more detail.

APPLICABILITY OF THE ORDERS

First, DOE 6430.1A applies to the processes of design and construction of new facilities and modifications to existing facilities, when the Order is a part of the applicable contracts. Therefore, it is inappropriate to apply 6430.1A to an existing and authorized facility unless it has been decided to modify the facility and the Order is specified in the applicable contract. DOE 420.1 has current nuclear safety design requirements and would be applicable in this regard when incorporated into contracts.

Once a nuclear facility has been designed and constructed, and accepted by DOE (authorized to operate), then the safety basis and configuration of the facility is controlled through application of the Unresolved Safety Question (USQ) process of DOE 5480.21 and the Safety Analysis Report (SAR) requirements of DOE 5480.23, including annual updates. That is, the responsible and Cognizant Secretarial Officer has the responsibility to review and accept the safety basis of the facility as documented in a SAR or to opt for safety improvements if justified in his judgement. DOE 6430.1A or DOE 420.1 can be used as references for comparison of the as-built design to current requirements to aid in these judgements, but neither Order is to be applied as a forcing function for retrofit of a facility.

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