The Secretary of Energy
Washington, DC 20585

90:1932

November 29, 1990

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

Dear Mr. Conway:

In accordance with Section 315 of Public Law 100-456, please find enclosed the Department of Energy's Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 90-6, which I accepted in my letter to the Board dated July 24, 1990.

To date, several actions have been completed to reduce the probability of a criticality event in the ventilation ducts and associated systems at the Rocky Flats Plant. The Plan describes those actions which have been completed as well as the remaining actions required to comprehensively address this issue, including measures to reduce and control material accumulations during future operations. We will keep you informed of our progress in executing this program.

Sincerely,

James D. Watkins
Admiral, U.S. Navy (Retired)

Enclosure

90:1932

DEPARTMENT OF ENERGY

IMPLEMENTATION PLAN

FOR THE

DEFENSE NUCLEAR FACILITY SAFETY BOARD

RECOMMENDATION 90-6

~~October 7, 1990~~

Nov. 29, 1990

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1.0 INTRODUCTION

1.1 PURPOSE

Fissile materials and other undefined debris have been accumulating in the ventilation ducts and associated systems at the Rocky Flats Plant over many years of operation. The presence of such material in the ventilation ducts and associated systems is a matter of concern relating to the safety and health of the public, including on-site workers. These concerns arise from the effect that such materials might have on criticality safety, radiation exposure, system operability, and the potential for environmental contamination. This implementation plan describes the Department of Energy's program to address the accumulation of fissile and other materials in ventilation ducts and related systems and includes the actions necessary to respond to Defense Nuclear Facilities Safety Board recommendation 90-6 (Reference 1).

The objectives of this program are to ensure that: (1) potential hazards associated with the accumulation of fissile and other materials in ventilation ducts and related systems are addressed and resolved in a safe and environmentally sound manner; and (2) actions are taken to ensure that material accumulation resulting from future operations will be prevented to the maximum extent practicable, effectively monitored, and controlled.

1.2 BACKGROUND

In response to public concerns that nuclear criticality accidents involving plutonium may have occurred at the Department of Energy's (DOE) Rocky Flats Plant (RFP), an independent review was conducted by SCIENTECH, Inc. (hereafter referred to as SCIENTECH). The SCIENTECH Criticality Safety Assessment Team (CSAT) found no evidence of any criticality accident but made recommendations for improving criticality safety at the RFP. In particular, the accumulation of fissile material in several ventilation ducts and associated systems was identified as a potential criticality safety problem. The ventilation ducts and associated systems evacuate the atmosphere from gloveboxes to the building ventilation plenums where the exhaust gasses pass through four stages of High Efficiency Particulate Air (HEPA) filters prior to being released to the environment.

In their report to the DOE (Reference 2), the CSAT made a number of recommendations which, if fully implemented, would reduce the probability of a criticality accident and maintain an acceptably low level of risk to the workers and the public. In response to this report, EG&G Rocky Flats, Inc. (hereafter referred to as EG&G) issued an Action Plan on February 16, 1990. The EG&G Action

Plan, was revised on May 4, 1990, in response to comments from the DOE Rocky Flats Operations Office (RFO). A second revision to the EG&G Action Plan was issued on May 16, 1990 (Reference 3) based on an independent review of the EG&G Action Plan, conducted by SCIENTECH, (Reference 4) . The revised Action Plan was responsive to the recommendations of the CSAT (reference 2) and SCIENTECH noted that if properly implemented the revised Action Plan would result in a reduced probability of a criticality accident and maintain an acceptably low level of risk to the workers and the public.

Based on its review of this issue, the Defense Nuclear Facilities Safety Board (DNFSB) recommended (Reference 1) that the DOE prepare a written program, with commitments, to address the accumulation of fissile and other materials in ventilation ducts and related systems. The recommendation further stated that the written program should address and include the following:

"o Description of remediation actions, including the scheduling and basis for same, that are deemed necessary prior to resumption of plutonium operations by DOE.

o Descriptions and justification of non-destructive assay techniques, calibration, modeling, and assay methodology.

o Estimation of radiation levels in areas of occupancy, both from gamma rays and fast neutrons.

o Determination of the effects of accumulation of fissile and other materials on the functionability of the ventilation ducts and related systems which must act to protect the health and safety of the public, including plant operating personnel.

o Description and justification of procedures and schedules, both short term and long term, for removal or reduction in amount and concentration of existing fissile and other unidentified debris in the ventilation ducts and related systems, as stated above.

o Determination of any design and operational changes in the ventilation ducts and related systems necessary to prevent further accumulation of significant amounts of fissile and other materials therein and to ensure continued operability of systems installed to protect the health and safety of the public

including plant operating personnel. This includes a thorough study of the glovebox filters and ventilation and alarm systems.

- o Establishment of a monitoring program for the ventilation ducts and related systems to establish that design and operational changes and modifications are effective in preventing significant additional accumulation of fissile and other materials."

The DNFSB was briefed by EG&G and SCIENTECH on June 26, 1990 concerning the Action Plans (references 3 and 4). On July 24, 1990 the Secretary of Energy accepted the DNFSB recommendation and established the following additional requirements (Reference 5):

"1. All lines of ductwork containing more than 400 grams of plutonium shall be cleaned to remove the material to the maximum extent practicable but in no case to leave a residue exceeding 400 grams in any one system of ducts. This will physically rule out the possibility of a criticality in even the most unlikely series of events."

Note: Ducts not exceeding the 400 gram limit will be cleaned, to the maximum extent practicable, as soon as possible after resumption of operations. The 400 gram threshold limit was selected because there are no circumstances under which 400 grams (or less) of plutonium in any chemical form or geometry found at the Rocky Flats Plant can achieve a critical mass. To account for fissile material measurement uncertainties, measured values are doubled before applying the 400 gram criteria. Thus, if the measured amount of fissile material in a duct is greater than or equal to 200 grams, it is considered to meet the 400 gram criteria and remediation actions are required by the Secretary's policy (Reference 5).

"2. The contractor shall develop and implement an Operational Safety Requirement (OSR) which includes a limiting condition for operation, a corresponding surveillance requirement, and a remediation action directive to assure that future operations do not lead to the accumulation of more than 400 grams of plutonium in any one system of ducts. The OSR must be submitted to and approved by DOE prior to resumption of operations.

3. If the contractor determines that the risks to workers during removal of material from ductwork exceeds the risks of continued operation with the material in the duct, the contractor must submit an analysis of the respective risks along with a justification for continued operation of the process lines contributing material to the affected

ductwork. If it is not possible to remove the material for other valid reasons, the contractor shall also submit an analysis justifying continued operation of the affected process line. The Secretary shall determine, on a case-by-case basis, if continued operation is warranted."

EG&G has begun implementation of the revised Action Plan (Reference 3) and is now developing a comprehensive Program Plan for accomplishing the remaining actions required to fully address the accumulation of fissile and other materials in ventilation ducts and associated systems. The sections that follow provide detailed descriptions of the program for addressing the DNFSB recommendations and implementing the Secretary of Energy's requirements.

1.3 TERMS AND DEFINITIONS

The following terms and definitions are used in this implementation plan:

ALARA. Acronym for "As Low As Reasonably Achievable," a basic concept of radiation protection that specifies that the radioactive discharges from nuclear plants and radiation exposure to personnel be kept as far below regulatory limits as practical.

DOE Orders. The Department of Energy controls the activities under its cognizance by promulgating Orders which must be followed by all Departmental Elements and, in accordance with contractual provisions, by contractors performing work for the Department. The DOE Orders referenced in this document are briefly described in Appendix A.

Duct. A duct, or system of ducts, is defined as a collection of header piping that forms a single upward flow path to an exhaust plenum. Included in the definition of a duct are the small diameter lateral lines that connect gloveboxes to headers.

Fissile Material. A nuclide capable of undergoing fission by interaction with slow neutrons provided the thermal neutron production cross section exceeds the effective thermal neutron absorption cross section. The fissile material discussed in this implementation plan is assumed to be plutonium with an isotopic content of 95 weight percent Pu^{239} and 5 weight percent Pu^{240} (and associated daughter products), which is representative of process stream material at the Rocky Flats Plant. The plutonium is combined with various unidentified materials in the ducts.

In uranium processing areas, any fissile material accumulations would consist of enriched uranium in various forms.

Independent Review. Independent reviews will be conducted in accordance with contractor independent review and appraisal system requirements delineated in Reference 6, DOE Order 5480.5, "Safety of Nuclear Facilities."

Prior to Resumption. Refers to remediation activities which will be completed as soon as practicable and which must be completed prior to resumption of operations involving fissile materials.

Remediation Action. Refers to any action that either reduces the amount of, mitigates the effects of, or prevents further accumulation of fissile and other materials in the ventilation ducts and associated systems.

2.0 PROGRAM DESCRIPTION

2.1 SCOPE

This program focuses primarily on public (including on-site workers) health and safety risks associated with the accumulation of fissile and other materials in the ventilation ducts and associated systems at the Rocky Flats Plant.

The program encompasses those activities which must be completed prior to the resumption of operations involving fissile materials and longer-term activities which may be completed after resumption.

2.2 APPROACH

To implement this program, EG&G established a task team responsible for: (1) directing the plant-wide effort to determine more accurately the extent of the problem;
(2) evaluating the associated hazards and risks; and (3) recommending and implementing measures to mitigate the problem and prevent its recurrence.

A program plan is being developed to comprehensively address the Board's recommendation and to implement the Secretary of Energy's policy. The program plan will encompass the Action Plan of reference 3. Six major tasks have been identified as follows:

Task 1: Determination of fissile material accumulation.

Task 2: Evaluation of nuclear safety risk.

Task 3: Evaluation of potential worker radiation exposures.

Task 4: Review of risk assessments and safety analyses.

Task 5: Prevention of fissile material accumulation.

Task 6: Removal of material from ventilation systems.

These tasks are described in further detail in Section 3.0, Detailed Technical Approach.

2.3 PROGRAM OBJECTIVES

The objectives established for this program are as follows:

2.3.1 Objective to be Accomplished Prior to Resumption

(a) Assure that a criticality accident does not take place.

(b) Assure that the presence of fissile and other materials in the ventilation ducts and associated systems does not result in an undue risk to the health and safety of the public, including on-site personnel.

(c) Assure that occupational radiation exposure resulting from the presence of fissile material in ventilation ducts and associated systems is As Low As Reasonably Achievable in accordance with Reference 7.

(d) Assure that future operations do not cause excessive accumulation of fissile and other materials in ventilation ducts and associated systems in the future.

2.3.2 Objectives to be Accomplished After Resumption

(a) Assure that fissile material and other debris in the ventilation ducts and associated systems will be properly removed or substantially reduced in amount and concentration.

(b) Assure that occupational radiation exposure resulting from the presence of fissile material in ventilation ducts and associated systems continues to be maintained As Low As Reasonably Achievable in accordance with Reference 7.

(c) Minimize future accumulations of fissile and other materials in ventilation ducts and associated systems.

3.0 DETAILED TECHNICAL APPROACH

This section describes the six tasks that constitute the remediation program and indicates when activities must be completed relative to resumption of plutonium operations. The activities which must be completed complete prior to resumption will be reviewed for adequacy by the DOE Operational Readiness Review for each plutonium operations building. Decisions regarding remediation action requirements will be based on the policy outlined in Reference 5 and the following criteria (Reference 3).

(a) CRITICALITY: K_{eff} + 4 sigma < 0.94 for fissile material found in exhaust ducts or waste lines including an account of: 1) the chemical form of Pu, 2) the effects of non-fissile material co-located with the Pu, and 3) the potential for relocation of Pu outside the exhaust duct or waste line. The methodology for criticality calculations assumes the accumulation of the fissile material in a minimum volume, minimum surface area, maximum density, optimally moderated (e.g. flooding) and fully reflected configuration.

(b) OCCUPATIONAL RADIATION EXPOSURE: Dose equivalent rate locations with possible continuous occupancy during normal operations < 0.4 mrem/hr. The federal annual allowable whole body radiation dose limit for occupational workers is 5 rem/year. The Rocky Flats Plant administrative whole body dose limit is 2 rem/year and will be further lowered to 1.8 rem/year in the near future. If a worker is exposed continuously to a 0.4 mrem/hour radiation source, for a full year (52 weeks X 40 hours/week), the resulting annual dose received by the worker would be 832 mrem (0.8 rem), which is less than one-half of the allowable limit.

(c) ENVIRONMENTAL RELEASE SOURCE TERM: Estimated radiological consequence to general public following creditable accident does not exceed limits established by DOE Order 6430.1A.

(d) SYSTEM OPERABILITY REQUIREMENTS: The accumulation of material does not hinder the safe operation of the process line or otherwise invalidate assumptions made in the Final Safety Analysis Reports regarding the operability of the ventilation ducts and associated systems.

(e) REMOVAL AND DISPOSAL: The risk associated with the removal and disposal of the material that has accumulated

in the duct does not exceed the risks associated with the presence of the material in the duct.

3.1 TASK 1: DETERMINATION OF FISSILE MATERIAL ACCUMULATION

The purpose of this task is to determine the quantity and distribution of fissile material accumulation in glovebox exhaust ducts through non-destructive assay (NDA) measurements. The main objective is to identify those ducts which require fissile material removal. Detailed descriptions and justification of non-destructive assay techniques, calibration modelling, and assay methodology are provided in Reference 8. The technical activities described by this task were previously reviewed by the CSAT, which found the corrective actions and plans to be technically adequate. Throughout the program, the NDA measurements will be independently reviewed, in accordance with Reference 6, including the treatment of the data, the assumptions made in evaluation of the data, and the validity of the statistical methods used in determining the sample size and composition for statistical measurements. This task is divided into sub-tasks as follows:

PRIOR TO RESUMPTION

3.1.1 NDA Measurements Prior to Resumption

The purpose of this sub-task is to perform measurements on the ductwork considered to have the highest probability of fissile material holdup based on analysis of operations performed and materials processed in gloveboxes served by the ducts.

(a) General Survey

General survey measurements were made utilizing the methodology employed by the SCIENTECH CSAT. A total of 5500 feet of duct was surveyed in Buildings 371, 707, 771, 776, and 779. The results were in agreement, within stated levels of uncertainty (see Reference 8), with the results obtained in Reference 2. The survey provided a gross conservative estimate of the maximum total accumulation of plutonium in ducts and also identified ducts containing sufficient accumulations of plutonium to warrant more detailed measurements. This sub-task was completed in September 1989.

(b) Detailed Measurements

More detailed NDA measurements were made of 1713 linear feet of glovebox exhaust ducts identified as containing significant holdup of plutonium by the General Survey in

Buildings 771, 707, and 777. A total of 6.75 Kg of plutonium were detected.

To further refine the upper bound and confidence limits on the total fissile material accumulation in the glovebox exhaust ducts detailed measurements will be made of all physically accessible ducts. These detailed measurements will begin after completion of the Statistical Sample described below.

(c) Statistical Sampling

After the initial survey, in which the selection of duct work for measurement was guided by the concern for nuclear safety, it was recognized that total plutonium accumulation in ventilation ducts would have to be determined to establish a new upper bound and confidence limits. Recognizing that available resources would constrain this effort, a Statistical Sampling Plan was developed by the Rocky Flats Statistical Applications group in conjunction with the Safeguards Measurements group. All glovebox exhaust ducts scheduled for NDA measurements prior to resumption were categorized in terms of their service, diameter, location, atmosphere (wet versus dry) and other pertinent factors and a representative sample of these ducts was selected for measurement. The statistical sample results provided rapid confirmation of the accuracy of predictions, based on operation analysis, regarding which ducts would likely contain significant quantities of material and which ducts would contain little or no material and thus increased the confidence that duct measurements have been appropriately prioritized.

Measurements initially included in this task were completed in July 1990 in Buildings 371, 374, 559, 707, 771, 774, 776, 777, 779. Additional measurements of the second floor of Buildings 707, 771, and 776 were added to the scope of this sub-task in July 1990. These subsequent measurements in Buildings 707 and 776 have been completed. The results will be documented in a formal report.

3.1.2 Validation of Assay Measurements and Methods

The purpose of this task is to correlate the "before remediation" and "after remediation" NDA measurements with the actual laboratory analyses (calorimetric assay) of the material removed from the duct. This correlation will provide additional information that can be used to determine the validity of the NDA

measurements and methods. The overall validation process will continue throughout the life of this program. However, measurements associated with individual ducts will be compared to calorimetric assays of removed material prior to resumption of operations in gloveboxes served by those ducts.

AFTER RESUMPTION

3.1.3 NDA Measurements After Resumption

NDA measurements will be made of ventilation systems in uranium buildings and ducts in fissile material handling buildings which were not measured prior to resumption because no accumulation of fissile material would be expected (e.g. room ventilation ducts). Effort on this sub-task will begin at the completion of section 3.1.1 above. This sub-task will complete the determination of fissile material accumulation and identification of ventilation ducts and associated systems which might require remediation.

3.2 TASK 2: EVALUATION OF NUCLEAR SAFETY RISK

The purpose of Task 2 is to assess the potential for a nuclear criticality accident due to the accumulation of fissile material in ventilation ducts and related systems. In Reference 9, the EG&G Nuclear Safety organization has documented, on a generic basis, the acceptable subcritical mass limits for pipes of various diameters and wall thicknesses.

Based on this generic analysis, all currently identified fissile material accumulations in ducts are considered safe and will remain safe in their current configuration unless catastrophic flooding and a combination of unlikely conditions should occur. These conditions would include the accumulation of the fissile material in a minimum volume, minimum surface area, maximum density, optimally moderated, and fully reflected configuration. The assumptions, calculations, and conclusions arising from these safety assessments will be independently reviewed, throughout the program. An initial review of the criticality safety analysis methodology has already been accomplished (Reference 10). This task is divided into the following sub-tasks:

PRIOR TO RESUMPTION

3.2.1 Conduct Criticality Assessments Using the Results of Section 3.1.1 Measurements

The purpose of this sub-task is to conduct a criticality safety evaluation of the amount of plutonium found in the ducts as a result of the section 3.1.1 measurements. The General Survey and Detailed Measurements identified fourteen ducts in buildings 707, 771, and 776 which must be cleaned to meet the requirements specified in reference 5. No ducts in building 559 have been identified as requiring material removal prior to resumption. The CSAT reviewed this work performed and found the results to be technically adequate.

Review of measurements from the Statistical Sampling program has identified five additional ducts in building 707 which must be cleaned. Since review of data from the statistical sampling conducted to date and the statistical sampling of the second floor of building 771 has not yet been performed it is anticipated that additional ducts might yet be identified.

The measurements which are to be made for the Complete Sampling phase of section 3.1.1 will also evaluated by the Nuclear Safety organization and might identify other ducts requiring remediation.

AFTER RESUMPTION

3.2.2 Review Duct Measurements Made After Resumption

Criticality assessments will be made by the Nuclear Safety organization based on measurements made after resumption (see section 3.1.3) to identify ducts requiring remediation.

3.3 TASK 3: EVALUATION OF WORKER RADIATION EXPOSURE

The purpose of Task 3 is to evaluate exposure levels to personnel resulting from the presence of radioactive materials in ventilation ducts and associated systems and to develop and implement actions to assure that personnel radiation exposures do not exceed established limits and are maintained As Low as Reasonable Achievable in accordance with Reference 7. The predicted operator exposure data will be independently reviewed and the soundness of the recommended remediation actions will be validated throughout the program. If the dose equivalent rate at locations with possible continuous occupancy during normal operations equals or exceeds 0.4 mrem/hr, remediation action will

be required prior to resumption. Additional remediation actions will be implemented after resumption of operations based on the ALARA principle. This Task is divided into the following sub-tasks:

PRIOR TO RESUMPTION

3.3.1 Conduct Analysis of Worker Radiation Exposure Based on Survey Measurements

The purpose of this sub-task is to analyze worker radiation exposures based on NDA measurements. Measurement data from Task 1.0 will be evaluated to determine which plant locations represent potential radiation exposure risks. Radiation measurements will then be made to determine actual radiation levels. As required, areas will be posted and controlled in accordance with Reference 7.

3.3.2 Incorporate Occupancy Times and Calculate Annual Operator Exposures

Once exposure rates are known, estimates of annual operating exposures will be made assuming that a worker would spend 2000 hr/yr at the work station. More realistic estimates of occupancy times will be combined with exposure rates to project annual exposures. These projected exposures will provide a basis for actions required to maintain exposures within established limits and As Low As Reasonably Achievable in accordance with reference 7.

3.3.3 Recommend Corrective Actions Based on Exposure

The purpose of this sub-task is to develop corrective action recommendations based on exposure estimates from section 3.3.2. Exposure reduction measures might include installing shielding, limiting worker occupancy time, removing material from the duct, or removing a section of duct altogether. This task will continue through the end of removal operations.

AFTER RESUMPTION

3.3.4 Reduce Personnel Radiation Exposure to ALARA

Measures to continually reduce personnel radiation exposure, per the ALARA principle in accordance with Reference 7, will be identified and implemented .

3.4 TASK 4: REVIEW OF RISK ASSESSMENTS AND SAFETY ANALYSES

The purpose of this task is to: review existing safety analyses in view of the plutonium accumulations in the ventilation ducts and associated systems; update safety analyses as required; and implement corrective actions, if needed. This task is divided into the following sub-tasks:

PRIOR TO RESUMPTION

3.4.1 Assess Impact of Accumulation on Current Safety Analyses

The purpose of this sub-task is to review current safety analyses taking into account the plutonium accumulations determined in section 3.1.1 and to identify compensatory action requirements.

AFTER RESUMPTION

3.4.2 Annually Assess Impact of Fissile Material Accumulations on Safety Analyses

The purpose of this sub-task is to evaluate the need for revision of current safety analyses on an annual basis. The annual evaluations will take into account the residual fissile material remaining in ventilation ducts as determined by NDA measurements.

3.5 TASK 5: CONTROL OF FISSILE MATERIAL ACCUMULATION

The purpose of this task is to develop and implement corrective actions to: increase criticality safety margins; reduce future accumulation of material; and assure continued operability of these systems. In reference 2, the CSAT identified root causes for the excessive accumulation of material in ventilation ducts and associated systems. These causes included design factors

(e.g. unfiltered ventilation ducts) and operational factors (e.g. a history of workers puncturing prefilters with a sharp tool, such as a screwdriver). This task identifies activities for further identifying and addressing root causes. The technical activities described by this task were previously reviewed by the CSAT as documented by reference (4). The CSAT found the approach to be technically adequate. This task is divided into sub-tasks as follows:

PRIOR TO RESUMPTION

3.5.1 Corrective Actions to Increase Criticality Safety Margins

The purpose of this sub-task is to increase criticality safety margins by implementing actions to prevent flooding of four exhaust duct headers that have been identified to be of nuclear safety concern because K_{eff} + 4 sigma > 0,94, as discussed in section 3.0. Two corrective actions are planned as a result of this sub-task.

The first corrective action was installation of a flow control valve on the fire control sprinkler system in Plenum #101 in Building 707, which serves three of the four ducts in question. The fourth duct in Building 771 already had a flow control valve installed.

The second corrective action involves testing the criticality drains in the heat chambers of Plenum #101 and Plenum FU-2 Zone 5 in Building 771 to ensure their operability.

It is anticipated that additional corrective actions might be identified as a result of activities related to this sub-task.

3.5.2 Corrective Actions to Minimize Further Accumulations

The purpose of this sub-task is to implement measures to minimize any further accumulation of material in ventilation systems. Planned or completed corrective actions include:

(a) Inspection of currently installed HEPA prefilters located at the gloveboxes to ensure that: filter media were intact; pressure drops across the filters were within acceptable limits; and the filter housings were seated properly in their mounting frames. The inspections began in April 1990, and were completed in May 1990. Testing and surveillance will be performed at appropriate intervals to assure that HEPA filter efficiency continues to meet design requirements.

(b) Evaluation of design modifications to reduce, to the maximum extent practicable, the amount of material that could enter the ventilation ducts and associated systems through the bypass lines. Potential design modifications being studied include installation of filters on exhaust bypass ducts, blanking off, or alarming and monitoring bypass ducts.

(c) Implementation of an Operational Safety Requirement, which includes a Limiting Condition of Operation, a corresponding surveillance requirement, and a remediation action directive, to assure that future operations do not lead to the accumulation of more than 400 grams of plutonium in any one system of ducts.

(d) To prevent improper operational practices which could result in unnecessary accumulation of material in the ducts, operational procedures will be reviewed and upgraded and operations personnel will be trained to assure that operators adhere to the approved procedures.

3.5.3 Verify Operability of Ventilation Ducts and Related Systems

Operability of the glovebox ventilation systems and their major components will be verified as part of vital safety system operability verifications to be made prior to resumption of plutonium operations.

3.5.4 Monitoring

A plan will be developed and implemented to conduct periodic sampling to determine if the corrective actions are effectively reducing the rate of accumulation of material in ducts and to assure that unsafe quantities of fissile and other materials do not accumulate in ventilation ducts and related systems. Monitoring frequencies will be based on measured quantities and projected accumulation rates.

AFTER RESUMPTION

3.5.5 Design Studies

The purpose of this sub-task is to conduct studies to identify design related causes of material accumulation in the ventilation ducts and associated systems. These studies will evaluate the following:

- o Means to improve exhaust filter seals
- o Optimization of glovebox exhaust flow rates
- o Reduction of the amount of heat, dust, and moisture in gloveboxes.
- o Redesign of glovebox duct systems
- o Minimization of atmosphere flow past bypass valves when valves are closed
- o Evaluation of the use of additional prefilters
- o Evaluation of bypass valve alarm and prefilter systems
- o Glovebox temperature, air flow, and humidity instrumentation

The completed studies will be evaluated to identify the need for design and operational modifications.

3.6 TASK 6: REMOVAL OF MATERIAL FROM VENTILATION SYSTEMS

The purpose of this task is to remove materials from ventilation ducts and associated systems identified as requiring such removal based on the criteria stated in section 3.0 or to meet the Secretary of Energy's requirements of reference 5. Based on the above requirements a number of ducts in three buildings have been identified as requiring material removal operations for nuclear safety reasons. Other ducts may yet be identified as requiring material removal based on the criteria identified in section 3.0.

The actual removal of material from ventilation ducts and associated systems will be accomplished via a program that includes systematic inspections, sample analyses, and equipment verifications and rehearsal in a mock-up facility. Unique procedures are developed for removal of material from each duct. Specific duct configurations are modelled in the mock-up facility to permit training of personnel and verification of equipment and procedures. The removal of material typically involves loosening of material by abrasive, vibratory or mechanical techniques and then collecting the loosened material in a vacuum collection device. New technologies, including robotics devices, are being developed to enhance removal effectiveness.

This task is divided into two sub-tasks as follows:

PRIOR TO RESUMPTION

3.6.1 Removal of Pu from Ducts Prior to Resumption

Fissile and other materials will be removed to the maximum extent practicable from ducts containing exceeding the 400 gram (Pu) limit of Reference 5 prior to resumption of operations involving

fissile materials in gloveboxes served by those ducts. In the event the contractor determines that the risks to workers during removal of material from ductwork exceeds the risks of continued operation with the material in the duct, the contractor must submit an analysis of the respective risks along with a justification for continued operation of the process lines contributing material to the affected ductwork. If it is not possible to remove the material for other valid reasons, the contractor shall also submit an analysis justifying continued operation of the affected process line. The Secretary of Energy shall determine, on a case-by-case basis, if continued operation is warranted. Prior to resumption, removal operations are planned in Buildings 707, 771, and 776.

AFTER RESUMPTION

3.6.2 Removal of Plutonium from Remaining Ducts

All ducts identified as containing fissile material will be cleaned to reduce, to the maximum extent practicable, the amount and concentration of fissile and other materials.

4.0 ADMINISTRATION OF THE PROGRAM

4.1 RESPONSIBILITIES

Deputy Assistant Secretary for Facilities, Defense Programs. The Deputy Assistant Secretary for Facilities has overall responsibility for conducting the preparations at Rocky Flats Plant for resumption of plutonium operations.

DOE Headquarters Rocky Flats Plant Resumption Program Office. The DOE Headquarters Rocky Flats Resumption Office is responsible for concurring in the EG&G Program Plan.

Rocky Flats Operations Office Manager. The Manager of the Rocky Flats Operations Office (RFO) is responsible for ensuring that duct remediation is performed in a safe and environmentally sound manner, coordinating DOE-RFO activities, approving EG&G plans, and ensuring the timely resolution of open items.

EG&G . EG&G is responsible for preparing plans and procedures and ensuring that ventilation ducts and associated system remediation actions are performed safely, efficiently, and in an environmentally sound manner. EG&G is also responsible for improving the conduct of plutonium operations at the Rocky Flats Plant to assure that future operations will not result in

excessive accumulation of fissile and other materials in ventilation ducts and associated systems.

4.2 PROGRAM PLAN

A Program Plan will be developed by EG&G and will document the plans, and management systems that those responsible for managing the program are to use.

The Program Plan will include:

(a) Program Summary (including a program description and objectives).

(b) Task Descriptions.

(c) Organization and Responsibilities.

(d) Budget.

4.3 QUALITY ASSURANCE (QA)

The Rocky Flats quality assurance program is currently undergoing a major upgrade to consolidate the existing War Reserve Quality Manual and the Non-Weapons Quality Manual into one Rocky Flats Quality Assurance Manual. In conjunction with this consolidation, plans are being developed to bring the site into full compliance with DOE Order 5700.6B "Quality Assurance" (Reference 11) and ASME NQA-1 (Reference 12) which is identified in Reference 11 as the preferred quality assurance standard for nuclear facilities. The plan for achieving this upgrade is defined in the EG&G Rocky Flats, Inc., Quality Assurance Organization and Development Plan/Schedule, Dated July 31, 1990. This transition is planned to be completed by September, 1991.

Reference 13 describes QA program requirements which apply to all quality related resumption activities including the activities described in this plan. Upgrades to the following select elements of the QA Program are being accelerated in an effort to support strengthened management control of remediation and resumption activities. These elements are:

QR-1 Organization
QR-2 Quality Assurance Program
QR-5 Instructions, Drawings, and Procedures
QR-7 Control of Purchased Items and Services
QR-10 Inspection
QR-11 Test Control
QR-14 Inspection, Test, and Operating Status
QR-15 Control of Non-Conforming Items
QR-16 Corrective Action

QR-17 Quality Assurance Records
QR-18 Audits
QR-21 Surveillance

As other quality elements are fully implemented site-wide the upgraded requirements will apply to the activities covered by this plan.

5.0 DELIVERABLES AND SCHEDULE

A Program Plan will be prepared by EG&G Rocky Flats, Inc. and approved by the DOE. The Program Plan will be provided to the DNFSB within 90 days of the date of this implementation plan. The Department of Energy does not feel that there is yet sufficient information upon which to base a detailed schedule for implementation of this plan. In lieu of a detailed schedule, the Board will be kept currently and fully informed with respect to implementation of the Board's recommendation as follows:

- Technical and other reports regarding this recommendation will be provided to the Board as they are made available to DOE.

- Progress reports will be prepared monthly by EG&G Rocky Flats, Inc. and transmitted to the DNFSB. The first progress report will be due to the Board within 30 days of the date of this implementation plan. The reports will summarize activities completed during the reporting period and discuss activities planned for the next reporting period. Late Dec, 1990

The Board will be given a comprehensive briefing regarding the status of implementation of this recommendation, as it pertains to each building, after completion of the Operational Readiness Review and prior to resumption of operations.

A written report, for each building, will be provided at least one week prior to the completion of the Operational Readiness Review.

It is expected that execution of this plan will take longer than one year. In this event, notifications will be made in accordance with reference 14.

REFERENCES

1. Defense Nuclear Facilities Safety Board Recommendation for the Secretary of Energy pursuant to Section 312(5) of the Atomic Energy Act of 1954, as amended, of June 4, 1990.

2. SCIENTECH, Inc., An Assessment of Criticality Safety at the Department of Energy Rocky Flats Plant Plane, Golden CO. July - September 1989.

3. EG&G Rocky Flats, Inc., Revised Response to July-September 1989 Assessment of Criticality Safety at the Department of Energy Rocky Flats Plant, Golden, Colorado, dated May 16, 1990.

4. SCIENTECH, Inc., A Review of EG&G Response to SCIENTECH's September 1989 Report "An Assessment of Criticality Safety at Rocky Flats Plant," dated June 6, 1990.

5. Secretary of Energy Letter to John T. Conway of July 24, 1990.

6. DOE Order 5480.5, "Safety of Nuclear Facilities."

7. DOE Order 5480.11, "Radiation Protection for Occupational Workers."

8. EG&G Rocky Flats, Inc., Non destructive Assay (NDA) Measurements of Process Holdup, dated July 19, 1990 (UCNI).

9. EG&G Rocky Flats Inc., Generic Criticality Safety Analysis of Plutonium in Glovebox Exhaust Systems, July 1990.

10. J. B. Briggs, letter to D. L. Mayfield, "Review of Generic Criticality Safety Analysis of Plutonium Glovebox Exhaust Systems", JBB-07-90, dated July 3, 1990.

11. DOE Order 5700.6B, "Quality Assurance."

12. ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities", 1985.

13. EG&G Rocky Flats Inc., Plutonium Operations Phased Resumption Management Plan, Revision 3, September 14, 1990.

14. Public Law 100-456, Section 315.

APPENDIX A

SUMMARY DESCRIPTION OF DOE ORDERS

DOE Order 6430.1A, General Design Criteria DOE Order 6430.1A provides general design criteria which apply to DOE facilities. Of particular interest, in section 0200-1.3, radiological siting guidelines are established for nonreactor nuclear facilities. The guidelines state that the maximum dose to an off-site individual shall not exceed 25 rem to the whole body, 300 rem to the thyroid, 300 rem to the bone surface, 75 rem to the lung, or 150 rem to any other organ from exposure to internally-deposited radioactive materials and/or to radiation from external sources. Accidents to be considered in evaluating radiological consequences include operational events and natural phenomena as applicable to the facility and site.

DOE Order 5480.5, Safety of Nuclear Facilities. DOE Order 5480.5 establishes nuclear facility safety program requirements for the Department of Energy (DOE) and DOE contractors in the areas of:

- Nuclear facility siting, design, construction, modification, operation, maintenance, and decommissioning;
- Radioactive and fissionable material production, processing, storage, transfer and handling;
- Environment, Safety, and Health; and
- Criticality hazards associated with fissionable material operations outside of nuclear reactors.

DOE Order 5480.11, Radiation Protection for Occupational Workers. DOE Order 5480.11 establishes radiation protection standards and program requirements for the DOE and its contractors with respect to the protection of workers from ionizing radiation. This Order defines a process whose objective it is to assure that dose levels are As Low As Reasonably Achievable.

DOE Order 5700.6B, Quality Assurance Program Requirements for Nuclear Facilities. DOE Order 5700.6B establishes DOE policy, sets forth requirements, and assigns responsibilities for establishing, implementing, and maintaining, plans and actions to assure quality achievement in DOE programs. The Order identifies ANSI/ASME NQA-1 as the preferred standard for Quality Assurance.

MONTHLY PROGRESS REPORTS TO DOE'S IMPLEMENTATION PLAN (DARS 90:1932) FOR DNFSB RECOMMENDATION 90-6 (DARS 90:1058) ARE AVAILABLE IN THE CENTRAL FILE, RECOMMENDATION 90-6.