Department of Energy
Washington, DC 20585

FEB 07 1995

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:

The enclosure is a preliminary report in response to your letter of November 25, 1994, concerning the Defense Nuclear Facilities Safety Board's Recommendation 94-4. As you suggested, our review of criticality safety related infractions at the Rocky Flats Environmental Technology Site has been expanded. Your requested delivery date for the report has not permitted completion of that review, but the enclosure includes the field information available to date. The late receipt of this information in Headquarters has not yet permitted a detailed review, so the reported information should be treated as pre-decisional. A final report will be provided upon completion of the review.

This report contains contractor privileged information, but may be placed in public reading rooms if Attachment eight of Enclosure three is omitted.

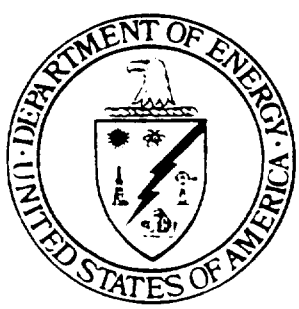
Sincerely,

Thomas P. Grumbly
Assistant Secretary for
Environmental Management

Enclosure

RESPONSE TO
THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB)
RECOMMENDATION 94-4

INTERIM REPORT
January 18, 1995



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RESPONSE TO THE
DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB)
RECOMMENDATION 94-4

The purpose of this paper is to provide a response to the issues and concerns raised in the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4 which covers deficiencies in criticality safety and Conduct of Operations at the Oak Ridge Y-12 Plant as applicable to the criticality safety limit infraction in Building 771 at the Rocky Flats Environmental Technology Site.

Background

On the evening of October 6, 1994, the Building 771 Production Manager reported to the Building 771 Shift Manager that solution draining activities outside the scope of authorized work had been conducted on the backshift on September 29, 1994. As a result, Building 771 nuclear operations were terminated, and an Occurrence Report was filed by the Shift Manager. Subsequent inquiry into the incident identified one employee who deliberately initiated the activity outside the authorized scope of work and two supervisory employees who not only did not stop the activities, but assisted in completing the unauthorized activities and then concealed them for seven days.

This unauthorized operation was reported in occurrence notification report RFO-EGGR-771OPS-1994-0062. Standing Order 34 was issued by EG&G Rocky Flats, Inc., on October 7, 1994, as a precautionary measure to immediately suspend movement, transfer, and operations involving fissile material at the Rocky Flats Environmental Technology Site. Standing Order 34 was subsequently revised to clarify suspended activities and to formalize restart requirements.

On November 25, 1994, the DNFSB Chairman, John T. Conway, requested in a letter to Thomas P. Grumbly that DOE provide a report that addresses the issues and concerns raised in Recommendation 94-4 as applicable to the Rocky Flats Building 771 criticality safety limit infraction. EG&G Rocky Flats and the Department of Energy/Rocky Flats Field Office (DOE/RFFO) had initiated and completed a number of activities as a result of the Occurrence Report and Standing Order 34 at the time this request was made. Many of these activities provide a direct response to the DNFSB specific recommendations.

During the period in which this report was being prepared, a second occurrence in Building 771 was reported (Occurrence RFO-EGGR-771OPS-1995-0003). Similar to the initial incident, this second occurrence constituted a violation of procedures and Conduct of Operations. On December 29, 1994, a technical staff engineer closed five pencil tank sight glass valves while

performing a CSQD valve line-up walkdown and verification. Management approval was not obtained prior to closing the valves nor was any notification made to management after the valves were closed. When questioned later, the technical staff engineer readily admitted closing the valves and stated he had intentions of notifying supervision of his actions. The same five pencil tank sight glass valves were re-opened on December 31, 1994, by a process specialist while performing a RCRA inspection. The valves, in the closed position, were not consistent with RCRA inspection requirements therefore, the process specialist opened them. Although, management approval was not obtained prior to opening the valves, the shift manager was later notified by the process specialist of his actions. This incident is believed to share root causes with the original event. Additional corrective actions were initiated and are considered throughout this response.

This paper is organized to first list each specific part of Recommendation 94-4 followed by the EG&G Rocky Flats and DOE/RFFO associated response. Each recommendation has been modified, shown in italics, to make it specific to Building 771 and the Rocky Flats Environmental Technology Site (the Site). Each related response provides a brief description and references documents enclosed with this paper that provide more detailed information related to the subject.

Recommendation 94-4 (1)

DOE determine the immediate actions necessary to resolve the nuclear criticality safety deficiencies at the Y-12 Plant (*Building 771*), including actions deemed necessary before restarting curtailed operations and any compensatory measures instituted. These actions should be documented, along with an explanation of how the deficiencies remained undetected by MMES (*EG&G*) and DOE (line and oversight).

EG&G Response 94-4 (1)

The immediate action was the termination of liquid transfer operations in Building 771, submission of Occurrence Notification Report RFO-EGGR-771OPS-1994-0062, 771 Operations (Enclosure 1) and the issue of Standing Order 34 to suspend movement, transfer, and process operations involving fissile material on the site. Enclosure 2, J. A. Geis letter JAG-193-94 to D. W. Ferrera, "Basis for Standing Order 34," November 2, 1994, provides some clarification guidance and includes the original and two revisions of Standing Order 34. The Standing Order is revised as restart approval is obtained for the suspended activities. A comprehensive Root Cause Analysis and Generic Implication Study was initiated and completed on November 28, 1994. Enclosure 3, A. H. Burlingame letter AHB-275-94 to Mark N. Silverman, "Root Cause Analysis and Generic Implications of the Unauthorized Draining of a Process Line in Building 771, November 28, 1994," completed the report and forwarded it to DOE/RFFO. The lack of acceptance of Conduct of Operations principles is identified as the first of four generic implications (Enclosure 3, Attachment 2, page 1). An excerpt from this section states "One of the

major improvements at Rocky Flats over the past few years has been to introduce a standards-based approach to work performance. That approach is embodied in the site's Conduct of Operations Program. Information gathered in response to the Building 771 event indicates that there are some personnel in Building 771 and other former production buildings who are not prepared to adhere fully to Conduct of Operations principles and practices. These employees generally believe that they cannot rely on management outside of their work groups to assure their safety and well-being and that they must rely on their own resources and process knowledge to accomplish work and improve their working conditions. As a result, operations personnel sometimes state that they have more faith in the "process knowledge" of experienced personnel in their building than in strict adherence to new procedures to assure their safety". The root cause report includes immediate, short-term, and long-term corrective actions that cover the site including Building 771. An evaluation of the delay in reporting the incident is included in the report.

After the critique of the events of the second occurrence in Building 771 on December 31, 1994, it was concluded that actions in progress but not yet completed from the Root Cause Analysis for the initial draining event were germane to this incident, and that the occurrence was continuing evidence of the failure by building personnel to embrace the concepts of Conduct of Operations. To ensure adequate control of workforce behavior while working toward a full implementation of Conduct of Operations, additional controls including increased levels of supervision and mentoring were instituted in the building.

In parallel with the root cause analysis, each director responsible for an activity involving movement, transfer, and process operations with fissile material suspended by Standing Order 34 was required to prepare a restart plan. The process for restart was initiated with directions [1] to use the Minimum Core Requirements from Attachment 2 of DOE Order 5480.31, Startup and Restart of Nuclear Facilities, as guidance for the preparation of plans. The process ensures completeness and consistency for each plan but permits grading the restart prerequisites to address actions identified in the root cause as applicable to the specific activity. The process uses the existing EG&G Rocky Flats, procedure (Admin 10.01) that implements DOE Order 5480.31 to provide consistent format of the restart plans.

A Safety Review Board subcommittee was established by the President of EG&G Rocky Flats, consisting of senior managers not associated with any of the restart programs to review the restart plans and provide appropriate recommendation to the Safety Review Board. These managers have significant, broad-based, and relevant experience which is being used to

1 J. A. Geis ltr JAG-179-94 to Distribution, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994.

process, and operation of the subcommittee. The Safety Review Board submits the recommendation to the EG&G Rocky Flats, President who has final approval authority prior to submission to the Manager, DOE/RFFO. The restart of suspended operations require approval by the DOE/RFFO manager.

The restart plans are based on an internal Review, Readiness Assessment or Operational Readiness Review as defined in DOE Order 5480.31. The restart plans focus on the causes and generic implications specified in the root cause analysis. As of January 13, 1995, the following restart plans have been or are planned to be submitted to DOE/RFFO:

1) Restart Plan for HSP 31.11 Brushing and Repackaging Revision 0 — 700 Area Only, November 17, 1994 (Enclosure 4).
2) Restart Plan for Thermal Stabilization in Building 707, Revision 0, November 17, 1994 (Enclosure 5).
3) Readiness Assessment of Movement or Transfer of Waste or Residue Drums, Waste Crates, or other Waste Containers Containing in excess of 200 grams of Fissile Material, Revision 5, December 5, 1994 (Enclosure 6).
4) Operational Readiness Review Liquid Stabilization Tank Draining Activities in Building 771 (Enclosure 7, Not included in this interim report).

The restart of operations specified in 1, 2, and 3 have been approved by DOE/RFFO. Restart Plan number 4, which requires an Operational Readiness Reviews (ORR), is being prepared. The plan will be included in the final report following review, comment, and approval by DOE. Additional restart plans for other suspended activities are in preparation and/or internal review by the Safety Review Board and its subcommittee.

DOE/RFFO Response 94-4 (1)

The Site took prompt, appropriate, and conservative actions as a result of the Building 771 event to curtail activities Site-wide until the implications of the event could be addressed. The unauthorized draining of tanks was discovered by EG&G management (Shift Manager) on October 6, 1994, at approximately 7:30 p.m. The Shift Manager immediately terminated operations involving fissile materials in Building 771, posted the affected glovebox as a criticality infraction, and notified DOE and EG&G management. On October 7, 1994, at 7:30 a.m., a critique was held on the event and attended by the RFFO Manager and the President of EG&G Rocky Flats. Immediately after the critique, EG&G suspended movement and handling of all fissile materials site wide.

DOE/RFFO has a formal process for overseeing the contractor restart process for all curtailed activities (Enclosure 8). The process includes walkdowns of spaces involved in the operations; reviews of operating procedures; criticality, nuclear, and operational safety analyses; and

interviews of contractor operating and management personnel. DOE/RFFO review of the root cause determined it was adequate to support the restart of drum movements, HSP 31.11 repack, and thermal stabilization in Building 707. These activities had undergone extensive review (HSP 31.11 and Thermal Stabilization), or were deemed very low risk (drum movements). In addition, DOE/RFFO focused restart reviews for these activities on the problem areas identified in the root cause to ensure that the problems identified were not applicable or corrective actions were in place. The DOE/RFFO comments on the root cause will be addressed as part of the restart process for liquid stabilization in Building 771 (Enclosure 9). The root cause analysis will be further reviewed by a group of independent technical experts commissioned by DOE/RFFO. The results of this review and any actions will be submitted in the final report.

Recommendation 94-4 (2) (a)

DOE perform the following for defense nuclear facilities at the Y-12 Plant (*Rocky Flats Environmental Technology Site*):

An evaluation of compliance with Operational Safety Requirements (OSRs) and Criticality Safety Approvals (CSAs), including a determination of the root cause of any identified violations. In performing this assessment, DOE should use the experience gained during similar reviews at the Los Alamos plutonium facility and during the recent "maintenance mode" at the Pantex Plant.

Editors Note: A combination of EG&G Rocky Flats, Inc., Criticality Safety Evaluations and Nuclear Material Safety Limits (NMSLs) or Criticality Safety Operating Limits (CSOLs) are equivalent to the Criticality Safety Approvals at the Y-12 Plant.

EG&G Response 94-4 (2) (a)

The reports covering similar reviews at the Los Alamos Plutonium Facility [2] and during the maintenance mode at the Pantex Plant [3] were reviewed to determine applicability to the Building 771 incident. The common issue in each report and the Building 771 incident is related to Conduct of Operations. As stated in the letter submitting the root cause ....."the fundamental and direct cause of this (Building 771) incident, that is the willing and knowing violation of the principles of Conduct of Operations and the subsequent non-disclosure of such violation for a period of seven days."

The process established by EG&G Rocky Flats and DOE/RFFO to complete a comprehensive root cause analysis (Enclosure 3) and prepare detailed restart plans, described in responses to Recommendation 94-4 (1), cover the issues raised in the Recommendation 94-4 item 2 (a) and

2 John T. Conway ltr to Victor H. Reis, Regarding the Termination of Normal Operations at Los Alamos National Laboratory TA-55, May 20, 1994

3 John T. Conway ltr to Victor H. Reis, Regarding the Change from an Operating Mode to a Maintenance Mode in the Zone R Facilities at the Pantex Plant, April 29, 1994

referenced reports.

The Conduct of Operations is addressed in core requirement 12 of DOE Order 5480.31, which requires the implementation status of DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," and is addressed in each of the restart plans (Enclosures 4, 5, 6, and 7). The infrastructure for Conduct of Operations was established for Buildings 559 and 707. The issue is the acceptance of the fundamentals of Conduct of Operations by site personnel, which is also addressed in each restart plan.

Another corrective action identified during the root cause analysis (Enclosure 3) was the need to enhance training on Nuclear Criticality Safety. This corrective action is included in the restart plans as part of prerequisites to meet core requirements 1, 2, and 3 in Attachment 2 of DOE Order 5480.31 covering procedures, training and qualification, and level of knowledge of operations and support personnel. The DOE Order 5480.31 core requirements 4 and 5 addressed in the restart plans cover the facility safety documentation, and reconfirm the condition and operability of safety systems including Limiting Conditions of Operation (LCO) and Operational Safety Requirements (OSR's). The restart plans also require review, reaffirmation, and/or revision to existing criticality safety limits. The specific criteria, methodology, and deliverables are described for each DOE Order 5480.31 core requirement in the restart plans (Enclosures 6, 7, 8, and 9).

DOE/RFFO Response 94-4 (2) (a)

Ensuring compliance to OSRs (which include criticality safety limits) is the highest priority of DOE/RFFO Facility Representatives. Facility Representatives observe activity performance and contractor management response on a daily basis.

When criticality safety limit violations or OSR out of tolerance conditions are identified, they are reported per DOE Order 5000.3B, which includes the requirement for a root cause analysis. RFFO facility representatives and ES&H personnel attend all critiques involving OSR violations and most critiques involving potential criticality safety problems. Also, the RFFO process for overseeing the re-start of curtailed activities requires RFFO personnel to independently assess the adequacy of compliance to the OSRs.

Recommendation 94-4 (2) (b)

A comprehensive review of the nuclear criticality safety program at the Y-12 Plant (*Rocky Flats Environmental Technology Site*), including: the adequacy of procedural controls, the utility of the nuclear criticality safety approvals, and a root cause analysis of the extensive level of non-compliance found in recent reviews.

EG&G Response 94-4 (2) (b)

EG&G Rocky Flats, Inc. has two site wide procedures, (NSM-03.12) "Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance" and (NSP-010) "Monthly Criticality

Safety Assessment," which are required controls for all buildings containing special nuclear materials (SNM). Procedure NSM-03.12 is a prerequisite to performing any activity involving movement or handling of fissile material. The Building 771 incident was not a result of inadequate nuclear criticality limits, controls, or approvals, but a deliberate violation of limits applied for the activity. Some additional actions were identified in the root cause analysis (Enclosure 3), including additional criticality training.

The Nuclear Criticality Safety Committee (NCSC) at the site has been collecting a number of documents covering assessments, concerns, evaluations, letters, etc., that are related to nuclear criticality safety. The NCSC was in the process of reviewing this information to identify the causal factors of recurring deficiencies within the criticality safety program at the time of the Building 771 incident. This activity was placed on hold while NCSC members participated in the root cause analysis of the Building 771 incident. Subsequently, a dedicated team of knowledgeable people from EG&G and Los Alamos National Laboratory has been assembled to complete a review of the criticality safety program deficiencies. The review and resulting corrective actions will be provided in the final report. Preliminary findings of this group include issues associated with the operations/criticality safety interface and the over utilization of administrative controls. Actions which relate to restart activities will be incorporated as appropriate into the restart plans at the time of identification. The restart plans (Enclosures 4, 5, 6, and 7) address the criticality safety concerns related to the specific activities.

DOE/RFFO Response 94-4 (2) (b)

The site nuclear criticality safety program was evaluated during the Buildings 559 and 707 Operational Readiness Reviews. The reviews included process specific and programmatic elements. In view of the Building 771 event, DOE/RFFO has requisitioned a team of experts in the nuclear safety field to perform an independent review of the nuclear criticality safety program at the Site which will focus on the implementation of nuclear criticality safety program elements site-wide. The review is scheduled for February 1995, and a final report will be issued and included in the final report.

Recommendation 94-4 (2) (c)

A comparison of the current level of Conduct of Operations to the level expected by DOE in implementing the Board's Recommendation 92-5.

EG&G Response 94-4 (2) (c)

EG&G Rocky Flats, implementation of the "conduct of operations" as related to the Board's recommendation 92-5 is "formality of operations." This includes readiness reviews prior to operation, training and qualification of operations and support personnel, Safety Analysis Reports, Limiting Conditions of Operations, criteria for meeting safety goals, and Conduct of Operations as required per DOE Order 5480.19. Each of the restart plans addresses the

formality of operations by using the Attachment 2 Minimum Core Requirements of DOE Order 5480.31. The determination for restart (e.g., internal review, readiness assessment, or operational readiness review) is made based on the criteria in DOE Order 5480.31 and direction from DOE/RFFO. The completion of the restart plans (Enclosures 4, 5, 6, and 7) provides objective evidence of the formality of operations.

Included in each restart plan are additional compensatory measures such as added management oversight, independent reviews, and meetings with personnel to discuss the incident and lessons learned. Buildings 559 and 707 have demonstrated a higher level of adherence to the formality of operations through an intensive mentoring program for Conduct of Operations. The mentoring program is now being extensively applied to Building 771 to significantly upgrade the culture of adherence to the program infrastructure. This is being accomplished by assigning full time to Building 771 personnel who were instrumental in establishing the Conduct of Operations culture in Buildings 559 and 707.

In addition, a team of internal consultants were assigned to work with specific managers in Building 771 to improve performance in Conduct of Operations. This assignment involved extensive floor level appraisal of behaviors in Building 771. They provided instruction and recommendations to key management personnel regarding needed improvements in Conduct of Operations behavior. The team of consultants assumed the role of mentor to designated managers in Building 771. In this role, the team identified performance measures for each manager, established baselines of performance, evaluated trends, and defined goals for performance in each area. The team worked directly with managers in identifying and removing barriers to performance. The team developed periodic reports on performance and evaluated trends to assist the Operations Manager and Director in identifying problems and resolutions.

Internal consultants have also been working with Support Services (particularly the Steam Plant), SNM Consolidation (particularly Building 371), and Waste Management (particularly Building 776) to facilitate maturing Conduct of Operations in those areas.

DOE/RFFO Response 94-4 (2) (c)

The level of Conduct of Operations implementation is continuously monitored by DOE Facility Representatives. Facility Representatives observe building activity performance and contractor management response to Conduct of Operations issues on a daily basis.
DOE/RFFO has approved the contractors implementation plans for DOE 5480.19. Buildings 707 and 559 have fully implemented the order. In order to accelerate this implementation schedule in Building 771, the contractor has provided additional mentors in Building 771 along with a stronger management team.

RFFO is implementing a Conduct of Operations Assessment Program to systematically assess

contractor performance on a site-wide level. Implementing procedures for the assessment program are scheduled to be completed and included in the final report.

Recommendation 94-4 (2) (d)

Development of plans, including schedules, to address any deficiencies identified in the analyses conducted above.

EG&G Response 94-4 (2) (d)

The corrective actions identified as a result of the root cause analysis and generic implications (Enclosure 3) have been assigned to the responsible organization and entered into the Plant Action Tracking System (PATS) to ensure completion. The corrective actions are divided into three categories: immediate, short term, and long term. Immediate means before restart of activities suspended by Standing Order 34 (Enclosure 2); short term means as soon as practicable within 6 months, and long term means as soon as practicable within 12 months.

The restart plans (Enclosures 4, 5, 6 and 7) provide specific criteria, addressing the Attachment 2 Minimum Core Requirements of DOE Order 5480.31. These criteria will be met and verified prior to the restart of the activity. The combination of corrective actions and restart plans provides the response to this recommendation.

DOE/RFFO Response 94-4 (2) (d)

Plans and schedules will be initiated to address any deficiencies identified in Site reviews. DOE/RFFO monitors contractor commitments and tracks external DOE/RFFO commitments utilizing the RFFO Commitment Tracking System.

Recommendations 94-4 (3) and 94-4 (4)

DOE evaluate the experience, training, and performance of key DOE and contractor personnel involved in safety-related activities at defense nuclear facilities within the Y-12 Plant (*Rocky Flats Environmental Technology Site*) to determine if those personnel have the skills and knowledge required to execute their nuclear safety responsibilities (in this regard, reference should be made to the critical safety elements developed as part of DOE's response to the Board's Recommendation 93-1).

Editors Note: We believe the reference to be to Recommendation 93-3 rather than 93-1 to match the topic and concern.

DOE take whatever actions are necessary to correct any deficiencies identified in (3) above in the experience, training, and performance of DOE and contractor personnel.

EG&G Response 94-4 (3) and 94-4 (4)

The restart plans (Enclosures 4, 5, 6, and 7) provide specific criteria for the training and

qualification for the supervision and assigned workers for each of the activities. The training programs consist of the Training Users Manual (TUM) and approved Training Implementation Matrix (TIM) per DOE Order 5480.20. The training also includes building, functional, and job specific training and qualification. Demonstration of performance and completion of qualification for nuclear operation will occur during the startup plans for each activity.

Specific experience, training level and performance of the criticality safety staff has been addressed by the following steps:

1. Hire a new Manager
2. Hire a Mentor Staff
3. Retain existing personnel and attract criticality safety personnel back from other site positions.

Significant progress has been made:

1. An incentive program is in place that reduced the staff attrition rate (50% less than previous year) to only two additional losses up to the January 1995 time frame. Prior to January 1995, seven additional people were added to the staff from other site positions.
2. Aggressive interviewing for Manager and Mentor positions was done, with one Mentor being hired in early November 1994, and a Manager (recognized in the criticality safety community) who arrived on site in mid-January. Two additional Mentor positions will be filled by the new Manager.
3. Los Alamos National Laboratory's most senior nuclear criticality safety expertise has conducted two tutorials at the site to assist the EG&G Criticality Safety Staff as well as operations and program personnel to understand the importance of the interconnections between process knowledge, and the requirement of criticality safety limits.

The actions taken have resulted in a more stable program with sufficient resources to correctly monitor the necessary contractor staff, respond to mission requirements and, ultimately, Safety Order-driven requirements.

With respect to Criticality Safety Staff training from external sources, LANL Criticality Safety Staff participation in site program efforts is ongoing. This cooperative effort is evidenced by participation in the Waste Management Program restart as well as the continuing programmatic efforts in support of Building 771 liquid stabilization criticality safety evaluations, and on the team created by the NCSC to review the existing criticality safety program and to propose improvements.

EG&G Rocky Flats has previously addressed the DNFSB Recommendations 91-1, 92-7, and 93-3 by establishing the following programs and documents maintained by the Human Resource Department:

1. Generic job descriptions of key personnel contained in the organization manual. This manual

has been submitted to the Department of Energy.

2. Position Information Questionnaires (PIQs), which identifies title, job code, education, and experience of specific positions.

3. A document containing minimum education and experience for technical positions that meets or exceeds the requirements outlined in DOE Order 5480.20.

4. Performance Appraisals that are performed and documented for all salaried positions on an annual schedule. Interim performance appraisals may be conducted when either appreciable improvement or deterioration of performance is noted.

Upon initial hire and with all subsequent promotions, employees are required to meet minimum education and experience guidelines. These guidelines increase progressively with each salary grade. Waivers to these guidelines are granted occasionally by Human Resources only upon management documentation that the employee can perform the job.

In order to fill a position either internally or externally, a Position Staffing Requisition must be initiated by management and approved by title, job code, education and experience as outlined in the PIQ. When a new position is required for which no PIQ exists, a new PIQ must be initiated by management and then reviewed and approved by Human Resources.

The combination of the specific information contained in the restart plans and the documentation and process maintained by Human Resources provides the response to Recommendations 3 and 4.

DOE/RFFO Response 94-4 (3) and 94-4 (4)

As discussed in Section (2) (b), DOE/RFFO has requisitioned a team of experts in the nuclear safety field to perform an independent review of the nuclear criticality safety program at the site. Part of the review will assess the adequacy of the site personnel working on criticality safety related activities. The review is scheduled for February 1995, and a final report will be issued by March 1, 1995. Plans and schedules will be initiated to address any deficiencies in this area and entered in the appropriate tracking system.

Summary

The root cause and generic implication report (Enclosure 3) provides a basis for corrective actions that encompass more than Building 771. Following are actions that have been identified, completed, and/or are underway by DOE/RFFO and EG&G Rocky Flats to address the issues and concerns that were raised by the DNFSB Recommendations.

- The uniform methodology for preparing, completing, and verifying each restart plan will ensure a comprehensive response to the issues and concerns contained in Recommendation 94-4.
- The process for preparing and reviewing restart plans is based on DOE Order 5480.31 and is supplemented by the EG&G Rocky Flats Safety Review Board.
- All restarts are approved by the President of EG&G Rocky Flats and by the DOE/RFFO Manager.
- Root cause analysis and corrective actions as well as core requirements in DOE Order 5480.31 were the primary considerations in preparing each specific restart plan.
- The training and qualification of personnel are addressed within each restart plan.
- Emphasis on Conduct of Operations, including interviews at all levels of management and employee attitude surveys, is included in restart plans.
- Criticality and nuclear safety are specifically addressed in each restart plan.
- Specific actions have been taken to strengthen the criticality safety staff.
- An additional analysis of the causal factors of recurring deficiencies in the criticality safety program is currently underway, and will be provided in the final report.

ENCLOSURE 1

OCCURRENCE REPORT

RFO-EGGR-771OPS-1994-0062, 771 OPERATIONS

OCCURRENCE REPORT

771 Operations

(Name of Facility)

Plutonium Processing and Handling

(Facility Function)

Rocky Flats Plant / EG&G Rocky Flats

(Name of Laboratory, Site or Organization)

Name: MATHIASMEIER, SUE G
Title: TECH SUPPORT INVESTIGATOR Telephone No.: (303)966-8004

(Facility Manager/Designee)

Name: C. Ballinger
Title: Operations/Facility Manager Designee Telephone No.: (303)966-2504

(Originator)

Name: S. G. Mathiasmeier Date: 10/27/1994

(Authorized Classifier (AC))

1. OCCURRENCE REPORT NUMBER: RFO--EGGR-771OPS-1994-0062
#1490/1505/1554/1600:A Pu-containing liquid was drained from a process line. Line draining was not within the scope of procedure being used.

2. REPORT TYPE AND DATE:

	Date	Time
[ ] Notification	10/08/1994	1013 MTZ
[ ] 10 Day	10/25/1994	1619 MTZ
[X] 10 Day Update	10/27/1994	1058 MTZ
[ ] Final		

3. OCCURRENCE CATEGORY:
[ ] Emergency [X] Unusual [ ] Off-Normal [ ] Cancelled

4. DIVISION OR PROJECT: EG&G Rocky Flats Envir. Tech. Site

5. DOE PROGRAM OFFICE:
EM - Environmental Restoration & Waste Management

6. SYSTEM, BLDG., OR EQUIPMENT:
Building 771, Solution Stabilization Operation

7. UCNI?: No

8. PLANT AREA: Waste Stabilization

9. DATE AND TIME DISCOVERED:
10/06/1994 1937 (MTZ)

10. DATE AND TIME CATEGORIZED:
10/06/1994 2044 (MTZ)

11. DOE NOTIFICATION:
10/07/1994 2154 (MTZ) R. Juroff DOE/HQ

12. OTHER NOTIFICATIONS:
10/07/1994 2103 (MTZ) D. Vaughn DOE/RFFO
10/07/1994 2132 (MTZ) B. Kray STATE
10/06/1994 2050 (MTZ) SDO, J. Conti DOE/RFFO

13. SUBJECT OR TITLE OF OCCURRENCE:
#1490/1505/1554/1600:A Pu-containing liquid was drained from a process line. Line draining was not within the scope of procedure being used.

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14. NATURE OF OCCURRENCE:
01) Facility Condition
F. Violation/Inadequate Procedures
01) Facility Condition
A. Nuclear Safety
02) Environmental
E. Agreement/Compliance Activities

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15. DESCRIPTION OF OCCURRENCE:
On October 26, 1994, it was determined that an additional issue existed which would be considered part of the original occurrence reported in SPMS 1490. This 10-Day Update was issued to add this occurrence to the original occurrence report. It was determined that an Operational Safety Requirement (OSR) violation had occurred because liquid samples were removed from Glovebox 42, Room 149, and were subsequently analyzed without the permission of the Building 771 Operations Manager. This issue was reported under SPMS 1600 on October 26, 1994, and this occurrence was combined with the original report with this 10-Day Update. Details were given in the final paragraph of Section 15.

Due to the fact that occurrences, SPMS Numbers 1505 and 1554, were discovered during the investigation into occurrence SPMS 1490, these three incidents have been combined in this report. All three occurrences pertain to the unauthorized draining of the fill lines of Tank 467 and the drain line of Tank 973 in Building 771. Because extensive investigations were necessary to assemble the information required, the 10-Day Report was not transmitted in the required time frame.

At 0025 hours on Tuesday, September 27, 1994, a pre-evolution briefing was held in Building 771, in accordance with the requirements in Conduct of Operations (COOP) procedure 1-31000-COOP-011, Pre-Evolution Briefing. The pre-evolution briefing was held prior to the performance of Task Information Package (TIP) 771-OPS-94-005, Transfer Solution from D-467 to Glovebox 42. All personnel involved in the performance of this TIP were in attendance at the briefing. TIP 771-OPS-94-005 provided instructions for air sparging and vacuum transfer of the actinide solution in Tank D-467, Room 149, into 4-liter narrow mouth bottles. As required by the TIP, these bottles

15. DESCRIPTION OF OCCURRENCE: (continued)

were to be filled to no more than approximately 3.75 liters, and were to be placed in a one-layer planar array inside Glovebox 42, Room 149. At 0320 hours, September 27, 1994, an entry in the Shift Managers' (SMs') Logbook indicated that the performance of the initial portion of the TIP was completed in a commendable manner, and that the samples had been drawn from the first three bottles of solution as required by the TIP.

Step 7.5.3 of the TIP is a Hold Point, and reads as follows, "Verify that operations may continue after the first three narrow mouth bottles have been analyzed and meet the requirements of NMSLs (referenced Appendix 5)." The Production Foreman (PF) signed off on this step on September 28, 1994. An entry in the SMs' Logbook on September 28, 1994, at 0100 hours, states that the continued performance of the TIP would not take place on this date because of the termination of operations due to the Lockout/Tagout (LO/TO) of Fans FN-1 and FN-3. This caused the continuation of the solution transfer operations to be postponed until the following day.

At 0018 hours on Thursday, September 29, 1994, a pre-evolution briefing was held prior to the continuation of TIP 771-OPS-94-005 tank draining activities. The Production Manager acted as SM for this briefing, as the SM was involved in a regularly scheduled shift briefing for midnight shift personnel. All personnel involved in the performance of the TIP were in attendance at the pre-evolution briefing, as all had attended the shift briefing on the preceding day shift. The Process Specialists (PSs) involved in the performance of the TIP had worked the day shift on September 28, 1994, and had returned to the plantsite to work the midnight shift in the morning hours of September 29, 1994. An entry in the SMs' Logbook at 0400 hours on September 29, 1994, states that the SM had observed the performance of the TIP activities, and that the operation had gone well. The entry further stated, "One hour final pull on Tank 467 now in process." There were no further entries in the logbook on this date regarding the performance of the TIP.

There were no logbook entries until October 6, 1994, but a letter written by the PM on October 7, 1994, supplied further information on the actions that followed the performance of TIP 771-OPS-94-005 on September 29, 1994. A portion of the PM's letter read as follows:

> "Tank 467 draining was completed on September 29, 1994 on the Mid Shift. After the last of the Tank 467 solution was collected, the decision was made to verify that additional drain lines connected to the identified lines were free from liquid. This decision was based on a safety factor to reduce the risk of leakage from these lines and elimination of personnel

15. DESCRIPTION OF OCCURRENCE: (continued)

exposure to clean-up and contain a possible leak.

The drain line from Tank 467 is connected to the fill line of Tank 467 and the drain line of Tank 973. Tank 973 is a recycle tank used to collect the same type of solution as that in Tank 467.

After the initial draining of Tank 467 was complete, the drain valve was closed and the fill line valve was opened to assure that all solution was removed. The solution from this line was collected in a 4-liter bottle. The drain line valves to Tank 973 were then opened to verify that this line was empty. This solution was also placed into 4-liter bottles. A total of approximately 5 liters of solution was collected during this operation.*

Because the actinide solution from the drain lines was appreciably darker than that from Tank 467, on Wednesday, October 5, 1994, the PM decided to pull a sample of solution from one of the bottles containing the darker colored solution. This sampling was not authorized by the TIP. Chemical Laboratory personnel performed an unofficial analysis of this sample, but no standards were run with this analysis. The sampling results were 8.52 and 8.58 grams/liter concentration of plutonium in this solution. The PM was aware that these readings were outside the Nuclear Material Safety Limits (NMSL) of 5 grams/liter for Glovebox 42. The limits in NMSL 940037/MFS-002-0/2/C6-13B, Tank D-467 Solution Transfer to Glovebox 42 (For Use with TIP-771-OPS-94-005, Rev. 0 Only), were formulated specifically for use with the TIP Tank 467 draining operations. Additionally, NMSL 940037/MFS-02-0/2/6C-13I, Line 5 Glovebox H-4 Nash Vacuum Pump System Operation for Tank D-467 Solution Transfer to Glovebox 42 (For Use with TIP-OPS-94-005, Rev. 0 Only), states, "NO other operations permitted."

At 1937 hours on October 6, 1994, the PM informed the Building 771 SM that operations had been performed on September 29, 1994, which were outside the scope of TIP 771-OPS-94-005. The PM notified the SM that the NMSL for Glovebox 42 had apparently been violated. The SM immediately notified the Building 771 Operations Manager (OM), and reported the occurrence to the Notification Center. The SM terminated Building 771 operations at 2043 hours, and initiated the preparation of Termination Operations Order 00-771-77. The SM notified the Department of Energy (DOE) Facility Representative, and briefed the DOE Staff Duty Officer (SDO). The SM attempted to notify the Building 771 Criticality Safety Building Support (CSBS) Engineer. Failing to find the CSBS,

15. DESCRIPTION OF OCCURRENCE: (continued)

the SM was able to locate other Nuclear Safety Criticality Engineering personnel who agreed to come to plantsite to investigate the incident. Subsequently, the SM presented a briefing to the midnight shift personnel at 0021 hours on October 7, 1994, to inform them of the termination of operations.

At 0108 hours on October 7, 1994, Nuclear Safety Engineering personnel notified the SM that their investigation had revealed that no imminent danger existed in Building 771 because of this incident. However, the Nuclear Safety Engineer indicated to the SM that a possibility existed that double contingency had been violated because of this incident. A critique was held on this occurrence at 0730 hours, October 7, 1994.

On October 10, 1994, during an independent review and verification of the valve Lockout/Tagout (LO/TO) for TIP 771-OPS-94-005, a PS determined that an air operated valve on the line leading to Tank 467 was incorrectly locked and tagged out. In addition, there was no LO/TO on the valve which should have been locked and tagged out. This incident was reported under SPMS #1505, which was combined with the original report.

On October 18, 1994, it was determined that unauthorized changes had been made to Appendix 7, Initial Valve Lineup, of TIP 771-OPS-94-005. In the Appendix 7 section labeled Deficiencies, hand-written notations were made that some valve numbers and locations in this appendix were incorrect. The entry further stated that the correct numbers and locations of the valves were inserted on pages 5 and 6 of the appendix; this entry was signed by the PM. The pen-and-ink changes were made and were initialed by the PM. Because this occurrence, reported as SPMS #1554, was discovered during the investigation of the original report, this occurrence was also combined with the original report.

At 1340 hours on October 26, 1994, following a further inquiry into the draining and sampling activities in Glovebox 42, it was determined that an OSR violation had occurred on October 6, 1994. When samples were taken from the 4-liter bottles and analyzed, the compensatory measures delineated in Addendum 1 to Termination Shift Order 771-94-075, Attachment 12, were not followed as required. The specific steps which were not followed were as follows:

"2. The Building 771 Operations Manager will give specific daily permission to perform analyses on TIP 5 samples, Building 559 waste samples, and Building 771 Utilities samples.

3. Laboratory personnel will report to the Shift Manager/designee and provide a status of sampling activities every four hours."

These requirements were not met during the sampling and

15. DESCRIPTION OF OCCURRENCE: (continued)
analysis on October 6, 1994. While the compensatory action requirements were administrative in nature, not meeting these requirements violated an established corrective action covering a Limiting Conditions for Operations (LCO) requirement. However, the technical basis for the compensatory measures was not violated. On October 26, 1994, SPMS 1600 was added to this occurrence report as it was considered to be part of the original occurrence.

16. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:
Normal Curtailed Operations

17. ACTIVITY CATEGORY:
Normal Operations

18. IMMEDIATE ACTIONS TAKEN AND RESULTS:
The movement, transfer, and operations involving fissile material in Building 771 were terminated. Following the critique for this occurrence, Standing Order 34 was written, including the entire Rocky Flats plantsite in this termination of operations.

Glovebox 42 was posted as an NMSL Violation as required by the Building 771 NMSL Manual.

Access to Room 149, which contains Glovebox 42, was limited to allow essential operations only, under the direction of the Building 771 OM.

19. DIRECT CAUSE:
3) PERSONNEL ERROR
C. Violation of Requirement or Procedure

20. CONTRIBUTING CAUSE(S):

21. ROOT CAUSE:

22. DESCRIPTION OF CAUSE:
The direct derivation method was used to determine the direct cause of these occurrences. Independent investigations into all four incidents are ongoing at this time, and a more detailed analysis will be provided in the final report.

The direct cause of this occurrence is personnel error, procedural violation. During the performance of TIP 771-OPS-94-005 on September 29, 1994, personnel exceeded the scope of the TIP by the unauthorized draining of actinide solution from the fill and drain lines leading to Tank 467. This occurrence was reported as SPMS 1490. The LO/TO errors, the

22. DESCRIPTION OF CAUSE: (continued)
pen-and-ink changes to Appendix 7 of the TIP, and the sampling activities which violated the Building 771 OSR, as reported under SPMS 1505, SPMS 1554, and SPMS 1600, were also considered to be personnel errors.

23. EVALUATION: (By Facility Manager/Designee)
Multiple investigations and evaluations are being performed on the four incidents detailed in Section 15. These investigations may result in further information being gathered which will be detailed in the final report.

24. IS FURTHER EVALUATION REQUIRED?: Yes [X] No [ ]

IF YES - BEFORE FURTHER OPERATION?: Yes [ ] No [X]

BY WHOM?:

BY WHEN?:

25. CORRECTIVE ACTIONS:
(* = Date added/revised since final report was signed off)

26. IMPACT ON ENVIRONMENT, SAFETY AND HEALTH:
To be submitted in the final report.

27. PROGRAMMATIC IMPACT:
To be submitted in the final report.

28. IMPACT UPON CODES AND STANDARDS:
To be submitted in the final report.

29. FINAL EVALUATION AND LESSONS LEARNED:
To be submitted in the final report.

30. SIMILAR OCCURRENCE REPORT NUMBERS:
1) To be submitted in the final report.

31. DOE FACILITY REPRESENTATIVE INPUT:

Entered by: Date:

32. DOE PROGRAM MANAGER INPUT:

Entered by: Date:

OCCURRENCE REPORT

771 Operations

(Name of Facility)

Plutonium Processing and Handling

(Facility Function)

Rocky Flats Plant / EG&G Rocky Flats

(Name of Laboratory, Site or Organization)

Name: GAFFNEY, RICHARD S
Title: PM SHIFT MANAGER Telephone No.: (303)966-2504

(Facility Manager/Designee)

Name: C. Ballinger
Title: Operations/Facility Manager Designee Telephone No.: (303)966-250

(Originator)

Name: S. L. Cunningham Date: 10/06/1994

(Authorized Classifier (AC))

1. OCCURRENCE REPORT NUMBER: RFO--EGGR-7710PS-1994-0062
   #1490/Procedural Infraction During Solution Stabilization Operation

2. REPORT TYPE AND DATE:

	Date	Time
[X] Notification	10/08/1994	1013 MTZ
[ ] 10 Day		
[ ] 10 Day Update		
[ ] Final		

3. OCCURRENCE CATEGORY:
   [ ] Emergency [X] Unusual [ ] Off-Normal [ ] Cancelled

4. DIVISION OR PROJECT: EG&G Rocky Flats, Inc.

5. DOE PROGRAM OFFICE:
   EM - Environmental Restoration & Waste Management

6. SYSTEM, BLDG., OR EQUIPMENT:
   Building 771, Solution Stabilization Operation

7. UCNI?: No

8. PLANT AREA: Residue Operations

9. DATE AND TIME DISCOVERED:
   10/06/1994 1937 (MTZ)

10. DATE AND TIME CATEGORIZED:
    10/06/1994 2044 (MTZ)

11. DOE NOTIFICATION:

10/07/1994 2154 (MTZ)	K. Juroff	DOE/HQ

12. OTHER NOTIFICATIONS:

10/06/1994 2050 (MTZ)	SDO, J. Conti	DOE/RFFO
10/07/1994 2132 (MTZ)	E. Kray	STATE
10/07/1994 2103 (MTZ)	D. Vaughn	DOE/RFFO

13. SUBJECT OR TITLE OF OCCURRENCE:
#1490/Procedural Infraction During Solution Stabilization Operation

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14. NATURE OF OCCURRENCE:
01) Facility Condition
F. Violation/Inadequate Procedures
01) Facility Condition
A. Nuclear Safety
02) Environmental
E. Agreement/Compliance Activities

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15. DESCRIPTION OF OCCURRENCE:
Following the completion of Task Information Package (TIP) #5, additional solutions from process lines outside the scope of the procedure. This violated not only TIP #5, but also the associated Nuclear Material Safety Limit 940037/MFS-002-0/2C6-13A (NMSL), and possibly caused a noncompliance with the temporary storage agreement with the Colorado Department of Public Health and Environment for storage of RCRA Wastes in Glove Box 42. TIP #5 involved the draining of actinide solution from Tank 467 into 4 liter containers located in Glove Box 42 of Building 771, Room 149.

The draining of the fill lines of tank 467 and the drain line of Tank 973 was not covered by TIP #5 or any other approved procedure. This draining resulted in an additional accumulation of 5 liters of solution. Preliminary investigation indicates that the 5 liters was mixed with 14 liters of floor wash solution and accumulated in five 4 liter bottles. The actinide solution drained from the process lines during this unapproved evolution was of a higher concentration than the solution drained from Tank 467. This resulted in 3 of the above mentioned five 4 liter bottles exceeding the solution concentration allowed under the NMSL. The NMSL allowed a maximum of 5 grams per liter total actinide solution. The concentrations found in the three 4 liter containers were 5.12, 7.55, and 8.25 gram per liter total actinide solution.

NMSL 940037/MFS-002-0/2C6-13A was written specifically for TIP #5 and was dependent on the Initial Valve Line Up specified in TIP #5, Appendix 7. The double contingency principle of the NMSL was violated when valves HV-750, HV-817, HV-753, and AV-3 were opened contrary to the requirements of the Initial Valve Line Up in TIP #5.

15. DESCRIPTION OF OCCURRENCE: (continued)

This notification report was not transmitted within the required time period due to ORPS transmission problems caused by upgrading the original occurrence from off-normal to unusual, and delays in classification.

16. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:
Normal Curtailed Operation

17. ACTIVITY CATEGORY:
Normal Operations

18. IMMEDIATE ACTIONS TAKEN AND RESULTS:

1. The movement, transfer, and operations involving fissile material in Building 771 were terminated. Following the critique for this occurrence, this termination was expanded to include the entire plant site.

2. Glove Box 42 was posted as a NMSL Violation as required by the Building 771 NMSL Manual.

3. Access to Room 149, which contains Glove Box 42, was limited to allow essential operations only.

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ENCLOSURE 2

BASIS FOR STANDING ORDER 34

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 2, 1994

TO: D.W.Ferrera, Safety Review Board Chairperson, Bldg. 111, X5008

FROM: J. A. Geis, SRB Subcommittee Chairperson, Bldg. 850, X7088

SUBJECT: BASIS FOR STANDING ORDER 34 - JAG-193-94

The subject Standing Order defines the activities that were either shutdown or suspended due to the unauthorized draining of fissile solution from process piping in Building 771. Since the transfer of fissile solution was performed outside the approved safety basis, solution transfers in Building 771 in support of Phase I Liquid Stabilization were shutdown for cause. Restart of this activity is, therefore, governed by Department of Energy Order 5480.31 and will require a formal Operational Readiness Review prior to receiving authorization to proceed.

The remaining activities described in the Standing Order fall into two categories. First, those activities in progress at the time of the incident were suspended by EG&G Rocky Flats, Inc. management as a precautionary measure to provide management with the opportunity to understand the generic implications and appropriate corrective actions prior to reinitiating the activities. Second, those activities that are not yet started were listed as suspended to assure that the lessons learned from this incident were incorporated into the restart plans for each activity.

The activities suspended all involve the handling of significant quantities of fissile material. Activities not suspended involve very limited quantities of fissile material and thus pose minimal criticality safety risk during continued performance with existing controls. For example, a criticality from the handling of waste containers with <200 grams of fissile material has been qualitatively judged to be incredible. Also analytical samples, which are typically < 2 grams in total weight, are not a credible criticality safety risk. The handling of piped process waste liquids with concentrations < 4E-3 gram/liter fissile material content has been qualitatively shown double contingent for the transfer authorized. There is no apparent credible scenario from handling radioactive sources. For these activities, even if deliberate action outside procedures were taken, criticality risk is minimal. These activities also provide for maintenance of compliance with safety and environmental standards, such that suspension could result in increased safety risks or violation of regulatory statutes.

Revision 0 of Standing Order 34 was issued to assure that the activities known to be ongoing or planned involving significant quantities of fissile material were properly suspended pending a review of the incident at the critique. Revision 1 was issued to more clearly list all of the activities intended to be suspended and Revision 2 was issued to further clarify the specific activity shutdown for cause and to more clearly define those activities not yet started and governed by their own restart readiness review.

If there are any questions concerning this, please contact me at extension 7088.

cc:
A. H. Burlingame
D. W. Croucher
J. G. Davis
R. E. Fray
W. S. Glover
P. M. Golan
T. G. Hedahl
R. E. Kell
M. M. McDonald
V. M. Pizzuto
D. J. Sanstrom
S. G. Stiger
G. M. Voorneis

sl

Standing Order No: 34
Revision: 0
Effective Date: October 7, 1994
Expiration Date: April 7, 1995
Page: 1 of 1

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and operations involving fissile material as defined by the scope and applicability of this order.

Scope and Applicability:

This Standing Order applies to movement of all fissile material except:

(1) all low-level and low-level mixed waste movements (less than 100 nano curies/gram),
(2) all waste/residue containers (55-gallon drums and waste crates only) containing less than 200 grams of dry fissile material, and
(3) analytical samples and analysis.

Directive / Instructions / Information:

1. Effective immediately, movement of all fissile material, with the exception of material specifically excluded above, is suspended.

2. Any exceptions to the above must be approved by the President of EG&G, Rocky Flats Inc., or his designee.

Approved by: Richard B. Kramer, 10/7/94
President Date

INFORMATION ONLY

PADC-94-02054

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INFOR
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Standing Order No: 34
Revision: 1
Effective Date: October 11, 1994
Expiration Date: April 11, 1995
Page: 1 of 1

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and process operations involving fissile material as defined by the scope and applicability of this order.

Draft Revision 1 was issued to list specific activities suspended under the Revision 0 of Standing Order.

Revision 1 final incorporates minor editorial changes to Draft Revision 1 and was approved by the Safety Review Board (SRB).

Scope and Applicability:

This Standing Order specifically prohibits movement, transfer and process operations involving the following fissile material.

1. Phase I and Phase II Solution Stabilization
2. SNM Consolidation
3. Thermal Stabilization
4. Stockpile Reliability Evaluation Program Shipments
5. SNM Inventory
6. Duct Remediation to remove the accumulation of fissile material from ventilation ducts and related systems.
7. HSP 31.11 Activities
8. Movement or Transfer of drums, waste crates, or other containers containing in excess of 200 grams of fissile materials.
9. Handling of HEUN solutions in any quantity.
10. Residue repack and characterization for drums or containers with greater than 200 grams of fissile material.

11. SNM Shipment program including:
    a. 4.5% enriched uranium oxide
    b. Enriched uranium hemishells
    c. Criticality experiment parts

12. No liquid wastes containing or expected to contain more than 4E-3 gram/liter concentration of plutonium or americium may be transferred in piping systems. Liquid wastes in containers are governed by the 200 gram limit described in 8 above.

Directive / Instruction / Information:

1. Effective immediately, all movements, transfers, and other processing operations involving fissile material listed above are suspended.

2. Questions concerning this Standing Order can be directed to the Chief Engineer.

3. Any exceptions to the above shall be submitted by the Cognizant Program Manager to the Chief Engineer for consideration including review by the appropriate SRE sub-committee.

Approved by: _____ 10/11/94
President Date

Standing Order No: 34
Revision: 2
Effective Date: October 20, 1994
Expiration Date: October 20, 1995
Page: 1 of 2

INFORMATION ONLY

SUBJECT SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and process operations involving fissile material as defined by the scope and applicability of this order.

Revision 2 is issued to list specific activities that are shut down for cause and to list activities that are suspended pending root cause analysis of the shutdown operation.

Scope and Applicability:

This Standing Order shuts down the following operation:

Transferring of fissile liquids from tanks to bottles for Phase I stabilization.

This Standing Order suspends the following operations:

1. SNM Consolidation
2. Stockpile Reliability Evaluation Program Shipments
3. SNM Inventory
4. Duct Remediation to remove the accumulation of fissile material from ventilation ducts and related systems.
5. HSP 31.11 Activities
6. Movement or transfer of drums, waste crates, or other containers containing in excess of 200 grams of fissile materials.
7. Residue repack and characterization for drums or containers with greater than 200 grams of fissile material.
8. SNM Shipment program including:
   a. 4.5% enriched uranium oxide
   b. Enriched uranium hemishells
   c. Criticality experiment parts
9. No liquid wastes containing or expected to contain more than 4E-3 gram/liter concentration of plutonium or americium may be transferred in piping systems. Liquid wastes in containers are governed by the 200-gram limit described in 6 above.

Standing Order No: 24
Revision: 0
Issue Date: October 20, 1994
Expiration Date: October 20, 1995
Page: 2 of 2

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Scope and Applicability: (continued)

This Standing Order places on hold the startup of the following activities which are governed by formal startup requirements of their own:

1. Phase II liquid stabilization activities.
2. Thermal Stabilization.
3. Highly Enriched Uranium Nitrate removal and shipment.

Directive / Instructions / Information

1. Effective immediately, all movements, transfers, and other processing operations involving fissile material listed above are suspended.
2. Questions concerning this Standing Order can be directed to the Chief Engineer.
3. Any exceptions to the above shall be submitted by the Cognizant Program Manager to the Chief Engineer for consideration including review by the appropriate SRB subcommittee.

INFORMATION ONLY

Approved by: _____, 10/20/94
President, A.H. Burlingame Date

ENCLOSURE 3

ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC.
ROCKY FLATS PLANT, P.O. BOX 464, GOLDEN, COLORADO 80402-0464 • (303) 966-7000

November 28, 1994

94-RF-11784

Mark N. Silverman
Manager
DOE, RFFO

ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-275-94

This memorandum forwards the subject Root Cause Analysis and Evaluation of Generic Implications (Attachment 1) for the tank draining incident in Building 771 that occurred on September 29, 1994. This information is provided for your information and to assist in your evaluation and ultimate approval of our actions to restart suspended operations.

In addition to the root cause analysis the following additional information/correspondence is provided:

- Attachment (2) documents an independent consultant's evaluation of the process used to conduct the analysis as well as the conclusions reached therein.
- Attachment (3) reflects my direction for the Senior Review Board (SRB) concerning further action in regards to this root cause analysis.
- Attachment (4) reflects my direction to all EG&G Directors concerning a sitewide review and briefings related to this analysis.
- Attachments (5), (6), (7), and (8) document additional action that I have directed to individual senior managers that will be coordinated through the SRB to further respond to the subject analysis.
- Attachment (9) documents the conclusions by the Chief Engineer that the procedure used to control this evolution adequately provided the required nuclear safety until such time that the procedure was willfully and knowingly violated.

I consider the subject analysis to be thorough and insightful. The recommendations are sweeping and if fully and effectively implemented should cause further improvement in the ability to perform work at Rocky Flats. In particular the analysis effectively addresses the fundamental and direct cause of this incident, that is the willing and knowing violation of the Principles of Conduct of Operations and the subsequent non-disclosure of such violations for a period of seven days.

The analysis however, appropriately extends far beyond this immediate and direct cause and provides insightful recommendations to further improve the processes and "culture" that has been progressively implemented over the last five years at Rocky Flats. Specifically, the recommendations fall into three basic categories.They are:

(1) Restart of Suspended Operations in the near-term

(2) Further improvement over the next few months in our processes used to control work at Rocky Flats

(3 Developing facts related to the "safety culture" and taking longer term actions to improve that culture

The EG&G Rocky Flats overall response to this incident and this analysis is to aggressively conduct the necessary reviews and where necessary, implement retraining, put in place applicable compensatory measures to allow prompt restart of suspended operations, to move forward with a careful and thougntful improvement of our processes to control work and to take action to further improve the safety culture at Rocky Flats. The three step process described above implements this approach. I believe it is very important that we continue to build upon our processes as a result of the lessons learned from this incident while at the same time ensuring our ability to quickly move forward with the important risk reduction activities confronting this site.

Attachment (9) documents the fact that the procedure used to conduct the subject operation adequately provided for double contingency and overall nuclear safety until such time as the procedure was intentionally violated. A key element in allowing us to move forward with a wide range of risk reduction activities is the final development and use of "activity based planning" using necessary and sufficient standards. We must aggressively move to finalize that process; however, until it is completed, I see nothing in this analysis that indicates that we cannot safely control work with existing work control documents given proper reviews and appropriate compensatory measures.

I will keep you advised as we continue with our analysis of this incident and the implementation of required corrective actions.

I request your support in acting on my recommendations for restart of suspended operations.

A. H. Burlingame
President
EG&G Rocky Flats, Inc.

plh

Attachments: (9)
As Stated

Orig. and 1 cc to M. N. Silverman

cc:
D. Sargent - DOE, RFFO
L. Smith - " "
K. Klein - " "

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 23, 1994

TO: A. H. Buningame, President, Bldg. 111, X4361

FROM: W. S. Glover, Performance Assurance, Bldg. 111, X6310

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 WSG-317-94

The purpose of this letter is to transmit the Root Cause Analysis of the unauthorized draining of solutions that occurred in Building 771 on September 29, 1994, and my evaluation of generic implications, associated with this event. These evaluations are in response to Occurrence Notification Report RFO-EGGR-771OPS-1994-0062, and in support of development and implementation of restart plans for operations suspended by Standing Order Number 34, Revision 2, dated October 20, 1994. The primary lesson learned from this event is that deliberate actions outside of authorized operations can undo the progress we are making in implementing Conduct of Operations and activity-based planning. The recommendations which flow from this primary lesson can be time phased as shown in Attachment 3, to return us to safe operations shortly, reducing real risks in buildings such as Building 771 with adequate safeguards against deliberate actions. Concurrent with restarting suspended activities, we can refine and improve programmatic process weaknesses which have been identified by the Root Cause Analysis. Compensatory measures are being implemented to support safe work with the continuing existence of the "safety culture" issue. The ultimate resolution of the basic cultural issue will be fashioned following a more complete understanding of the issue. Actions to achieve this better understanding currently are underway.

On the evening of October 6, 1994, the Building 771 Production Manager reported to the Building 771 Shift Manager that solution draining activities outside the scope of authorized work were conducted on the backshift on September 29, 1994. Building 771 nuclear operations were terminated, and an Occurrence Report was filed by the Shift Manager. Subsequent inquiry into the incident identified one employee who deliberately initiated the activity outside the authorized scope of work and two supervisory employees who not only did not stop, but assisted in completing the unauthorized activities and then concealing them for seven days.

The Root Cause Analysis, Attachment 1, focused on the facts and circumstances surrounding the individual event in Building 771 and concluded that there were one summary cause, three root causes, two contributing causes, and two potential problems, listed in order of importance as follows:

Summary Cause

- Personnel failed to fully accept and implement the concepts of Conduct of Operations.

Root Causes

- Task performance was less than adequate in that a worker deliberately performed work outside of the authorized scope of work;
- Supervision of the task was less than adequate to prevent the intentional unauthorized operation; and

- Barriers and controls which would have deterred an unauthorized solution transfer were less than adequate; including those associated with the Resource Conservation and Recovery Act (RCRA).

Contributing Causes

- Corrective actions were not yet implemented or were less than adequate for previously identified events or circumstances that had characteristics similar to this event; and
- The process to ensure that individuals meet current training and qualification requirements prior to assignment to work activities in Building 771 is less than adequate.

Potential Problems

- The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities; and
- Removal of the lockout/tagout per Task Information Package (TIP) 5 was not in compliance with the compensatory measures established for the Raschig Ring tank Unreviewed Safety Question Determination (USQD).

I concur with the causal factors and potential problems which are discussed in detail in the attached Root Cause Analysis report.

The Root Cause Analysis and associated corrective action recommendations focused on the specific event in Building 771. The Generic Implications evaluation was completed by my office and senior personnel familiar with the Root Cause Analysis and considered broader implications which, if corrected, should mitigate or prevent future recurrence of this or related events across the site.

The Generic Implications of this event include:

- Lack of acceptance of Conduct of Operations principles;
- Ineffective management actions in resolving identified problems;
- Additional types of hazards warranting management attention; and
- Inadequate discipline in and process for creating and maintaining authorization bases.

Due to the significance of these Generic Implications, I have recommended actions beyond those covered in the Root Cause Analysis. My recommendations are included in the Evaluation of Generic Implications of Building 771 Incident, Attachment 2.

Once you have concurred with the Root Cause Analysis and Evaluation of Generic Implications they will be forwarded to the responsible manager, Building 771 Operations Manager, for appropriate action per 1-D97-ADM-16.01, Occurrence Reporting and to the Chairman of the Safety Review Board for appropriate inclusion in actions to support suspended operations restart. For convenience, I have assembled the recommendations from the Root Cause Analysis and the Generic Implications evaluation into one summary table, provided as Summary of Root Causes, Generic Implications, and Recommendations, and provided it here as Attachment 3.

I recommend that recommendations 4.3 in the Generic Implications Evaluation and S.2, part of A.1, B.2, B.4, C.1, C.2, C.3, C.4, E, G.1, and G.2 in the Root Cause Analysis be implemented, where applicable, before lifting Standing Order 34, which limits the movement of fissile material. These recommendations have been incorporated in the restart plans which have been submitted to the Department of Energy, Rocky Flats Field Office for approval. The other corrective actions should be scheduled for completion as soon as practicable in the short term (6 months) or long term (12 months) as indicated in Attachment 3.

KDS:ker

Attachments:
1. Root Cause Analysis of Building 771 Unauthorized Draining of Process Lines Reported on Occurrence Report RFO-EGGR-771OPS-1994-0062
2. Evaluation of Generic Implications of Building 771 Incident
3. Summary of Root Causes, Generic Implications, and Associated Recommendations

cc:
J. G. Davis
J. A. Geis

ROOT CAUSE ANALYSIS OF THE BUILDING 771 UNAUTHORIZED OPERATION OF PROCESS LINES REPORTED IN OCCURRENCE REPORT RFO--EGGR-771OPS-1994-0062

Report Number: CA-94-010 Report Date: 11/23/94

1. Description/Date/Time of Event

Summary of Event

The purpose of this section is to provide a brief overview of the event. The background section will contain a more detailed account of the event and the causal factors preceding and following the event.

On September 29, 1994, at approximately 0315, a solution containing Plutonium (Pu) was drained from a process line that was not included within the scope of Task Information Package (TIP) 771-OPS-94-005 (TIP 5). The solution obtained in this unauthorized operation was darker and more viscous than the solution drained from Tank D467 and was placed in five 4-liter bottles and diluted. The material balance card was revised to indicate that the five extra 4-liter bottles came from Tank D467.

Draining of the unauthorized solution into Glovebox 42 was not reported until October 6, 1994, after the Technical Supervisor I (hereafter referred to as the Production Foreman [PF]) obtained a result of a quick analysis of a bottle containing the unauthorized solution. The sample indicated a Pu gram per liter (g/l) concentration of approximately 8.25 g/l which was above the limit listed in TIP 5 (5 g/l) on Nuclear Material Safety Limit (NMSL) NMSL 940037/MFS-002-0/2/C6-13B.

Summary of Root Cause Analysis Conclusions

The unauthorized operation did not comply with the NMSL associated with TIP 5. Also, the unauthorized operation did not comply with Conduct of Operations practices established in the procedures and training at Rocky Flats.

Although the NMSL was not complied with, there was still some safety margin to prevent an actual criticality event. The authorized scope of work resulted in fifty-five 4-liter bottles containing solutions with plutonium concentrations of less than the limit of 5 g/l. The unauthorized operation resulted in accumulation of an additional five 4-liter bottles of solution, three with a plutonium concentration in excess of the 5 g/l NMSL. In order to have a criticality, more solution at a concentration significantly higher than 5 g/l would have been required. Thus, there was a safety margin even in the unauthorized operation, albeit not known or controlled in advance. Information was provided to the root cause analysis team from Engineering and Safety Services (Letter DPS-139-94) indicating that TIP 5 included adequate double contingency and double contingency was achieved during the execution of TIP 5, until the beginning of the unauthorized operation.

1. Description/Date/Time of Event (continued)

The draining of the unauthorized solution also resulted in a non-compliance with the requirements listed in Unreviewed Safety Question Determination (USQD) USQD-RFP-93.1503-GLS, "Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs." This non-compliance occurred when valves were opened that permitted transfer of unauthorized solution from process lines other than those designated in TIP 5.

There are also Resource Conservation and Recovery Act (RCRA) implications for this event. TIP 5 had been reviewed by the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment (CDPH&E) prior to the TIP being implemented. The Division had agreed with draining Tank D467 and with interim storage of the resulting solutions in Glovebox 42 pursuant to Compliance Order No. 93-04-23-01.

The root cause analysis focused on the facts and circumstances surrounding the individual event in Building 771 and concluded that there were one summary cause, three root causes, two contributing causes, and two potential problems. The two potential problems identified did not cause or directly contribute to the event, but were areas of concern identified during the conduct of the analysis. The causes and potential causes are listed below in order of significance in causing or contributing to the unauthorized operation of draining solution from lines outside of the scope of TIP 5. The term less than adequate (LTA) is used in the context of this report to identify processes, performance, or systems that were not adequate enough to prevent or mitigate the consequences of the unauthorized operation.

Summary Cause

- Personnel failed to fully accept and implement the concepts of Conduct of Operations.

Root Causes

- Task performance was LTA in that a worker deliberately performed work outside of the authorized scope of work;
- supervision of the task was LTA to prevent the intentional unauthorized operation; and
- barriers and controls which would have deterred an unauthorized solution transfer were LTA, including those associated with RCRA.

Contributing Causes

- Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event; and
- the process to ensure that individuals meet current training and qualification requirements prior to assignment to work activities in Building 771 is LTA.

1. Description/Date/Time of Event (continued)

Potential Problems

- The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities; and
- removal of the lockout/tagout (LO/TO) per TIP 5 was not in compliance with the compensatory measures established for the Raschig Ring tank non-compliance USQD.

Methodology of Root Cause Analysis

A root cause analysis is an in-depth analysis of a single event or group of similar events to determine the root and contributing causes. Event and Casual Factors (E&CF) Charting (Attachment I) was the main methodology used in the conduct of this root cause analysis. After the development of the E&CF Chart, the main contributing causal factors were evaluated to determine root and contributing causes using the Root Cause Checklist from Procedure 1-11000-ADM-16.03, Cause Analysis. Document reviews and interviews were used as the main fact gathering tools. The facts presented in this report were verified through document reviews and/or personal interviews. Statements made by one individual in an interview were not considered factual until the information was verified in subsequent interviews with other individuals or through document reviews. A listing of the documents reviewed during the conduct of this root cause analysis is provided as Attachment II.

Attachment III provides a listing of the general categories of individuals interviewed. The analysts who conducted the document reviews and interviews also developed the E&CF Chart and this root cause report. The root cause report was also reviewed by a team of managers and consultants to test the completeness and defensibility of the analysis.

Fact gathering by the root cause analysis team did not begin until October 11, 1994, five days after the event was disclosed and twelve days after the event itself. Also, interviews conducted by the team of the individuals involved in the event occurred after they had already been interviewed by others. Interviews by the team of the three key people who were involved in the event occurred while their employment was in the process of being suspended and then terminated. After their employment was terminated, no further interviews were conducted.

The initial schedule for completion of the root cause analysis was three days. As a result, fact gathering for this root cause analysis was initiated without a clearly defined scope for the analysis because of the urgency to quickly identify the causes and associated corrective actions. Later, as the significance of underlying issues became more clear, the scope and schedule were expanded.

1. Description/Date/Time of Event (continued)

Fact gathering for this analysis was hampered by the early inquiries by others. Also, a few people interviewed for this analysis were reluctant to have their names used in connection with the information they provided.

Background

In December 1989, nuclear weapons production activities were curtailed at Rocky Flats. The 1989 curtailment directive stopped all production processes using plutonium in Building 771 without directing specific steps to assure safety during curtailment. During this root cause analysis, it was determined that some workers in Building 771 expressed concerns about the solutions left in the tanks and requested, in early 1990, that the tanks be drained. Tanks were not drained as a result of the workers' concerns because of management's assurance that production would soon resume.

The opinion that resumption would occur soon and that the curtailment was temporary persisted through 1992. In early 1993 the mission of Rocky Flats was changed. The new mission did not include plans for resumption of curtailed plutonium defense production at Rocky Flats. Since the original curtailment was perceived as "temporary," a plan for extended shutdown had not been formulated. Consequently, the curtailment had been essentially a "stop-in-place" without planned management of plutonium (such as, solution stabilization, thermal stabilization, Special Nuclear Material [SNM] storage) for extended shutdown or cessation of production. The "stop-in-place" situation resulted in a growing uncertainty about actual conditions within the process equipment and facilities. This led to increased opportunities for exposure and contamination from leaks and deteriorating equipment and storage containers.

In order to improve control of plutonium and resolve RCRA storage deficiencies, Building 771 Phase I Liquid Stabilization commenced in April 1992 with the completion of TIP-92-006. TIP-92-006 involved the removal and processing of liquid that contained fissile material, stored in 4-liter bottles, that were packaged in drums. A readiness evaluation was completed in May 1994 to expand Phase I to include tank draining activities. As a result of these expanded activities, Tank D454 was drained in June 1994. Subsequently two other tanks were drained (tanks D1001 and D1002) in July 1994. The same manager, foreman, and crew leader that were involved in the draining of tanks D454, D1001, and D1002 were involved in the draining of Tank D467.

1. Description Date Time of Event continued)

As part of the ongoing expanded Phase I activities, TIP 5 was developed and approved in August and September 1994, per procedure APNO-12, entitled Task Information Package (TIP) Preparation Procedures, to drain the solution from Tank D467. The TIP stated that based on process knowledge, there were 203 liters of plutonium nitrate at a concentration of less than 0.5 g/l of plutonium in Tank D467. The process included draining the solution from Tank D467 into a 4-liter glass flask and then hand pouring the solution from the flask into 4-liter narrow-mouth bottles inside of Glovebox 42. TIP 5 included prerequisites, responsibilities, limitations and precautions, and instructions. TIP 5 required that the 4-liter bottles were only filled to the 3.75 liter level in accordance with the Interim Nuclear Material Safety Manual for Intraplant Shipments. As an administrative control for the process, the 4-liter bottles were marked at the 3.75 liter level. All operations met this 3.75 liter administrative control.

On September 26, 1994, after a briefing of the task team on the requirements for performing the job (called a pre-evolution briefing) at 0840, the NMSLs were posted, the LO/TO for the vacuum pump was removed, and the initial valve line-up for TIP 5 was conducted. The initial valve line-up sheets required pen and ink changes to reflect the as-found condition of the valves. (The appropriateness of using pen and ink changes is being evaluated as part of Occurrence Report RFO--EGGR-771OPS-1994-0062. Additionally, a review of the TIP process is being conducted outside of the scope of this root cause analysis. The pen and ink changes are assigned to Building 771 operations and the TIP process review is assigned to Organizational Effectiveness). The LO/TO remained lifted until the completion of the tank draining evolution on September 29, 1994, at 1022. The LO/TO was not re-installed at the end of each shift.

The rest of the TIP 5 tank draining operation, which occurred over several days and involved the same key personnel and several different process specialists, was conducted on the backshift (midnight to 0800) due to electrical safety upgrades that were occurring on the day shift. There were several safety concerns relating to the electrical system in Building 771, and the electrical upgrades were established as the number one priority in Building 771 by the Operations Manager. Building 771 management decided not to conduct tank draining concurrent with the electrical upgrades because the upgrades required some safety equipment (e.g., ventilation system backup power supplies) to be taken out of service. The TIP allowed the draining operation to be conducted over more than one shift.

On September 27, 1994, after the pre-evolution briefing at 0005, the vacuum pump was started, Tank D467 was sparged, three 4-liter bottles were filled, and samples were obtained to determine the fissile material concentration of the solution in the tank. These evolutions were completed in accordance with the TIP 5 requirements. The samples were taken to the Building 771 Laboratory for the required analyses. The analyses were completed on the day shift of September 27, 1994. The results (0.15 to 0.19 g/l of Pu) were within the limit listed in the NMSL.

Description/Date/Time of Event (continued)

On September 28, 1994, after a pre-evolution briefing at 0015, work under TIP 5 was begun to transfer the remaining solution from Tank D467 drain lines, via hand-held flasks, to the 4-liter bottles inside of Glovebox 42. One 4-liter bottle made of polypropylene broke when dropped from the upper to the lower level of Glovebox 42 during an authorized hand-transfer task. After this bottle broke, newer low density polyethylene 4-liter bottles were utilized for this operation. Subsequently, three 4-liter bottles were filled. The operation was then stopped because of concerns about the operability of the building ventilation system due to ongoing electrical upgrades.

The concern about ventilation was resolved, and, after a pre-evolution briefing on September 29, 1994, at 0000, the TIP 5 operation was continued in order to drain the remaining solution from Tank D467. There were six individuals directly involved with the TIP 5 tank draining operation on September 29, 1994. These individuals consisted of three Operators and a Crew Leader (referred to as Process Specialists [PS] in the TIP), one PF (referred to as the Supervisor in the TIP), and one Manufacturing Manager, Building (referred to as the Production Manager [PM] in the TIP). Hereafter, the term PS or Process Specialist is used to denote the Crew Leader who initiated the unauthorized operation.

In the Process Operations Support organization responsible for performing the D467 tank draining, there were 25 operators, three foremen, and one manager working in Building 771. There was a total of 91 persons assigned to Building 771 who reported to the Building 771 Operations Manager. There were an additional 167 persons assigned to Building 771 who performed support activities for the Operations Manager but who did not directly report to the Operations Manager. During the backshift draining operations there were approximately eight EG&G/RF personnel at the work location.

All of the EG&G Rocky Flats individuals directly involved in the TIP 5 tank draining operation on September 29 had received formal COOP training, training to TIP 5, and training in tank draining (except one operator who indicated in interviews that TIP 5 training was not received). While most of the training for the individuals involved in the TIP 5 operation was current, some of the management and supervisory personnel involved in the operations on September 29 had expired training in the following areas:

- Production Manager (PM) - Nuclear Criticality Safety Supervisor training expired on 09/10/94
- Production Specialist (PS) - Glovebox training expired on 02/04/94
- Shift Technical Advisor (STA) - Nuclear Criticality Safety training expired on 07/14/94
- Shift Manager (SM) - RCRA Computer Based Training (CBT) and RCRA On-The-Job Training (OJT) expired on 03/03/94

One of the three Operators had expired RCRA OJT.

1. Description/Date/Time of Event (continued)

TIP 5 required the presence of the Operations Manager or designee in the process area during the performance of activities involving the movement of SNM. The designee was required to be appointed in writing. While the PM acted as the Operations Manager designee in the performance of this requirement, he was not appointed in writing. A written designation for the PM to act for the Operations Manager was found for the two previous TIP tank draining operations in Building 771. Although not required by the TIP, the Operations Manager directed that the TIP 5 operation be observed by a Shift Technical Advisor (STA). In addition, a Department of Energy (DOE) Facility Representative observed portions of the TIP 5 operation. The SM also observed portions of the operation during his rounds.

To continue with the TIP 5 operation the PS drained solution from Tank D467 into the flask in Glovebox 42. The flask was handed to an Operator who poured the solution from the flask into the 4-liter bottles in Glovebox 42. The 4-liter bottles were then handed from Operator to Operator and placed in the bottom level of Glovebox 42. During the process, samples were collected from each 4-liter bottle, and the sample containers were placed in a plastic bag which was stored in Glovebox 42. Forty-nine additional 4-liter (3.75 liters) bottles of solution were collected which resulted in a total number of 55 4-liter bottles resulting from the authorized draining of Tank D467.

At approximately 0315 on September 29, 1994, the draining was complete except for maintaining a vacuum pull on Tank D467 for a one hour period as required by TIP 5. The vacuum pull was maintained to remove any residual liquids that could have been in the process lines or the tank itself. It was previously determined by those performing and observing the tank draining operation that all personnel except the PS would take a break for lunch once the draining operation was complete and the vacuum pull was in progress. The vacuum pull was considered a minor operation, although it was included as a defined step in the solution transfer portion of the TIP, requiring documented evidence of completion by initialing the task step in the TIP by an operator and an independent verifier. The next step in the TIP was to notify supervision that solution transfer was complete. Personnel involved in observing the TIP 5 tank draining, including the assigned management representatives (PM and STA), left before the solution transfer was complete. The PS was assigned to monitor the vacuum pull, clean-up the area, and prepare for bag-out operations because he was the most experienced of the operators. All other personnel then left the area.

1. Description, Date/Time of Event (continued)

After the other personnel had left the area, the PS proceeded, without direction or authorization, to alter the valve line-up required in TIP 5 with the stated intent of draining solution from the drain line leading to Tank D973. Tank D973 was considered operationally empty, that is, the level of Tank D973 is below the capability of the sight glass to measure. Operationally empty tanks could contain up to 30 liters of solution. Since the PS was involved in the development of TIP 5, he said he knew that this operation was outside the scope of the TIP. An interview with the PS indicated that he made a request during the preparation of TIP 5 to include the draining of this drain line within the scope of the TIP. Interviews with other individuals responsible for the development of TIP 5 and a review of the TIP 5 history file failed to verify that the PS requested that the additional drain line be included within the scope of TIP 5.

The drain line from Tank D973 is cross connected with the drain line of Tank D467. Tanks D467 and D973 were used as ion exchange wash/recycle tanks during production and were expected by the PS to contain the same type of solution. Tanks D971 and D972, which are part of a tank farm with Tank D973, were used as raw (batch) feed tanks during production and would be expected to contain a higher Pu concentration than tanks D973 and D467 (see Attachment IV, Drawing From TIP 5).

While conducting his rounds, the SM entered the Glovebox 42 area and noticed that a dark solution was in the flask in Glovebox 42. Presence of the SM was not required by TIP 5; however, the SM said he was making rounds in the building. The PM then returned to the area and observed a flask containing the dark viscous solution and the presence of the SM at Glovebox 42. The SM commented to the PM about the dark color of the solution, and then left the area without any further investigation into the activities. Interviews with the SM did not resolve why he did not further investigate the activities he observed. After the SM left the area, the PM inquired of the PS as to what was going on. The PS stated that he was draining the drain line from Tank D973. When asked if the PM wanted the PS to continue with the unauthorized operation, the PM stated that since he had probably lost his job anyway, they might as well continue. The PM was then asked if the PM wanted the PS to put the liquid back where it came from. The PM said no. The PM then assisted the PS with the unauthorized operation by helping dilute the unauthorized solution.

During interviews the PS stated that he drained the drain line from Tank D973 because of problems related to contamination from leaking valves, radiation exposure, and RCRA issues. The PM stated during the interview process that he knew draining the additional line was not within the scope of TIP 5, but he assisted because of concern over losing his job, his friendship with the PS, and also because he thought it was a good idea and should have been included within the scope of the TIP.

1. Description/Date/Time of Event (continued)

The PF returned to the area and observed the unauthorized operation in progress. He realized that the work being done was outside of the scope of TIP 5. He became very upset and had to leave the area until he could regain composure. After the PF regained his composure, he returned to the area but did not stop the unauthorized operation. During interviews conducted for this root cause analysis, the PF's motivation for not stopping the unauthorized operation and later assisting in concealing the event was not explored. Follow-up interviews were not conducted because employment of the PS, PM, and PF was terminated. Neither level of supervision stopped the operation, and all three of the personnel then participated in an attempt to conceal this activity. As a result of interviews conducted for this root cause analysis, it was determined that these three individuals did not know they may also have been in non-compliance with the USQD compensatory measures for Raschig Ring Tanks in the course of the unauthorized operation.

The unauthorized solution that was collected in the flask located inside Glovebox 42 was of a darker color and more viscous than that from Tank D467. Based upon experience and a knowledge of the process, the involved personnel believed that this darker color indicated a higher level of Pu concentration. The interview process provided information that the liquid contained in the flask was then distributed between five 4-liter bottles and diluted, utilizing residual solution obtained from the floor of the glovebox that was spilled during the Tank D467 bottle filling and sampling operations. The PM and PS stated that the unauthorized solution was diluted in an attempt to give the appearance that the liquid came from Tank D467. However, the STA indicated that the floor of the glovebox was dry when he exited the room, prior to the unauthorized operation. Also, the DOE Facility Representative who observed most of the solution transfer from Tank D467, except for the vacuum pull, stated that at most, one pint of liquid was on the glovebox floor when she left.

The unauthorized operation of draining the drain line from Tank D973 increased the number of 4-liter bottles in the glovebox by five, to a total of 60. There is a total of approximately 224.75 liters of solution contained in the 60 4-liter bottles (each filled to 3.75 liters). The volume recorded in TIP 5 for Tank D467 was 210 liters. There is a difference of approximately 14.75 liters between the amount of solution estimated to be in Tank D467 and the amount of solution contained in the 60 4-liter bottles in Glovebox 42. The information obtained from interviews with the PF, PM, and PS indicated that the amount of solution drained from the drain line to Tank D973 was no more than five liters. Therefore, there are approximately 9.75 liters of extra solution, the source of which is not established, assuming that the five liters came from the D973 drain line.

1. Description Date/Time of Event (continued)

A review conducted by the senior manager of the organization responsible for performing TIP 5, postulated three possible scenarios for the additional solution listed in Letter REF-107-94, as identified below:

- the darker solution was diluted with nitric acid from the nitric acid supply line connected to the glovebox;
- a fraction of solution was taken from each of the 55 4-liter bottles containing the solution from Tank D467 and added to the five darker 4-liter bottles containing the solution from the unauthorized operation; or
- additional lines outside the scope of TIP 5 were drained in addition to, or other than the ancillary lines to Tank D973.

Another scenario was identified by the Liquid Stabilization Group on October 31, 1994, (Letter RSS-127-94) postulating the use of a process water line in Glovebox 42 to dilute the darker solution. Nothing uncovered by the root cause analysis team substantiated any of the identified scenarios. Therefore, the actual source of the liquid used for dilution has not been established, and this casts some doubt that the full facts of the unauthorized operation are known.

The PM entered the additional 4-liter bottle numbers and amounts of solution on the material balance card as if they had come from Tank D467, and the PF verified the card. The TIP was then completed and the equipment was returned to the original configuration, as required by TIP 5.

To determine if there was a potential to have a Pu concentration above the requirements of the NMSL, the PF went to the Building 771 Analytical Laboratory on September 30, 1994, and reviewed the history files for sample results related to Tank D973. He stated that he was still concerned about the dark color of the unauthorized solution. He believed that if the record review indicated the Pu concentrations were below the associated NMSL, then the unauthorized operation could go undiscovered. The records he was able to review were from December 1989, and indicated that the Pu gram per liter concentrations of the solutions that were contained in the tank in 1989 were well within the current NMSL requirements for this operation. The records he was able to review indicated that at the time of sampling in 1989, the tank contained in excess of 100 liters of solution. During Aqueous Recovery Operations, tanks were sampled by operations personnel prior to transferring to another tank within the same Material Balance Area. At the time of the unauthorized operation, the tank was considered to be operationally empty.

1. Description/Date/Time of Event (continued)

On October 6, 1994, the PM asked the PF to take a sample from one of the five 4-liter bottles containing the unauthorized solution from the unauthorized operation. The sample was taken at this time because the laboratory had been shut down for several days and was unable to run the 60 samples from the TIP 5 operation. The PM was concerned that the darker liquid was in fact at a higher level of Pu concentration than the five grams per liter that the NMSL permitted. The PM believed that if the sample of the unauthorized solution indicated the Pu concentration was below the associated NMSL, then the unauthorized operation would go undiscovered. The sample was taken to the Analytical Laboratory and run to obtain a quick result without using a laboratory requisition. Historically, quick result samples were run by the Analytical Laboratory prior to receiving a laboratory requisition, with the understanding that a laboratory requisition would follow. However, in this instance, appropriate notifications were not made to building management requesting permission to run the sample, contrary to the requirements of COOP-1. The result of the sample indicated a Pu concentration of approximately 8.25 g/l.

In an interview with the root cause analysis team, the PM stated that he was called at home by the PF and told of the sample results. The PM returned to Building 771 and reported the unauthorized operation to the SM. The SM immediately terminated operations and made the appropriate notifications to the Emergency Operations Center Notification Officer, per procedure. The Operations Manager was briefed on the occurrence at approximately 2000. The Staff Duty Officer for the DOE, Rocky Flats Field Office (RFFO) was notified at 2050. Senior management was made aware at 2133. By this time, the unauthorized operation had been kept silent for seven days.

A critique of the event was conducted at 0730 on October 7, 1994, in Building 111. As a result of the information from the critique, management initiated a formal investigation of possible wrong doing in connection with the unauthorized operation. During the root cause analysis, it was determined that much of the information presented at the critique meeting, concerning who was involved and what specifically happened, was not accurate. Other investigations conducted of this event substantiate this determination.

Interviews conducted with individuals in Building 771, taken collectively, indicated that there were several COOP concerns within the building. Operations management was of the opinion that COOP was implemented to a 70% level in the building based on Building 771 mentor reports of how many COOP procedure elements were in place. Even so, COOP was ineffective, for during interviews it was stated by some individuals that they also would have drained the drain line from Tank D973, even if it was outside the scope of the TIP. These individuals said they had more faith in their knowledge of the processes and experienced operators than in procedural compliance. Further, interviews identified the existence of cliques and tightly knit groups in the building who expressed a willingness to cover for each other.

1. Description/Date/Time of Event (continued)

As part of the root cause analysis interview sheet, those interviewed were asked what the concepts "Empowerment," "Just Do It," and "Barrier Busters" meant to them. Many of those interviewed had not heard of nor did they understand the concepts "Empowerment" and "Barrier Busters." Those interviewed responded that "Just Do It" meant to get it done, but do it safely.

Interviews included questions to determine if there were perceptions of schedule pressure for completion of TIP 5. Most of the people interviewed by this team stated there were both state regulatory compliance and award fee motivations to have Tank D467 drained before the end of the fiscal year. Only one person said this motivation caused pressure on timing of the operation. However, since the unauthorized operation went beyond draining of Tank D467, pressure, whether real or not, to drain Tank D467 cannot be said to be a cause for the unauthorized operation.

During the root cause analysis, documents were found that identified previous reviews, assessments, and memoranda identifying events or circumstances with characteristic similar to the causal factors of this event. These documents had been provided to various levels of management.

Time records were also checked to determine if involved individuals had worked excessive hours during this evolution. They had not.

2. Root and Contributing Causes, Potential Problems

The following definitions apply to categorization of causes in this report.

Contributing Cause: A cause that increased or potentially increased the consequences or severity of the event or condition. Correction of contributing causes will not, by itself, prevent recurrence of the event or condition, but contributing causes are important enough to require corrective action to improve the quality of the process, equipment, or product.

Corrective Action: Corrective actions identified in Section 3 of this report are provided as recommendations from those who performed the root cause analysis. Corrective actions are required to be recommended for each identified root or contributing cause by the Cause Analysis procedure. The purpose of the recommended corrective actions is to provide management with recommendations which will prevent or minimize the likelihood of recurrence of the event or condition root cause analyzed.

MORT Cause Code: A code listed in the Cause Analysis procedure and originating from document WP-27 (SSDC), MORT Based Root Cause Analysis. The purpose of the MORT Cause Code is to facilitate the tracking and trending of causes of identified adverse events of conditions.

ORPS Cause Code: A code from the Occurrence Reporting and Processing System used to track and trend causes associated with occurrences and required by DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.

Root Cause: The fundamental cause(s) that, if corrected, will preclude recurrence of an event or condition.

Summary Cause

Based upon a review of the root and contributing causes of this analysis, the sum of these root and contributing causes indicates a failure of involved personnel to fully accept and implement the concepts of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities:

- Root Cause A demonstrates noncompliance with portions of Chapter I, Operations Organization and Administration, and Chapter XVI, Operations Procedures;
- Root Cause B demonstrates noncompliance with portions of Chapter I, Operations Organization and Administration, and Chapter II, Shift Routines and Operating Practices;
- Root Cause C and Potential Problem G demonstrate noncompliance with portions of Chapter IX, Lockouts and Tagouts;
- Contributing Cause D demonstrates noncompliance with portions of Chapter VI, Investigation of Abnormal Events; and
- Contributing Cause E demonstrates noncompliance with portions of Chapter V, Control of On-Shift Training.

The causes below are presented in order of significance in causing or contributing to the unauthorized operation of draining solution from lines outside of the scope of TIP 5.

Root Cause

A. Task performance was LTA in that one worker deliberately performed work outside and beyond the scope of TIP 5. Additionally, the worker's foreman and manager not only did not stop but assisted in the activities and subsequent concealment of the event once they became aware of the unauthorized operation.

Discussion

- Upon completion of TIP 5, the PS assigned to drain the solution from Tank D467 drained additional solution from the lines attached to Glovebox 42. He stated that he wanted to mitigate leaks, reduce future radiological exposures to personnel, and reduce potential decontamination efforts. Reviews of associated documentation and an interview with a Building 771 manager indicated that the Tank D973 drain line did not have a history of leaks during the previous year.

2. Root and Contributing Causes, Potential Problems (continued)

- The PM and PF stated that they decided to assist in the completion and concealment of the activity to protect the PS and themselves from disciplinary action. Additionally, all three individuals were of the opinion that the Tank D973 drain line needed draining and were convinced that they knew what they were doing was safe based upon experience and a knowledge of the processes involved.

- All three individuals stated that they were aware of the TIP 5 requirements and understood COOP concepts. In addition, other individuals interviewed also stated that they understood COOP concepts. However, some of these individuals stated they had a higher reliance on experience and process knowledge than procedures or COOP.

- None of the three individuals involved in the unauthorized operation expressed concern about any potential criticality accident.

ORPS Cause Code - 3C, "Violation of Procedure or Requirement"
MORT Cause Code - 21, "Task Performance"

B. Supervision was LTA to prevent one person from deliberately undertaking an unauthorized operation. The PM, PF, and STA left the area prior to the end of the TIP 5 operation. Additionally, the SM entered the area of Glovebox 42 during the unauthorized operation and took no action when he saw the dark solution in the flask in Glovebox 42.

Discussion

- At the completion of the draining of Tank D467, all supervision left the area for lunch and the PS was alone at Glovebox 42. Neither the PM nor PF, who had supervisory responsibilities, stayed in the area until TIP 5 was completed. They both left prior to the completion of the one hour vacuum pull and the re-establishment of the vacuum pump LO/TO.

- Although not required by TIP 5, an STA was verbally assigned by his management to observe the TIP 5 evolution. The STA also left prior to the completion of the one hour vacuum pull and the re-establishment of the vacuum pump LO/TO.

- At the time that the SM entered the area, a dark solution was in the flask in Glovebox 42. He noted the solution was a darker color and commented on the color to the PM when the PM returned to the area. The SM then left the area without any further investigation into the activities.

2. Root and Contributing Causes, Potential Problems (continued)

- TIP 5 required the presence of the Operations Manager or designee in the process area during the performance of activities involving the movement of SNM. After completion of the Tank D467 draining and prior to the vacuum pull to remove any residual solution in the drain line and tank, the PM left the area, even though SNM could have been transferred during the vacuum pull. Also, the vacuum pull was included in the solution transfer portion of TIP 5.

- TIP 5 required that the Operations Manager or a designee appointed in writing observe the operation. The PM was not appointed in writing to act for the Operations Manager. However, on the two previous tank draining operations, the PM was designated in writing to act for the Operations Manager in observing operations during the movement of SNM.

- Through interviews, it was discovered that the PS assigned to perform TIP 5 was previously known by management as not completely supportive of COOP. It was known that he did not think COOP controls were necessary in order to drain the tanks and associated lines. He also was known to have a lack of respect for authority. These factors were apparently not considered in leaving the PS alone during the vacuum pull.

- Due to expired training, the PS, PM, and STA assigned to observe the TIP 5 operation were not qualified to participate in the TIP 5 operation. This condition was not recognized by management prior to the performance of TIP 5.

ORPS Cause Code - 6C, "Inadequate Supervision"
MORT Cause Code - 20, "Supervision"

C. The barriers and controls established in TIP 5 for the draining of Tank D467 were LTA and allowed the unauthorized draining of lines other than those described in TIP 5. This lack of barriers and controls adversely affected compliance with nuclear criticality safety, USQD compensatory measures, and had implications under RCRA.

Discussion

- In order to provide adequate protection for individuals, the facility, or the environment from harm, barriers and controls are placed between the hazard and the potential target. The concept of establishing barriers and controls is sometimes called defense-in-depth. Defense-in-depth can consist of physical and administrative barriers and controls as well as process knowledge and supervisory oversight. In the development of TIP 5, physical barriers were not specified. Instead, administrative barriers in the form of a procedure (TIP 5), the process knowledge of the operators, and supervisory oversight by the PM and PF were relied upon.

- The decision not to use physical barriers (e. g., LO/TO) was made, according to interviews, because it was assumed by those who developed TIP 5 and the supporting Criticality Safety Evaluation that personnel executing TIP 5 would do so in accordance with COOP concepts. Since no physical barriers were used and supervisory oversight was absent during the unauthorized operation, defense-in-depth to prevent the willful actions was defeated. After the PS decided to work outside the scope of TIP 5, the supervisory oversight assisted in the unauthorized operation. Process knowledge failed the PS, PM, and PF when a solution of a higher than expected Pu concentration was obtained. The root cause analysis team does not know if foreknowledge of the plutonium concentration in the actual solution drained would have prevented the unauthorized operation by the PS.

ORPS Cause Code - 4A, "Barriers LTA"
MORT cause code - 16, "Barriers and Controls"

Contributing Causes:

D. Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event.

Discussion

Previous reviews, assessments, and memoranda provided management with opportunities to implement effective corrective actions to preclude this type of event. The following examples are not intended to be all inclusive.

2. Root and Contributing Causes, Potential Problems (continued)

- An informal memo from the Manager, Criticality Analysis Engineering to the Director, Nuclear Safety Engineering, dated March 8, 1993, discussed many concerns relating to criticality safety. The broad concerns discussed in the memo were immature conduct of operations, reliance on procedure compliance in a system not yet ready to ensure procedural compliance, and inadequate independent oversight of operations within EG&G.

- A collective significance evaluation of criticality safety procedural infractions at RFETS was conducted in the second quarter 1994. This report was issued to the Associate General Manager, Standards, Audits, and Assurance on May 16, 1994 with a copy to the Chairman of the Nuclear Criticality Safety Committee. This evaluation identified LTA implementation of policies; LTA accountability of management/personnel; task performance errors; and ineffective corrective actions to identified deficiencies.

ORPS Cause Code - 6A, "Inadequate Administrative Control"
MORT Cause Code - 14, "QA/QC"

E. The process to ensure that individuals meet the current training and qualification requirements prior to assignment of work activities in Building 771 is LTA in that several individuals involved in the TIP 5 operation had expired training and qualifications. Due to expired training and qualification, the PS and PM were not qualified to participate in the TIP 5 operation. Also, the STA's nuclear criticality safety training had expired.

- The PM's Nuclear Criticality Supervisor training expired on 09/10/94. The PS's Glovebox training expired on 02/04/94. The STA's Nuclear Criticality Safety training expired on 07/14/94. The SM's RCRA CBT and RCRA OJT training expired on 03/03/94. Additionally, some of the other individuals signed into the area had expired RCRA OJT, Hazardous Waste, Radiation Worker, Glovebox, Nuclear Material Safeguards, and Hazardous Communication training.

- The annual Nuclear Criticality Safety Committee appraisal of Building 771 operations, conducted on June 24, 1993, identified 30 individuals who did not have current nuclear criticality training. The appraisal report recommended the development of a program to ensure that worker training requirements are monitored to prevent deficiencies before they occur. The corrective action to address this concern was either not implemented or ineffective.

ORPS Cause Code - 5D, "Insufficient Refresher Training"
MORT Cause Code - 23, "Training"

2. Root and Contributing Causes, Potential Problems (continued)

Potential Problems:

F. The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities.

Discussion

- During interviews, the PM stated that one of the reasons he didn't stop the unauthorized operation was because he felt that he had lost his job already.

- Interviews conducted with other workers at Rocky Flats indicated that some would stop unauthorized operations while others would not, but that both groups expected to be disciplined and criticized for reporting the noncompliance.

- Evidence of consistent implementation of rewards and sanctions could not be obtained. Individuals interviewed spoke of inconsistent application of discipline, but could not to provide specific supporting facts.

- Where fear of reprisal exists for reporting safety problems, these unreported safety problems (whether valid or not) will likely remain unknown to management, therefore, precluding taking effective corrective actions.

ORPS Cause Code - 6E, "Policy Not Adequately Defined, Disseminated, or Enforced"
MORT Cause Code - 3, "Policy Implementation"

G. The removal of the LO/TO as required in TIP 5 did not comply with the compensatory measures established for USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs.

- USQD-RFP-93.1503-GLS requires compensatory actions to establish controls that ensure no physical movement of solution occurs through gravity feed and by mechanical transfer means. The recommended compensatory measures include the use of physical restraints to prevent all possible methods of solution transfer (e. g. gravity feed, mechanical, etc.). Examples given include separating and blanking off all lines into and out of vessels which could transfer solution, a verified LO/TO of all vacuum/vent valves to the vent position, and the LO/TO of the valves and pumps required for solution transfer, where solution transfer could only occur through active mechanical means.

2. Root and Contributing Causes, Potential Problems (continued)

- Letter BDL-019-94 from the Building 771 Assistant Operations Manager to the Rasnig Ring Action Plan Program Manager states that compensatory measures taken were to electrically LO/TO the vacuum pumps and the vacuum header root isolation valve.

- The LO/TO of the vacuum pump consists of closing valve HV-1331 and placing the Line 5 Nash Pump Local Disconnect in the OFF position. The LO/TO was removed when the Line 5 Nash Pump Local Disconnect was placed in the ON position on September 26, 1994, at 1034 and Valve HV-1331 was opened on September 27, 1994, at 0120. The LO/TO was not replaced until completion of the tank draining evolution on September 29, 1994, at 1025. The TIP 5 end-of-shift instructions did not require that the LO/TO be replaced at the completion of activities each day. The controls to ensure that the vacuum pump was not operated except during the scheduled tank draining were less than adequate in that there were no physical barriers in place to preclude activities outside the scope of the TIP. Interviews indicated that not replacing a LO/TO until completion of the activity, even if the activity lasted several days, was normal for Building 771. During the actual performance of the TIP 5 activities the removal of the LO/TO was acceptable as adequate controls were in place.

ORPS Cause Code - 6E, "Policy Not Adequately Defined, Disseminated, or Enforced"
MORT Cause Code - 3, "Policy Implementation"

3. Corrective Actions/Assumed Risks

The corrective actions listed are related to each identified cause through the assigned number (i.e., Corrective Actions S1 and S2 relate to the Summary Cause, Corrective Actions A1 and A2 relate to Cause A, Corrective Actions B1 and B2 relate to Cause B, etc.).

Summary Cause:

Based upon a review of the root and contributing causes of this analysis, the sum of these root and contributing causes indicates a failure of involved personnel to fully accept and implement the concepts of DOE Order 5480.19, Conduct of Operations Requirements For DOE Facilities.

3. Corrective Actions/Assumed Risks (continued)

Corrective Actions:

S1. Ensure that the "New Directions" message (focus on getting high priority/high hazard "real work" done safely by using the site infrastructure and necessary and sufficient standards) reaches the workers. Accomplish this through the development of special teams using credible Subject Matter Experts (SMEs) to outline the current EG&G Rocky Flats management position relating to COOP and process knowledge for liquid stabilization, thermal stabilization, etc. The purpose of these teams is to establish a trust between management and workers by discussing the issues leading to the current conditions and solutions for moving forward, emphasizing the need for help and suggestions from workers.

S2. Improve senior management visibility by an increased presence and involvement during operations to demonstrate management's interest through personal involvement and to show their concern and respect for all levels of management and employees.

S3. Survey the employees in all fissile materials process buildings to confirm that management understands the extent and nature of differences of opinion, practices, attitudes, and behavior regarding conduct of operations. Evaluate the results of the survey and implement additional actions relating to the human factors that are at the root of this event.

Root Cause A:

Task performance was LTA in that one worker deliberately performed work outside and beyond the scope of TIP 5. Additionally, the worker's foreman and manager not only did not stop but assisted in the activities and subsequent concealment of the event once they became aware of the unauthorized operation.

Corrective Actions:

While it is difficult to positively stop individuals from intentional non-compliance with procedures, the corrective actions for Root Cause A will concentrate on those actions necessary to improve the overall understanding of COOP and the need to follow procedures.

A1. Enhance training for all site employees requiring a knowledge of nuclear and criticality safety. Include the following two specific improvements to training:

- Conduct briefings regarding criticality safety as it relates to this event for all site personnel. Clearly identify this event as a criticality safety issue and stress how the intentional non-compliance with procedures to drain a process solution line resulted in the collection of a solution which unexpectedly exceeded the NMSL established for personnel safety.

3. Corrective Actions/Assumed Risks (continued)

- Include lessons learned information in appropriate site training (criticality lessons learned in Nuclear Criticality Safety Training, radiological lessons learned in Radiation Worker/Safety Training, etc.).

A2. Increase the effectiveness of the implementation of COOP at RFETS as it relates to culture and individual behavior, and make procedures properly reflect process knowledge so that workers trust and follow the procedures.

Root Cause B:

Supervision was LTA to prevent one person from deliberately undertaking an unauthorized operation. The PM, PF, and STA left the area prior to the end of the TIP 5 operation. Additionally, the SM entered the area of Glovebox 42 during the unauthorized operation and took no action when he saw the dark solution in the flask in Glovebox 42.

Corrective Actions:

B1. Develop guidance for the minimum levels of supervision based upon potential risks. Incorporate this guidance into the processes which control the development of work control documents.

B2. Increase independent safety oversight for high risk/priority activities to monitor the effectiveness of supervision.

B3. Improve Senior Management's training of lower level management through the following methods:

- continue to fully utilize the Leadership Academy to train lower level management in all organizations;
- provide routine coaching of lower level management by senior management; and
- each senior manager should develop a management development program to instruct lower level management on how to become effective managers.

B4. Strengthen the qualification process to ensure that management qualifies and selects operators/specialists who have demonstrated adequate knowledge of and commitment to COOP concepts and that these individuals are assigned to high risk/priority evolutions.

3. Corrective Actions Assumed Risks (continued)

Root Cause C:

The barriers and controls established in TIP 5 for the draining of Tank D467 were LTA and allowed the unauthorized draining of lines other than those described in TIP 5. This lack of barriers and controls adversely affected compliance with nuclear criticality safety, USCD compensatory measures, and RCRA.

Corrective Actions:

C1. Revise the assumptions used in the development of work control documents and various evaluations so that COOP is not assumed to be fully implemented.

C2. Emphasize the use of physical barriers and/or increase independent oversight or supervision for work activities involving high or potentially high risk/priority activities.

C3. Re-evaluate the adequacy of compensatory measures in use for previously evaluated USQDs and correct when necessary. Consider that COOP is not fully implemented when evaluating the compensatory measures for adequacy.

C4. Implement measures that ensure RCRA compliance is integrated into work planning, briefing, and controls including those controls identified in C2 above.

Contributing Cause D:

Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event.

Corrective Actions:

D1. Complete actions already in progress to modify the Corrective Action Program and train employees in the use of the modified program.

D2. Develop performance indicators for individual managers to evaluate management performance in driving high priority issues to closure.

Contributing Cause E:

The process to ensure that individuals meet the current training and qualification requirements prior to assignment of work activities in Building 771 is LTA in that several individuals involved in the TIP 5 operation had expired training and qualifications. Due to expired training and qualifications, the PS and PM were not qualified to participate in the TIP 5 operation. Also, the STA's nuclear criticality safety training had expired.

3. Corrective Actions/Assumed Risks (continued)

Corrective Actions:

E. Develop a process to track personnel training and qualifications to ensure that only those individuals with current training and qualifications are assigned work activities.

Potential Problem F:

The perception of the inconsistent application of discipline at Rocky Flats is so strong that some workers may be afraid to stop and report unauthorized or unsafe activities.

F1. Perform an analysis of the consistency of disciplinary actions during the past two years and implement corrective actions that result.

F2. Assure that all RFETS personnel understand that the process for holding individuals accountable for adherence to policy, procedures, and requirements is even-handed and professional.

- Train management in the RFETS disciplinary process.
- Brief Rocky Flats personnel on the RFETS disciplinary process.
- Encourage the reporting of problems through the development of a "no-fault" reporting process and provide training in the use of this process.
- Periodically communicate the facts associated with the reporting of adverse safety information - correct the perception that people are punished for reporting unsafe operations.

Potential Problem G:

The removal of the LO/TO as required in TIP 5 was not in compliance with the compensatory measures established for USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs.

Corrective Actions:

G1. Evaluate the compensatory measures required in USQD-RFP-93.1503-GLS to ensure the adequacy of controls for tanks and associated lines not in compliance with NMSLs. Implement any new compensatory measures deemed necessary to ensure adequate controls for tanks and associated lines not in compliance with NMSLs

G2. Discontinue the LO/TO practice that allows the removal of LO/TOs at the beginning of a task without replacing the LO/TO until task completion, when the task is interrupted.

4. Attachments

I. Event and Causal Factor Chart (5 pages)

II. Documents Reviewed During Root Cause Analysis (4 pages)

III. Personnel Interviewed During Root Cause Analysis (1 page)

IV. Drawing From TIP 5 (1 page)

Lead Root Cause Analyst — J. A. McLaughlin — Date 11/23/94

Root Cause Analyst — R. S. Bird — Date

Root Cause Analyst — S. M. Lehman — Date 11/23/94

Root Cause Analyst — D. L. Mayfield — Date 11/23/94

Root Cause Analyst — E. R. Swanson — Date

Root Cause Analyst — T. J. Tegeler — Date 11-23-94

Responsible Manager — K. D. Stovall — Date 11/23/94

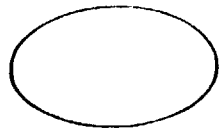
EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

Abbreviations

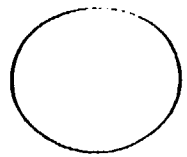
Bldg	-	Building
Crit	-	Criticality
DOE	-	Department of Energy
GB	-	Glovebox
g/l	-	Grams per Liter
Liq Sta	-	Liquid Stabilization
LO/TO	-	Lockout/Tagout
L/U	-	Line-up
PEB	-	Pre-evolution Brief
PF	-	Production Foreman
PM	-	Production Manager
PS	-	Production Specialist
RCRA	-	Resource Conservation and Recovery Act
SM	-	Shift Manager
STA	-	Shift Technical Advisor
Tk	-	Tank
TIP	-	Task Information Package
4L	-	Four Liters

Legend

Items within rectangles represent events and are presented in chronological order. These events can precede the incident or occur after the incident.



Items within ovals are causal factors or conditions and contribute to the events to which they are linked.



Items within circles represent the incidents which occurred

Ovals, rectangles, or circles with dashed lines are presumptive conclusions

Solid arrows link events

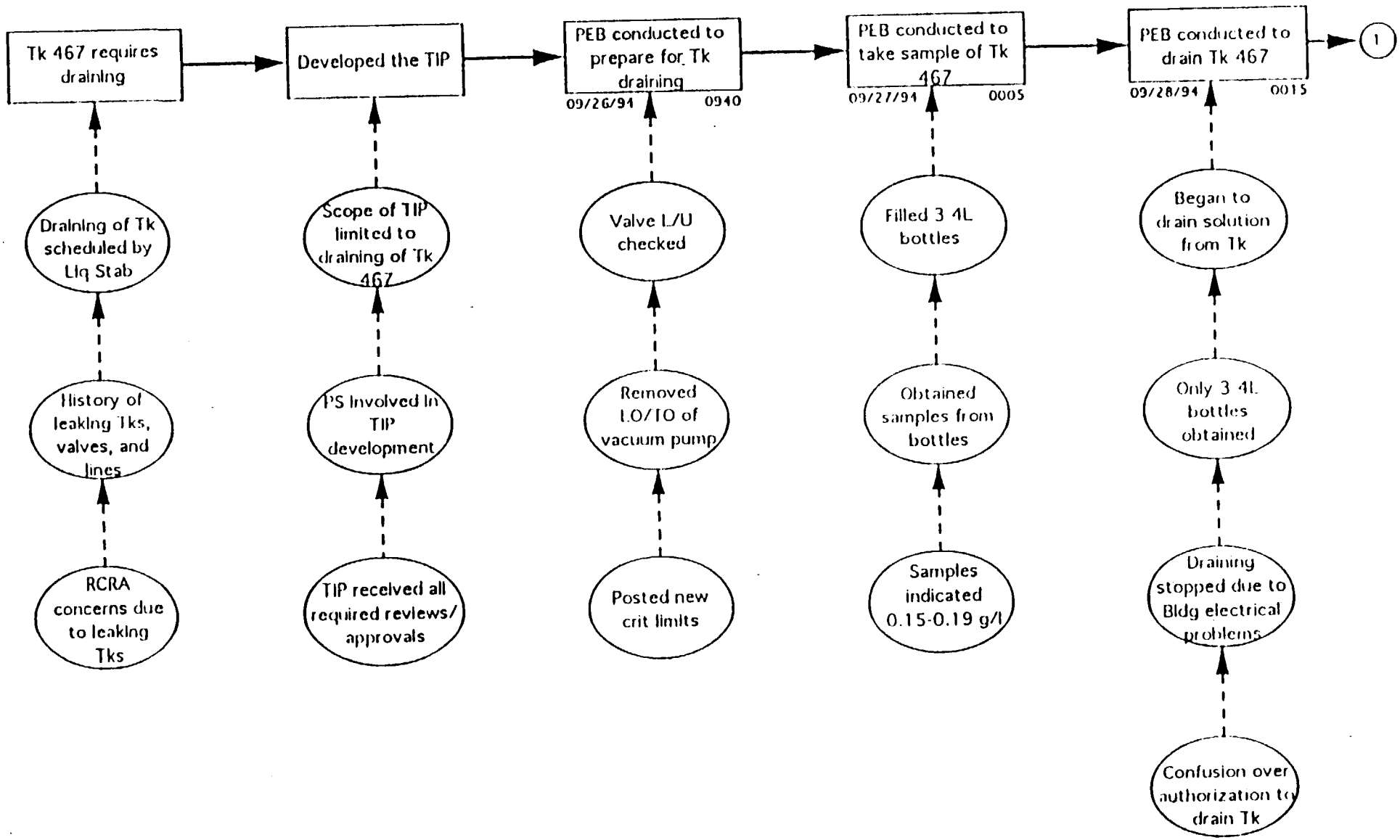
Dashed arrows link causal factors with events

A

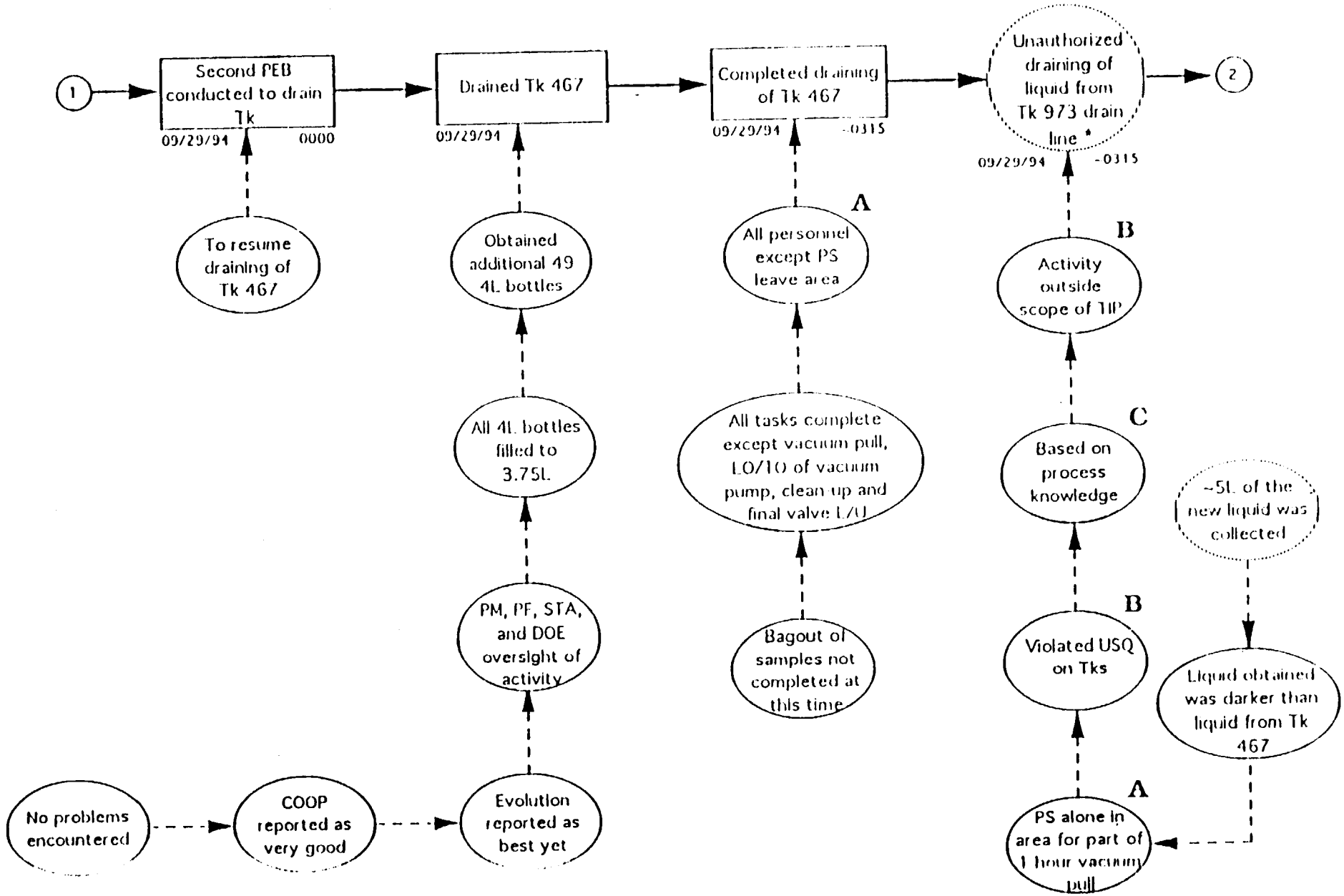
Causal factor selected for evaluation using the Root Cause Checklist. The letter corresponds to the specific Root Cause Checklist

ATTACHMENT 1

EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

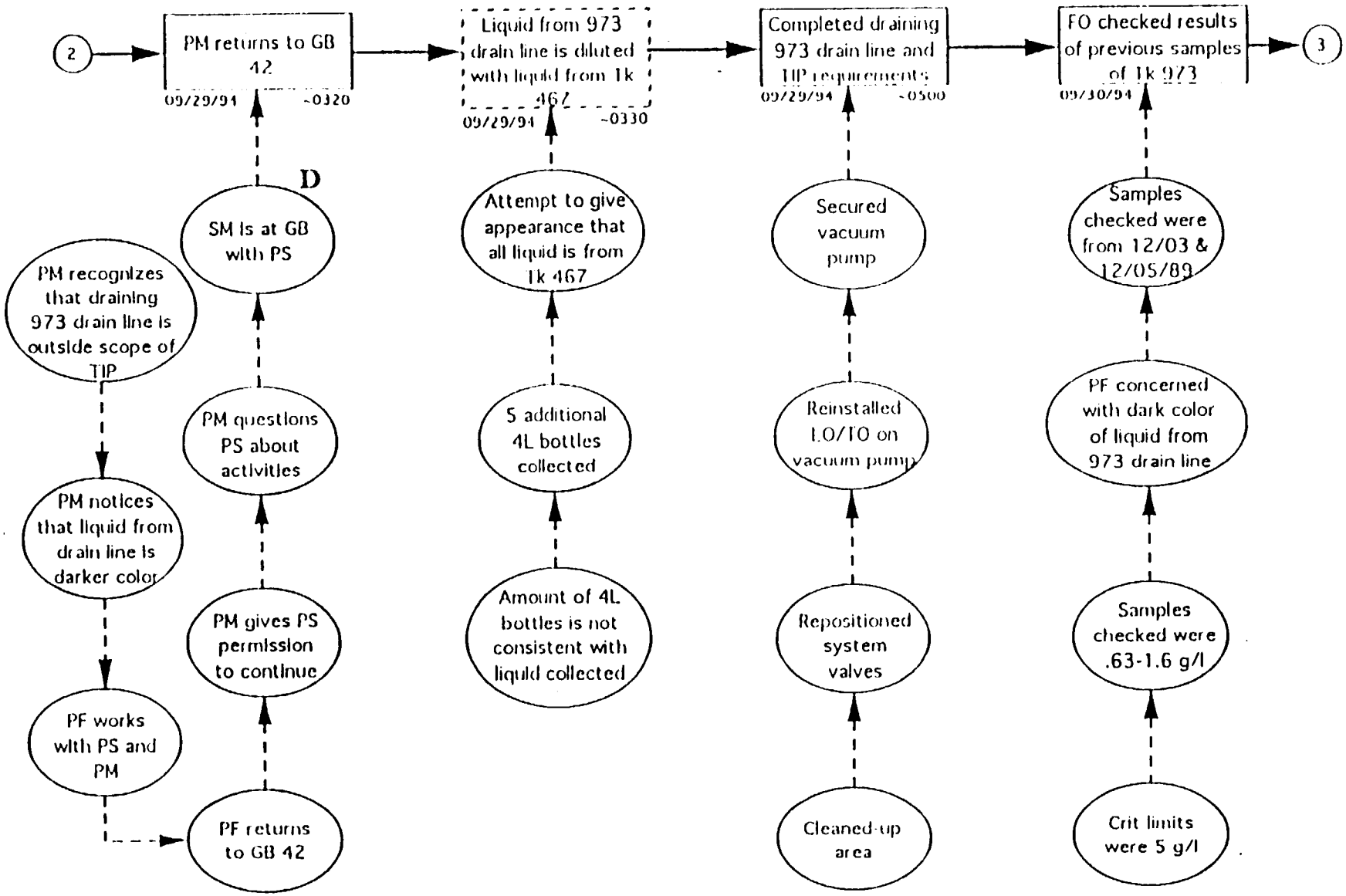


EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINII EVENT OF 09/29/94

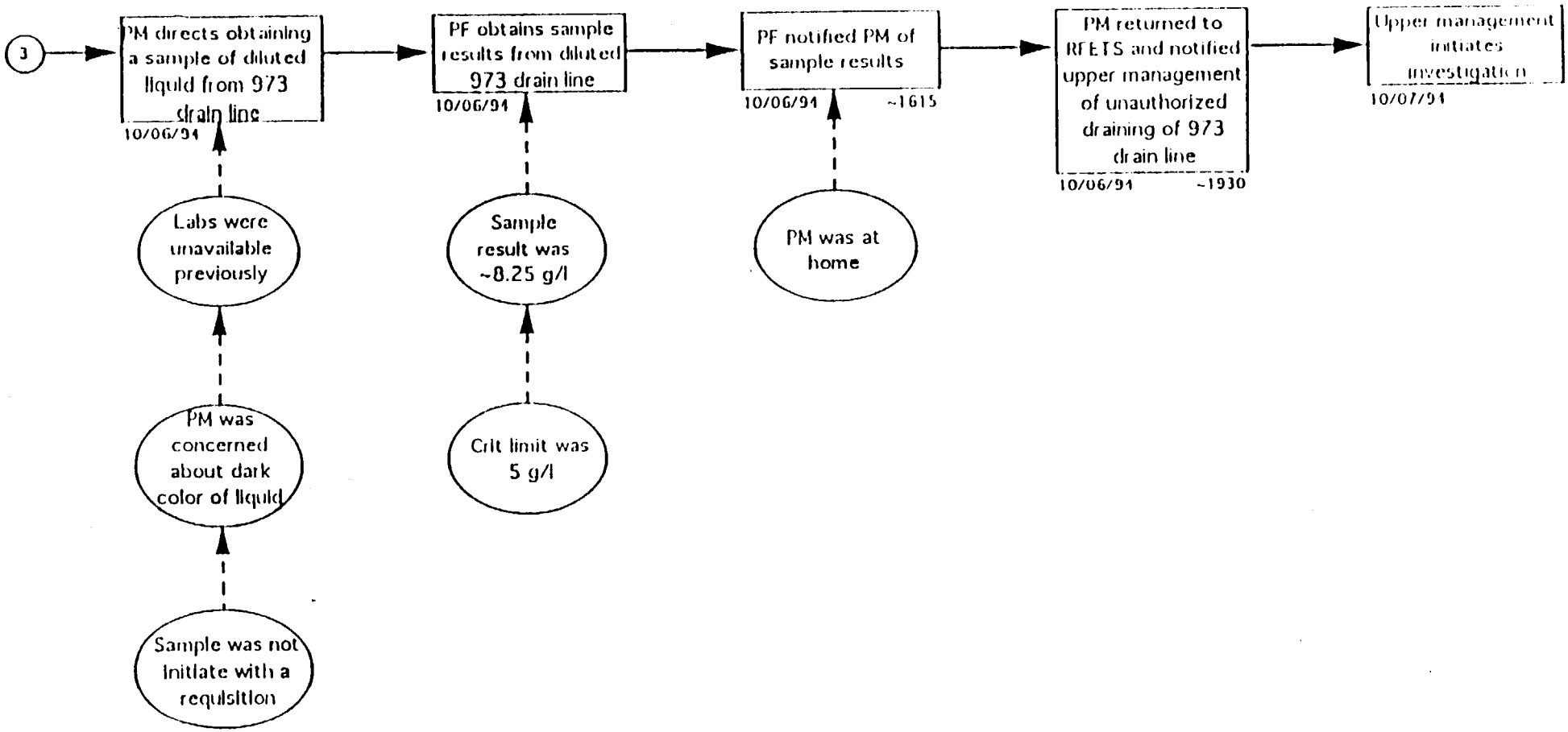


* Additional liquid assumed to be from 973 Tk drain line

BUILDING 771 TANK DRAININ[illegible] VENT OF 09/29/94



EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94



ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

1. Critique Meeting Attendance Sheet, Tracking Number 94-1490, T. Lepke-Critique Meeting Director, dated 10/07/94
2. Standing Order No. 34, Suspension of Fissile Material Movements, dated 10/07/94, Expires 04/07/95
3. Shift Superintendent's Daily Summary, dated 10/07/94
4. Shift Superintendent's Daily Summary, dated 10/08/94
5. Analytical Requisitions from 1989, for Tank D973:(52939, 52154, 52973, & 52251)
6. Figure 7, Appendix 6, from TIP No. 771-OPS-94-005
7. Occurrence Fact Sheet from D. C. Bailey with attachment, dated 10/06/94
8. Copy of the Building 771 Shift Manager Log for 10/06/94, from 1800 hours through 0301 hours on 10/07/94
9. Draft Critique Meeting Minutes, dated 10/07/94
10. Task Information Package No. 771-OPS-94-005, Transfer Solution from D-467 to Glovebox 42, approval date 09/16/94
11. Electronic Massaging to Mark Silverman, From Russell E. Fray, Corrective Actions for Occurrence 94-1490 (Tank D-467), dated 10/07/94
12. Occurrence Notification Report, RFO--EGGR-771OPS-1994-0062, dated 10/08/94
13. M. V. Mitchell ltr, MVM-037-94, to D. B. Hensley, Possible Nuclear Materials Safety Procedural Infraction Involving Glovebox 42, dated 10/08/94
14. D. M. Chavez ltr, (unsigned) to Lessons Learned, Procedural Violation-Line 42, dated 10/12/94
15. D. T. Jackson ltr, DTJ-173-94, to R. E. Frey, Administrative Inquiries Unit Report on Procedural Violation (Case 95-11), dated 10/12/94
16. Critique Meeting Minutes, Possible Criticality Infraction, Tank 467, dated 10/07/94
17. Corrective Action List, dated 10/12/94
18. R. E. Fray ltr, REF-107-94, to A. H. Burlingame, Summary of Building 771 Tank Draining Violations, dated 10/12/94
19. Hazardous Waste Management Storage/Treatment Tank Bi-Weekly Inspection Log Sheet, dated 09/93-09/94
20. Inspection Log Sheet For Mixed Residue Tank Systems, from 10/93 to 10/94
21. G. E. Francis ltr, GEF-042-94, to W. A. Kirby, Task Information Package (TIP) 771-OPS-94-003 Required Actions, dated 05/12/94
22. J. N. McKamy memo, to D. G. Satterwhite, My Personal "Gut Feel" Criticality Concerns at EG&G RF, dated 03/08/93
23. Lockout/Tagout Permit 25811, page 3 of 3
24. USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance with NMSLs/CSOLs RFO-EGGR-RFP-111993-0005 # 1310, dated 03/30/94
25. R. L. Moore ltr, RLM-013-94, to Distribution, Raschig Ring-Filled Tank Compliance with Compensatory Measures, dated 20/08/94
26. D. B. Hensley ltr, DBH-157-93, to W. A. Kirby, Controls on Raschig Ring Filled Tanks, dated 09/29/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

27. D. G. Satterwhite ltr, 94-RF-06669, to James C. Selan, DOE, RFFO, Isolation of Raschig Ring Tanks for Double Contingency with Respect to the Raschig Ring Unreviewed Safety Question Determination, dated 09/19/94
28. B. D. Larsen ltr, BDL-019-94, to R. L. Moore, Rashig Ring Tank Compensatory Measures B771/774, dated 02/11/94
29. Root Cause for 771 Questionnaire (Example)
30. Radiation Work Permit No. 94-771-00108, dated 07/12/94
31. Shift Superintendent's Daily Summary, dated 10/11/94
32. Shift Superintendent's Daily Summary, Page 1 of 2, dated 10/19/94
33. Shift Superintendent's Daily Summary, dated 10/27/94
34. RFO--EGGR-771OPS-1994-0062 10-Day Update Report, dated 10/27/94
35. M. N. Silverman ltr, 03641-RF-94, to A. H. Burlingame, Management of Nuclear and Criticality Safety Control, dated 09/22/94
36. R. S. Schmidt ltr, RSS-127-94, to R. E. Fray, Incependent Look Into The Building 771 Tank 467 Draining Incident, dated 10/31/94
37. R. E. Kell ltr, REK-593-94, to Distribution, Control of Valve and Switch Positions Important to Criticality Safety, dated 10/21/94
38. The Current Discipline System paper, dated 10/28/94
39. J. G. Davis ltr, JGD-1253-93, to W. A. Kirby, Annual Nuclear Criticality Safety Committee (NCSC) Appraisal of Building 771 Operations, dated 08/25/93
40. D. W. Ferrera ltr, DWF-970-94, to Distribution, Membership of Safety Review Board (SRB) Subcommittee for Material Movement Restart Plan Review, dated 10/20/94
41. 771/774 Operations Shift Orders, Number 771-93-046, Rev. 5, Suspension of Tank Activity, dated 07/13/94
42. USQD-771-94.1187-SDG, Transfer of Solution From D-467 to Glovebox 42, Task Information Package TIP 771-OPS-94-005, Rev. 0, dated 09/16/94
43. D. B. Hensley ltr, DBH-267-94, to Distribution, Authority to Supervise Evolution for TIP 22, dated 08/19/94
44. D. B. Hensley ltr, DBH-284-94, to Distribution, Authority to Supervise Evolution For TIP 22, dated 08/27/94
45. D. B. Hensley ltr, DBH-157-94, to Distribution, Designated Operations Management Oversight for TIP 003, dated 04/25/94
46. Appendix 8, TOP 771-OPS-94-003, Independent Verification Alignment Checklist, Valve Line-Up Sparging and Draining D-454, pages 8 and 9 of 10, dated 06/14/94
47. Appendix G, TIP# 771-OPS-94-008, Section 7.3, Initial Valve Line-Up, pages 1 & 2 of 5, dated 09/29/94
48. Plant Action Tracking System Location Query for Bldg. 771 Sorted by Prefix, Origin, Commitment, Plan No., page 278, dated 10/25/94
49. RFO--EGGR-771OPS-1992-0058, Final Occurrence Report, dated 10/01/94
50. RFO--EGGR-771OPS-1993-0096, 10-Day Update, dated 05/17/94
51. #31 Shift Manager Log Review for Trends Which Would Have Alerted Us, E. R. Swanson, dated 10/28/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

52. 771/774 Operations Order Number 00-771-09, Work Control Actions, dated 09/13/94
53. 771/774/886 Operations Organizational Structure, dated 08/11/94
54. J. Fox ltr, JF-25-94, to Distribution, Area Personnel For Buildings 771/774, dated 10/31/94
55. Time Card Review Data
56. Training Review Notes and Data
57. D. M. Chavez ltr, (unsigned) to Performance Assurance, Nuclear Criticality Potential in Glovebox 42 of Bldg. 771, dated 11/02/94
58. Criticality Safety Evaluation, NMSL Number: 940037, Evaluation Number: MFS-2 (UCNI)
59. K. D. Stovall ltr, KDS-205-94, to M.E. Amaral, Reporting and Discipline, dated 11/15/94
60. M.E. Amaral ltr, MEA-672-94 to K. D. Stovall, Reporting and Discipline, dated 11/17/94
61. D. E. Guthrie ltr to J. A. McLaughlin, Task: What Policies, Stancards, & Procedures Were Violated by Workers?, dated 11/10/94
62. Inside Energy, Grumoly Orders Shakedown After Criticality Scare at Rocky Flats, dated 10/31/94
63. M. N. Silverman ltr, 03641-RF-94, to A. H. Burlingame, Management of Nuclear and Criticality Safety Controls, dated 09/22/94 with responses (1) A. H. Burlingame ltr, 94-RF-10503, to M. N. Silverman, Management of Nuclear and Criticality Safety Controls, dated 10/14/94 and (2) R. E. Kell ltr, 94-RF-11219, to D. A. Brockman, Management of Nuclear and Criticality Safety Controls, dated 11/08/94
64. M. V. Mitchell ltr, MVM-038-94, to D. B. Hensley, Possible Nuclear Materials Safety Procedural Infraction Involving Glovebox D-2 in Building 771, dated 10/12/94
65. Substantive Notes of Safety Review Board Meeting No. 94-8, Pages 1 through 4 of 7, dated 08/15/94
66. D. B. Branch ltr, DBB-071-94, to Distribution, Mentor Report for the Period August 22, 1994 to September 23, 1994, Report Number Twenty-Eight, dated 09/23/94
67. D. B. Hensley ltr, DBH-161-94, to D. B. Branch, Conduct of Operations Implementation Plan for B-771, dated 05/16/94
68. Safeguards Measurements, Safeguards Measurements Holdup Team ltr, SMDA-94.098, to B. D. Larsen, Preliminary Measurement Results for Tank 467 in Bldg. 771, dated 08/09/94
69. H. P. Mann ltr, HPM-411-94, to D. W. Ferrera, Nuclear Criticality Safety Issues Detected Through EG&G Rocky Flats, Inc. Oversight Organizations, dated 05/09/94
70. D. W. Croucher ltr, NCSC-04-94, to Distribution, Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990, At the Rocky Flats Plant, dated 06/03/94
71. K. D. Stovall ltr, KDS-138-94, to D. W. Ferrera, Collective Significance Analysis of Criticality Safety Procecural Infractions 1990 Through 1993, dated 06/14/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

72. C. A. Finleon ltr, CAF-067-94, to S. D. Chestnut, Solution Accountability in Building 771, dated 11/10/94
73. D. P. Snyder ltr, DPS-139-94, to A. H. Burlingame, Review of Criticality Safety Related to System Configuration and Valve Lineups for TIP-005, Building 771, D-467 Tank Draining, dated 11/03/94
74. D. P. Snyder ltr, DPS-137-94, to A. H. Burlingame, Review of Criticality Safety Related to System Configuration and Valve Lineups for TIP-005, Building 771, D-467 Tank Draining, dated 11/02/94
75. D. P. Snyder ltr, DPS-138-94, to Distribution, Review of TIP-005, Building 771, D-467 Tank Draining, dated 11/01/94
76. Assessment Report, Assessment No. 94-0002, Building 771 Conduct of Operations, dated 03/07/94
77. Assessment Report, Assessment No. 94-0242, Annual Nuclear Criticality Safety Assessment of Building 771, dated 06/28/94
78. Information Only Lessons Learned, Lessons Learned Document Number: 10-94-009, Criticality Safety Procedural Infractions at Rocky Flats Plant, dated 06/28/94
79. M. E. Amaral ltr, MEA-235-94, to G. E. Marx, Disciplinary Actions, dated 04/08/94
80. D. C. Bailey ltr, (unsigned), to B. D. Larsen, Bottle Failure Report, dated 09/29/94

ATTACHMENT III
PERSONNEL INTERVIEWED DURING ROOT CAUSE ANALYSIS

Due to the sensitive nature of this analysis and the other simultaneous investigations into potential wrongdoing, the individuals interviewed during the conduct of this root cause analysis were promised anonymity. Therefore, the individuals interviewed during this analysis are not identified as part of this report. The Lead Root Cause Analyst will maintain a listing of those interviewed as part of the history file. The categories of individuals interviewed included the following:

- Three individuals directly involved in the unauthorized operation,
- Four Building 771 management personnel,
- Two operators not involved in the unauthorized operation,
- Three individuals involved in the development of TIP 5,
- Two DOE, RFFO Facility Representatives,
- One DOE, RFFO contractor, and
- Other individuals as required to establish the facts relating to the unauthorized operation and/or Building 771 controls.

ATTACHMENT IV - DRAWING FROM TIP-5

APPENDIX 6

Figure 2

TIP# 771-OPS-94-005

FOR INFORMATION ONLY

Evaluation of Generic Implications of Building 771 Incident

With the assistance of several senior staff members, the Director of Performance Assurance completed an evaluation of the generic implications of the Building 771 event involving unauthorized draining of a process line and subsequent concealment by three EG&G employees. The evaluation was performed to identify any broader implications that arise from the root and contributing causes of this event and to recommend corrective actions that should be taken to address the generic implications beyond those recommended in the Root Cause Analysis. The information that was collected by the team that performed the Root Cause Analysis, the Root Cause Analysis Report itself, and further information that was gathered by the Performance Assurance staff were considered during the evaluation of generic implications.

The four generic implications we have identified are discussed below, along with recommendations for corrective actions.

1. Lack of Acceptance of Conduct of Operations Principles

One of the major improvements at Rocky Flats over the past few years has been to introduce a standards-based approach to work performance. That approach is embodied in the site's Conduct of Operations Program. Information gathered in response to the Building 771 event indicates that there are some personnel in Building 771 and other former production buildings who are not prepared to adhere fully to Conduct of Operations principles and practices. These employees generally believe that they cannot rely on management outside of their work groups to assure their safety and well-being and that they must rely on their own resources and process knowledge to accomplish work and improve their working conditions. As a result, operations personnel sometimes state that they have more faith in the "process knowledge" of experienced personnel in their building than in strict adherence to new procedures to assure their safety. Their dissatisfaction with the procedures that they are supposed to use is compounded by a perception that the procedures sometimes do not reflect adequately the process and systems knowledge that workers in the buildings possess.

In summary, a number of factors contribute to some personnel in the former production buildings distrusting both the motives and level of knowledge of management. These personnel have not accepted the new standards-based approach to conducting work at Rocky Flats for the following reasons:

- With regard specifically to Building 771, the 1989 curtailment directive resulted in the stoppage of all production processes using plutonium in the building without providing for an orderly and planned shutdown. Given the conditions in the building at the time, the "stop-in-place" shutdown was perceived by many workers in Building 771 to have disregarded consideration of their health and safety.

- A conviction on the part of some individuals that the approach they used to conduct activities in the production buildings prior to the FBI raid was good enough, given the success in the national defense mission that was achieved using that approach. The approach relied heavily on knowledge of the various processes and involved a minimum of formal procedures and paperwork.

- A conviction that the accomplishments of the past and the knowledge and skills of the workers were ignored and that they were treated with disrespect by some outside personnel brought to the site during the 1990-91 time frame.

- Failure by workers and management to reconcile the two cultures now found at Rocky Flats. Without the new culture for Conduct of Operations, work cannot go forward. Without process knowledge, the new Conduct of Operations is hollow. In reality, the two cultures are mutually dependent upon one another, but this fact has not been made clear to or been well understood by workers and managers in nonresumption buildings.

- Distrust of both the motives and level of knowledge of senior management because they inadequately communicated the basis for their decision to target Buildings 559 and 707 for initial resumption activities that first ignored and then stripped resources from higher risk facilities such as Building 771. The workforce did not understand that Buildings 559 and 707 resumption efforts were to provide a template for other buildings and that management intended to rapidly move toward resumption of Building 771 and other buildings after Buildings 559 and 707 were up and running. This issue was exacerbated by the fact that, because of the intense focus of resources on Buildings 559 and 707, personnel in other buildings received little of the training that was ultimately determined to be necessary to achieve success in the new Conduct of Operations culture. Unlike Buildings 559 and 707, the old and new cultures in the nonresumption buildings were not forced to work together and come to grips with their mutual dependence upon each other as part of a resumption effort.

- The long-standing national defense mission of the plant was determined to be obsolete due to emerging international events. Decisions being made about new missions often occur outside of the plant and lead to divisions among personnel at the site. Many employees believe there is no common purpose for activities conducted at the site.

- Dissatisfaction with the new procedures because they sometimes do not reflect adequately the status of equipment or the process knowledge possessed by the personnel in the buildings. Failure to adequately incorporate process and equipment status knowledge results in incorrect or difficult-to-use procedures.

- A failure of the workers to accept that they have a responsibility to make the new approach for Conduct of Operations work. The workforce must be actively involved to assure that process and status knowledge are incorporated in new procedures.

- A belief that at least some members of management, including senior management, are not themselves fully committed to Conduct of Operations principles. This belief results from perceptions that some managers fail to consistently follow procedures.

- A belief, common to DOE sites, that M&O contractors and their management styles come and go, but site culture and process knowledge endure.

The generic implication of these conditions can be stated as follows:

> Management and operations personnel have failed to achieve an acceptable process for conducting work that incorporates both Conduct of Operations principles and process knowledge. Due to their perception that some work control documentation (procedures, TIPs, etc.) is inadequate, some workers continue to rely on "process knowledge" rather than procedures as the principal basis for their safety. As a result, the potential exists for additional events to occur where failure to follow Conduct of Operations principles leads to unsafe conditions.

Recommendations:

1.1 Based on the results of the survey, in Corrective Action S.3 of the Root Cause Analysis, design and implement team building exercises to achieve a method for developing and implementing procedures, work instructions, and work practices, acceptable to management and workers, that fully reflect process and equipment status knowledge. This recommendation should be implemented in connection with Corrective Action S.1 of the Root Cause Analysis.

1.2 Institute training in situational ethics for all employees of Rocky Flats Environmental Technology Site. This training will aid personnel in making ethical choices in a complex, highly regulated, industrial environment controlled by overlapping and sometimes conflicting technical standards.

2. Ineffective Management Actions in Resolving Identified Problems

Several internal and external assessments of site activities have cited failure of management to take effective corrective action for identified deficiencies as a recurring problem. These assessments include the Root Cause Analysis of Special Nuclear Material Storage Nonconformances at Rocky Flats in August 1993, an EG&G Corporate review of operations in April 1994, a DOE, RFFO QA assessment in October 1994, and an in-process independent QA assessment expected to be completed in November 1994.

This Root Cause Analysis and a review of related data similarly highlighted instances where management has failed to take effective corrective action for previously identified events or circumstances that had characteristics similar to those which contributed to the events in Building 771.

- The Root Cause Analysis for this unauthorized solution draining event describes several situations where problems in the site's nuclear safety program have been identified in the recent past. Despite attention by high level management oversight organizations, including the Nuclear Criticality Safety Committee and the Safety Review Board, many of the discrepancies remain unresolved.

- A review of occurrence reports for Building 771 identified two past events involving deficiencies which indicate weaknesses in implementation of required programs (Occurrence Reports RFO-EGGR-771OP-1992-0058, a Nuclear Material Safety Limit violation which occurred because bottles containing plutonium solution were improperly spaced; and RFO-EGGR-771OP-1993-0096, proper procedures were not followed when transferring Special Nuclear Material (SNM) from Room 159 to Room 146, Building 771). More effective corrective actions for these occurrences may have prevented the unauthorized solution draining activities on September 29, 1994.

- Review of the site's Issues Management system identified a number of category 2 issues that relate to implementation weaknesses in the criticality safety program that have not been corrected in a timely manner.

Based on the foregoing, there appear to be two generic problems to be addressed in the area of management effectiveness:

1. A number of issues with characteristics similar to those which contributed to this event had been identified through the various problem reporting, audit and assessment, and corrective action programs. Management had not assured that effective corrective actions were taken.

2. The several management oversight organizations, including the Nuclear Criticality Safety Committee, the Safety Review Board and the Executive Safety Committee, have not adequately supported management in assuring that effective corrections are implemented.

The net result is less than adequate and timely corrective action, leading to recurring safety problems.

A contributing factor to both of these issues is a historical lack of effective tracking and trending of deficiencies and generation and use of associated performance indicators. As part of New Directions, EG&G has been aggressively pursuing the development of effective Performance Indicators with significant success. When these indicators are fully in place and mature, they will better focus management attention on key problem areas and facilitate timely corrective actions.

The generic implications of this situation are as follows:

> *Management's failure to assure effective and timely corrective actions and the failure of the site's senior safety oversight committees to adequately support management in assuring effective corrective actions are implemented increase the likelihood of potentially unsafe conditions.*

Recommendations:

2.1 Redefine and strengthen the safety oversight functions of the Safety Review Board, Nuclear Criticality Safety Committee, and Executive Safety Committee, and monitor effective implementation of these functions.

2.2 Institute a monthly line management review of the effectiveness of corrective actions for significant conditions adverse to quality, safety, and environmental protection.

3. Additional Types of Hazards Warranting Management Attention

The potential hazard that existed in the specific case of the Building 771 solution draining incident was a criticality safety hazard. There are several other types of hazards that exist at the site, including, but not limited to fire hazards, electrical hazards, occupational safety hazards, pressure hazards, radiological hazards, toxic chemical hazards, and environmental insult. The root causes of the Building 771 solution draining incident could lead to unsatisfactory conditions or practices for the programs that control these other hazards. This conclusion gives rise to the following generic implication:

> *The site's programs that control other types of hazards, including, but not limited to fire hazards, electrical hazards, occupational safety hazards, pressure hazards, radiological hazards, toxic chemical hazards, and environmental insult, may not be operating effectively due to inadequate implementation of Conduct of Operations.*

Recommendations:

3.1 Provide early dissemination of the circumstances, root causes, and recommendations connected with this Building 771 solution draining incident to program managers responsible for these other hazards, specifically, and to site personnel, generally.

3.2 After completion of the team building exercises and survey in recommendations S.1 and S.3 of the Root Cause Analysis and 1.1 of this Generic Implications Evaluation, apply lessons learned to other safety and environmental compliance programs at Rocky Flats.

4. Inadequate Discipline in and Process for Creating and Maintaining Authorization Bases

Review of the conditions surrounding this Building 771 incident and other incidents that have occurred leads to the conclusion that the site continues to suffer from inadequate discipline in and process for creating and maintaining authorization bases for conducting work. Some specific examples are listed below:

- The TIP process is implemented in Building 771 in a manner that lacks the discipline intended by the site's Level 1 procedure development and implementation processes. For example, TIP implementation in Building 771 allows management to modify TIPs in the field without benefit of a review of the proposed changes by personnel or disciplines who prepared the original TIP. This violates a fundamental safety principle of defense in depth. In the case of TIP 5, valve lineups were changed in the field that had been previously relied upon in the criticality safety analysis for the activity. In addition, TIP 5 contained no evidence that prerequisites were verified as new daily operations started. TIP 5 did not require reimplementation of the lockout/tagout required as a compensatory measure for a USQD at the end of each daily operation.

- An Unreviewed Safety Question Determination (USQD) was written for TIP 5 that did not acknowledge the need for controls that were specified in another USQD for Raschig Ring Tanks.

- Although the TIP process is perceived to be less formal than the procedure process, the TIP process contains most of the same safeguards. However, guidance on TIP implementation is not consistent and the TIP generation procedure (APNO-12) is out of date. Both of these conditions reflect a lack of discipline with respect to the authorization basis.

- Occasionally, Shift Orders, Operations Orders, and management letters are being used as part of the authorization basis in ways that were not intended. More formal documents such as procedures are the appropriate mechanism in most cases. The use of these less formal documents apparently arises from the belief that it takes too much effort and time to develop procedures.

- Criticality engineers report that the requirement to validate assumptions used in nuclear criticality safety analyses has been replaced by a requirement for operations personnel to concur with the overall criticality safety physical and administrative controls specified for an activity. This change in practice was designed to increase the efficiency of the process, but it reduces specific attention to technical bases for criticality safety.

- An assumption used in developing the criticality safety analysis for Building 771 solution draining per TIP 5 was that the Conduct of Operations Program was implemented in the building. This assumption was used, in part, to justify the use of administrative controls in lieu of physical controls of the boundary conditions on TIP 5 operations.

- Criticality safety engineers say they have been encouraged to specify administrative controls rather than physical controls due to cost and schedule implications and because of the one-time nature of many of the operations they evaluate.

One of the key objectives of the resumption program was to establish an adequate and documented authorization basis for hazardous activities. For the buildings that completed resumption, revised OSRs and various procedures were used to assure that the authorization basis was maintained once established. For a variety of reasons consistent with the site's new mission, we have relaxed our approach to authorization basis for the nonresumption buildings and have been evolving toward a formal activity-based planning approach, which is targeted for future implementation. Activity-based planning includes performing hazards analyses and preparing an

appropriate activity control envelope. Activity-based planning will consistently incorporate the development of appropriate authorization bases for activities; however, its implementation will require a degree of discipline not currently being displayed.

The generic implications of this situation are as follows:

> *The lack of discipline in and process for establishing and maintaining appropriate authorization bases for hazardous activities increases the probability of safety controls being inadequately specified or being violated during the conduct of these activities. This lack of discipline and process increases the probability of occurrence of incidents such as the Building 771 unauthorized solution draining incident.*

Recommendations:

4.1 Complete development of and implement a formal activity-based planning process for authorizing high risk or high priority work at Rocky Flats.

4.2 Improve processes for confirming building status is in compliance with the approved authorization basis including not only the Final Safety Analysis Report (FSAR), but also Unreviewed Safety Question Determination (USQD), Justification for Continued Operations (JCO), Standing Orders, Shift Orders, etc., and maintaining conformance during authorized work.

4.3 In the interim, until recommendations 4.1 and 4.2 in this evaluation and B.1 of the Root Cause Analysis are implemented, there should be additional protection against deliberate violations of safety requirements. This additional protection should be provided by requiring the presence of supervision and the use of physical barriers or other measures to ensure that safety is maintained and authorization basis is adhered to throughout all operations and activities of significant risk or priority involving fissile materials.

SUMMARY OF CAUSES, GENERIC IMPLICATIONS, AND ASSOCIATED RECOMMENDATIONS

Causes & Implications	Corrective Actions	Priority*
Summary Root Cause: Conduct of Operations (COOP) was less than adequate.	S.1 Team building with workers, experts, and managers.	Short Term
	S.2 Increase senior manager presence during operations.	Immediate
	S.3 Survey opinions, practices, attitudes, and behavior regarding COOP and implement recommendations.	Short Term
Root Cause A: Performance of task was less than adequate.	A.1 Enhance training on nuclear criticality safety.	Immediate & Short Term
	A.2 Increase effectiveness of COOP implementation and procedures.	Long Term
Root Cause B: Supervision of work was less than adequate.	B.1 Develop and implement guidance for minimum levels of supervision.	Short Term
	B.2 Increase independent safety oversight of high risk operations to monitor effectiveness of supervision.	Immediate
	B.3 Improve senior managers' training of lower level managers.	Long Term
	B.4 Consider knowledge of and commitment to COOP as part of qualification process.	Immediate
Root Cause C: Inadequate barriers and controls were established in work control document (TIP 5).	C.1 Do not assume COOP is fully implemented in writing work control documents.	Immediate

Causes & Implications	Corrective Actions	Priority*
	C.2 Emphasize use of physical barriers, supervision and independent oversight for high risk/priority activities.	Immediate
	C.3 Re-evaluate adequacy of compensatory measures for USQDs.	Immediate
	C.4 Assure RCRA compliance integrated into work controls.	Immediate
Contributing Cause D: Ineffective corrective action for previously identified weaknesses.	D1. Complete actions already underway to modify corrective action program, and train people in the revised program.	Short Term
	D2. Develop performance indicators for managers to evaluate their performance in driving high priority issues to closure.	Short Term
Contributing Cause E: Participants had expired qualifications.	E. Assure trained and qualified personnel assigned to operations.	Immediate
Potential Problem F: Perception of inconsistent discipline may hinder reporting of safety information.	F.1 Analyze consistency of disciplinary actions and implement identified actions.	Short Term
	F.2 Assure understanding of accountability for adherence to requirements, including "no fault" reporting of safety information.	Short Term
Potential Problem G: Removal of Lockout/Tagout (LO/TO) was not in compliance with compensatory measures for USQD.	G.1 Evaluate and improve, as required, compensatory measures for USQD-RFP-93.1503-GLS.	Immediate
	G.2 Discontinue current LO/TO practice for interrupted activities.	Immediate

Causes & Implications	Corrective Actions	Priority*
Generic Implication 1: Lack of acceptable process for conducting work which effectively combines COOP principles and process knowledge.	1.1 Team building exercises to implement lessons learned from survey in S.3. Combine with actions under S.1.	Long Term
	1.2 Institute situational ethics training.	Long Term
Generic Implication 2: Ineffective implementation of corrective action.	2.1 Redefine, strengthen, and monitor safety oversight functions of SRB, NCSC, and ESC.	Short Term
	2.2 Institute monthly line management review of corrective action implementation.	Short Term
Generic Implication 3: Other types of hazards warrant attention for COOP weaknesses.	3.1 Disseminate information about this event to program managers and other site personnel.	Short Term
	3.2 Apply lessons learned from S.1, S.3, and 1.1 to other types of hazards.	Long Term
Generic Implication 4: Absence of discipline in and process for creating and maintaining authorization bases.	4.1 Develop and implement activity-based planning process.	Short Term
	4.2 Improve processes for maintaining building status in compliance with approved authorization bases.	Short Term
	4.3 Implement protection against knowing and intentional violation of safety requirements until other improvements are implemented.	Immediate

*Priorities are defined as follows: Immediate means before restart of activities suspended by Standing Order 34; Short Term means as soon as practicable within 6 months from this date; and Long Term means as soon as practicable within 12 months from this date.

SCIENTECH, INC.

[illegible] BLVD SUITE 225 ■ GOLDEN COLORADO 80401 ■ PHONE 303-278-4338 ■ FAX 303-278-0092

November 23, 1994

Anson H. Burlingame
President
EG&G Rocky Flats, Inc.
P.O. Box 464

Subject: RJM-32-94: Review of Root Cause Analysis and Generic Implications Evaluation

Dear Mr. Burlingame:

At the Request of your Safety Review Board (SRB), I was asked to review the Root Cause Analysis and implementation of associated corrective actions regarding the unauthorized draining of plutonium solution in Building 771 on September 29, 1994. This letter is to tell you and the SRB of the results of my review of the Root Cause Analysis and the Evaluation of Generic Implications of that incident, which are being transmitted to you by William Glover, Director of Performance Assurance.

The Root Cause Analysis and the Evaluation of Generic Implications were both conducted in an open and thorough manner, consistent with practice in the nuclear industry. The casual factors, generic implications, and related recommendations identified in the evaluations are complete and well considered. Effective implementation of the recommendations should preclude further incidents of this type and will also assist implementation of an improved conduct of operations culture at Rocky Flats.

A return to plutonium handling operations should be possible in the very near term with implementation of recommendations outlined by Mr. Glover. This is possible because he has effectively dealt with the central need for improvement identified by this incident. That is, there is a need for additional protection against deliberate acts by individuals conducted outside of approved operations. The additional protection needed for a return to operations in the immediate future will be provided by the items so identified by Mr. Glover.

I also call your attention to the longer term corrective actions recommended as a result of this incident. The most important of these actions will lead to a reconciliation of the two cultures that have struggled with one another for

the past several years at Rocky Flats. It is now clear to me that conduct of operations that does not effectively account for process knowledge will fail. Just as we have known since 1990 that proceeding without conduct of operations is unacceptable, so now we know that proceeding without reconciliation of process knowledge is unacceptable. Over the longer term we must unite the two cultures, as we did in Buildings 559 and 707. Obviously, the challenge is to achieve that goal with improved efficiency.

Finally, I call your attention to the idea of "no fault" reporting of new safety information that is contained in the recommendations of the Root Cause Analysis. At this stage of the maturation of safety culture at Rocky Flats it is imperative that this idea be give prominence and full management support. It appears from the Root Cause Analysis that workers and managers are not clear in their minds that new safety information must be reported candidly and rapidly whenever it occurs. Experience of the Federal Aviation Administration showed the way for the commercial nuclear industry in this policy area. That experience taught us that there must be immunity from punishment for anyone that reports new safety information. As we progress along this road at Rocky Flats, we will also learn, as have others before us, that we must teach people not to correct their own mistakes. But first, and foremost, we must teach them not to hide their mistakes.

I will continue in my assignment with the SRB to assist in implementation of the recommendations of these evaluations. If you have any questions, please call me at (303)278-4338. Thank you for the opportunity to be of service.

Sincerely,

Roger J. Mattson

Roger J. Mattson, Ph.D.
Senior Vice President

cc: William Glover
Art Geis
Dennis Ferrera
Kevin Stovall
Root Cause Analysis Team

File: 4506-001

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: W. S. Glover, Performance Assurance, Bldg. 111, X6310

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-268-94

I have reviewed the subject root cause analysis which you forwarded to me on November 23, 1994. You and your team are to be commended for a thorough and insightful evaluation.

By separate correspondence I am directing the Senior Review Board (SRB) to continue to analyze the issues related to this incident, to track and trend through the use of performance indicators the issues identified in your root cause analysis, and to provide recommendations for closure of all of the corrective actions related to this incident.

I request that you work with the Director of Organizational Effectiveness to proceed with the Employee Survey contained in Recommendation S.3. This survey should be conducted for all personnel who routinely perform work in Buildings 559, 707, 779, 776/777, 771, 371, and 886. When you have completed that survey I request that you provide me with a recommendation concerning expanding the survey sitewide. I also request that you compare the results of this survey with a similar survey that was conducted in 1992 and evaluate the trends indicated by such an evaluation.

Again, I commend you and your team for a job well done.

plh

cc:
R. S. Bird
J. A. Geis
W. S. Glover
S. M. Lehman
D. Mayfield
M. M. McDonald
J. A. McLaughlin
K. E. Rocky
L. C. Smith
K. D. Stovall
E. R. Swanson
T. J. Tegler

This analysis should not be viewed as an indictment of the progress that has been made over the last five years at Rocky Flats in implementing the principles of Conduct of Operations. Rather, it should be used as a valuable tool to help us further improve in all areas of our operations.

plh

Attachment:
As Stated

cc:
J. G. Davis
D. W. Ferrera
R. E. Fray
J. A. Geis
W. S. Glover
P. M. Golan
T. J. Healy
T. G. Hecahl
D. T. Jackson
R. E. Kell
G. E. Marx
M. M. McDonald
G. McKenna
J. G. Paukert
V. M. Pizzuto
J. K. Schwartz
S. G. Stiger
G. M. Voorheis

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: Distribution

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-269-94

Attachment (1) is a thoughtful and insightful analysis into the criticality infraction incident in Building 771 that occurred on September 29, 1994. I want to ensure that this analysis receives the broadest possible review by EG&G Rocky Flats personnel. Accordingly, you are requested to include this root cause analysis in your required reading program. Additionally, you should ensure that this analysis is briefed to all personnel within your organization.

By separate correspondence I have directed the Safety Review Board (SRB) to control the corrective actions resulting from this incident. Such corrective actions falls into three distinctive phases. They are:

(a) Restart of Suspended Operations in the near-term

(b) Further improvement over the next few months in our processes used to control work at Rocky Flats

(c) Developing facts related to the "safety culture" and taking longer term actions to improve that culture

Your briefings on this root cause analysis should emphasize that the direct cause of this incident was a willful and knowing violation of the principles of Conduct of Operations and an intentional non-disclosure of such violations for a period of seven days. You should emphasize that such actions cannot and will not be tolerated.

The root cause analysis appropriately goes far beyond this immediate cause and provides insightful recommendations to further improve our ability to safely conduct work at Rocky Flats. These recommendations are applicable sitewide using the graded approach.

In particular, you should make it clear that we cannot conduct operations at Rocky flats unless the principles of Conduct of Operations are followed. However, you should also emphasize that applying Conduct of Operations in the absence of "process knowledge" is a hollow effort that will ultimately fail.

Principal Technical Advisor assume the permanent positions as Co-Chairmen of the SRB. This action is being initiated in order to provide very senior personnel that do not have day-to-day line management responsibilities in leadership positions of the SRB. They will have the experience to deal with and the time to devote to the complex issues being confronted by the SRB.

I am concerned with the apparent continuing inability to effectively and efficiently close all issues related to nuclear safety. It is clear that better teamwork and leadership is needed between senior nuclear safety and operations personnel to improve in this area. I request that the SRB give this issue strong attention.

Line organizations have implemented recent improvements in the manner in which performance indicators are used to track and trend operations at Rocky Flats. The root cause analysis suggests that improved use of performance indicators by the SRB and its subcommittees could provide precursors of future mistakes and allow management to take corrective action before such mistakes occur. I request that the SRB take immediate action to enhance this important area.

I am particularly pleased with the manner in which the subcommittee to the SRB has managed recent restart activities. I encourage the SRB to consider the use of additional subcommittees (virtual teams) in future activities.

As noted in Generic Implication (3), additional management attention using the lessons learned from the incident in 771 should be taken to control other types of hazards. Using the graded approach the SRB should carefully evaluate how to deal with this issue.

The actions requested herein, are intended to further improve on an already credible and effective effort by EG&G Rocky Flats senior managers. The actions in the past by this board have provided valuable advice and direction to all senior managers to improve in their individual areas of responsibility. These actions are intended to add additional value to an already capable process.

plh

cc:
D. W. Croucher
J. G. Davis
D. W. Ferrera
R. E. Fray
J. A. Geis
W. S. Glover
P. M. Golan
T. G. Hedahl
R. E. Kell
V. M. Pizzuto
D. J. Sanderstrom
S. G. Stiger
G. M. Voorhees

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: SRB Chairman

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-273-94

The subject analysis is hereby forwarded to you for further action by the Senior Review Board (SRB). Such action should include the following:

(a) Using this root cause analysis as a baseline, continue to analyze the issues related to this incident. Maintain a database of all such issues including the specific recommendations contained in the root cause analysis.

(b) Establish appropriate performance indicators (where applicable) and track and trend these issues to evaluate the effectiveness of the actions being taken.

(c) Provide recommendations to me for closure of all of the individual corrective actions, particularly those contained within the root cause analysis, related to this incident.

This root cause analysis, and particularly the Generic Implications Evaluation, are very thorough and insightful. The recommendations are sweeping and if fully and effectively implemented should cause further improvement in the ability to safely perform work at Rocky Flats. The root cause analysis recognizes three essential elements of action to be taken. They are:

(1) Restart of suspended operations which can be promptly undertaken with the application of appropriate compensatory measures in areas requiring further improvement.

(2) Concurrent with restart activities additional improvements can be achieved on actions that EG&G has progressively taken over the last 5 years to achieve the appropriate formality of operations.

(3) In the longer term, develop facts related to the "safety culture" at Rocky Flats and develop plans to effectively deal with this issue.

Your approach should recognize that restart activities can, with proper compensatory actions, proceed while the actions related to subparagraphs 2 and 3 above are being implemented.

The root cause analysis points out weaknesses in our ability to effectively close issues related, in this case to nuclear safety. However, I am concerned that this weakness is more broadly based than only the nuclear safety issue. Some of those weaknesses, I believe, are historic in nature, particularly those related to the Senior Oversight Committee. Recent improvements in the SRB process, particularly the actions related to restart of suspended activities, have been impressive. However, further improvement is needed and a better focus on addressing "non-crisis" issues on a routine basis is required. Accordingly, I request that, effective immediately, the Vice President for Standards and the Los Alamos

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: R. E. Fray

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-270-94

The subject root cause analysis leaves two issues directly related to operations under your responsibility that have not been fully addressed. They are:

(a) On September 29, 1994, the Shift Manager noted a darker colored liquid in a flask in glovebox 42. It is not clear what action he took to investigate or resolve his questions related to this liquid. I am concerned that the senior line manager in the facility may have noted an unusual condition and then failed to adequately follow up on his observations.

(b) The subject analysis also leaves unresolved the source of approximately 14.75 liters of liquid contained in the sixty four-liter bottles in glovebox 42.

You are requested to conduct a further review of these two issues and provide the Safety Review Board (SRB) your conclusions and the action that you will take based upon those conclusions.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: D. Jackson, Internal Audit, Bldg. 850, X2434

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-271-94

The subject root cause analysis identifies weaknesses in the manner in which your investigation of this incident was documented. This should not be viewed as a criticism of the professionalism of your investigators. Rather, I encourage you to consider ways to improve on an already credible investigative process. It is my understanding that the Federal Bureau of Investigation (FBI) provides field team training to assist organizations such as yours in conducting investigations of this nature.

I request that after you have reviewed this root cause analysis you develop a training program to further enhance your organization's investigative skills. I further request that you provide the Safety Review Board (SRB) with a written analysis of your review and the description of the actions that you will take in this regard.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: F. G. McKenna, General Counsel, Bldg. 111, X2342

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-272-94

The subject root cause analysis identifies two issues related to discipline at Rocky Flats that warrant further consideration. They are:

(a) Confirm that EG&G has a "no fault" policy related to reporting safety violations and that such a policy has prominence and full management support.

(b) Conduct a review of disciplinary actions taken over the last two years to identify potential inconsistencies and/or weaknesses in the disciplinary process.

I request that you take action to deal with both of these issues. With regard to the "no fault' policy please work closely with the EG&G consultant Dr. Roger Mattson. The commercial nuclear industry evidently has such a policy in place that may be applicable at Rocky Flats.

Please provide directly to me the results of your actions related to the above two issues as well as your recommendations for further improvements. Particularly with respect to your review of past disciplinary actions you should consider collecting and reporting such results as "privileged" information. Except in the case of "privileged" information, I request that you keep the SRB fully appraised of your actions in this matter.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

PRIVILEGED INFORMATION

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 3, 1994

TO: A. H. Burlingame, Building 111, X 4361

FROM: D. P. Snyder, Engineering & Safety Services, Bldg. 130, X5420 D P Snyder

SUBJECT: REVIEW OF CRITICALITY SAFETY RELATED TO SYSTEM CONFIGURATION AND VALVE LINEUPS FOR TIP-005, BUILDING 771, D-467 TANK DRAINING - DPS-139-94

Ref: D. P. Snyder ltr, DPS-137-94, to A. H. Burlingame, Same Subject, November 2, 1994

PURPOSE

The purpose of this memo is to replace the referenced letter and provide clarification concerning the Double Contingency Criticality Safety review of TIP-005, Building 771, Tank 467 draining.

DISCUSSION

I conducted a review of TIP-005 to determine if Double Contingency related to Criticality Safety existed. My review included walkdowns by Criticality Safety Engineering, table top reviews with Operations, Engineering and Criticality Safety and a personal review of the TIP-005 procedure.

The basic focus of my review was to understand what constitutes double contingency for TIP-005 in the eyes of Criticality Safety Engineering and to review the lineups and system diagrams to determine if these double contingency principles were adequately and accurately implemented.

In the simplest of terms, double contingency for credible criticality accident scenarios was established for activities that could potentially affect Raschig Rink tank solution transfers and for any activities within Glovebox 42, such as draining, sampling, storage, etc.

For activities that could potentially affect Raschig Ring tanks, double contingency included LO/TO of the vacuum system (motive force for solution transfer) and closing fill and drain valves and opening vent valves on affected tanks.

Double contingency during TIP-005 execution, when the vacuum system (motive force) was in operation, included closed drain and fill valves and open vent valves for tanks which could be affected. The second contingency was to further isolate the vacuum header to other Raschig Ring tanks. As a precaution, a physical watch was posted to observe liquid level on any tank which was not isolated by two valves.

Operations within Glovebox 42 were controlled by the posted NMSL.

CONCLUSION

TIP-005, as approved, provided Double Contingency for credible criticality accident scenarios.

Additionally, the TIP, as executed, ensured Double Contingency was achieved until the point when Process Operators commenced an unauthorized draining evolution beyond the scope of the approved procedure.

RESPONSE REQUIREMENTS
No response is required.

dgb

cc:
W. L. Coulter
R. E. Fray
W. S. Glover
D. B. Hensley
R. E. Kell
D. G. Satterwhite

ENCLOSURE 4

RESTART PLAN FOR HSP 31.11
BRUSHING AND REPACKAGING (BUILDING 707)

RESTART PLAN

for

HSP 31.11

BRUSHING and REPACKAGING

Revision 0 - 700 Area Only

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

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RESTART PLAN FOR HSP 31.11 BRUSHING AND REPACKAGING

INTRODUCTION

This Restart Plan is to reaffirm the safety culture and readiness for continuation of the brushing of oxide and repackaging of plutonium metal items which are currently out of compliance with Health and Safety Practices Manual, Section 31.11, "Transfer and Storage of Plutonium for Fire Safety", in order to mitigate the risk of a plutonium fire.

This activity, which is currently suspended under Standing Order 34 since October 7, 1994, has been in successful operation in Building 707 since May 1994 and has safely dispositioned 188 plutonium items. [Three additional items were safely dispositioned under this project in Building 779 in January 1994.] The suspension of this activity was taken as a precautionary measure in response to the Building 771 incident.

The plutonium material affected by this project is stored in Buildings 707, 771, 776/7, and 779. However, the brushing and repackaging activities are only planned to be performed in Building 707, a building which has a fully reviewed infrastructure as a result of recent Operational Readiness Reviews. The rigorous preparation of this building over the past four years provides a high confidence in its readiness and qualification to perform these activities. The material in the other buildings is only planned to be retrieved from storage and transferred to Building 707, in sealed containers, for processing, and then returned to the originating building for storage.

This Restart Plan documents the Core Requirements for Readiness Assessment, as described in DOE Order 5480.31, and the Criteria, Methodology, and Deliverables for each Requirement. All verification documentation in support of the Deliverables for this Plan are included as appendixes to this Plan as that documentation becomes available.

This plan is submitted as directed by A. H. Burlingame letter, AHB-209-94, dated October 12, 1994 .

This Readiness Assessment addresses each Root Cause and Contributing Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, dated October 16, 1994, as follows:

Root Cause A:

> Task performance was Less Than Adequate (LTA) in that one worker knowingly and willfully performed work outside and beyond the scope of Task Information Package (TIP) 5. Additionally, the worker's foreman and manager assisted in the activities and subsequent cover-up once they became aware of the unauthorized activities.

Response

As documented herein, all personnel involved with material handling operations will have been interviewed by management. Additionally, management and supervision will have been interviewed by upper management.These interviews will be conducted to ensure that everyone understands their responsibilities and that procedures must be followed, training is adequate, and that criticality safety is understood.

Root Cause B:

Supervision was LTA.

Response

The level of experience of personnel involved in this project is such that it leads us to be confident in the quality of management and supervision. This will be validated through the oral interview process.

Root Cause C:

Physical Barriers were (LTA)

Response

As noted in this plan, physical barriers will be verified as in place and supportive of the requirements as defined in the CSOL's/NMSL's.

1. Subject area

Readiness assessment for the continuation of HSP 31.11 brushing and repackaging activities in Building 707, including the transfer of material from Buildings 771, 776/777 and 779.

2. Purpose

Confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise plutonium brushing and packaging activities exhibit formality such that these activities are accomplished in a safe manner.

3. Hazard Category

Based on 1-H24-ADM-10.01, Startup and Restart of Nuclear Facilities, Appendix 4, this will be a restart from a "precaution pending review". Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope

In Building 707, where HSP 31.11 activities are performed, criticality safety is paramount. To ensure that brushing and repackaging activities are accomplished safely, the organizational infrastructure must be verified to be in place. This is accomplished by confirming the following infrastructure is in place to support HSP 31.11 brushing and repackaging:

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility safety
5. Activity supporting hardware systems
6. Crit. Safety deficiencies
7. CSAs/STCSs
8. Criticality Safety training
9. Criticality Safety drills
10. Functional test start-up
11. Knowledge of assignment
12. Conduct of Operations application
13. Sufficient numbers of qualified personnel
14. Safety awareness culture
15. Safety basis
16. Modifications incorporated into procedures
17. Technical and management qualifications

Buildings 771, 776/777 and 779 have material stored in them that must be transferred to Building 707 for brushing and repackaging. The assessment for Buildings 771, 776/777 and 779, in addition to the oral interviews, will include reviews of : (1) procedures, (2) CSOLs/NMSLs, (3) training and qualifications. No brushing and repackaging activities will be performed in Buildings 771, 776/777, and 779.

5. Schedule

The execution of this restart plan began on October 27, 1994, with a projected completion date of on or before November 23, 1994.

6. Assessment Specialists

Team members: R. C. Leonard (Team leader)
S. R. Badgett
R. J. Erfurdt
A. J. Holifield
E. L. Morgan
V. M. Pizzuto
P. Sasa
J. W. Stailing
G. W. Tasset
G. M. Voorheis

7. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

Criteria: Develop listing of required procedures, (see Appendix A)

Methodology: Document review

Deliverable: Documented verification that listed procedures are approved and available and that adequate safety controls are incorporated.
Actionee: W. S. Fleming

CORE REQUIREMENT 2:

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented.

Criteria: Develop listing of trained and qualified employees, by function, (see Appendix B)

Methodology: Records review per Training Users Manual (TUM)

Deliverable: Documented verification of adequate training/qualification (with dates for next training due) Actionee: D. M. Shaw

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Criteria: Conduct oral interviews that include a review of the Building 771 incident

Methodology: All-hands briefings (see Appendix C)
Management seminars (see Appendix D)
Individual interviews (see Appendix E)
Feedback sessions (see Appendix F)

Deliverable: Signed off interview questionnaires (with evaluations of sat/unsat) and attendance rosters.
Actionee: Assessment Team

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "Safety Envelope".

Criteria: Verify NSM 3.12 compliance

Methodology: Review of pre evolution briefing records

Deliverable: Documented verification of NSM 3.12 inclusion in pre evolution briefings. Actionee: R. S. Brown

Note: See additional safety basis documentation in Core Requirements 1, 5, and 15.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition and operability of safety systems, including safety related process systems and safety related utility systems. This includes examinations of records of tests and calibration of safety system and other instrumentation which monitor Limiting Conditions of Operations (LCO) or that satisfy Technical Safety Requirements (Operational safety requirements). All systems are currently operable and in a satisfactory condition. For the HSP 31.11 project, the focus of this requirement will be on Building 707 only.

Criteria:	Verify OSR compliance and surveillance requirements are met
Methodology:	Record reviews of applicable VSS LCO surveillances
Deliverable:	Documented verification of LCO surveillance compliance. Actionee: A. J. Holifield

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

Criteria:	Verify compliance thru Plant Action Tracking System
Methodology:	Records review
Deliverable:	Documented verification that Criticality Safety deficiencies have been dispositioned. Actionee: R. S. Brown

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

Criteria:	Verify thru Compliance Management Records
Methodology:	Records review
Deliverable:	Documented verification that nonconformances have been dispositioned. Actionee: S. Williams

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

Criteria: Verify that the POD and pre evolution briefings verify adequate management programs, sufficient numbers of qualified personnel, facilities and equipment.

Methodology: Records review

Deliverable: Documented verification that requirements have been met and are being maintained.. Additionally, provide documented verification that the most recent inventory of the Emergency Response cabinets (Best Team, Emergency Reentry and Spill Response cabinets) was completed and determined to be satisfactory. Actionee: D. M. Shaw

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented.

Criteria: Review of Building 707 Drill Plan

Methodology: Records review

Deliverable: Documented verification of criticality safety drill compliance. Actionee: S. R. Badgett

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators.

Criteria: Review of the Graded Start-up Test Program

Methodology: Document review

Deliverable: Documented verification that B707 is in compliance with the Graded Start-up Test Program requirements.
Actionee: A. J. Holifield

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities is adequate for operations.

Criteria: The necessary attributes of the Conduct of Operations Manual are applied to support the activity. These attributes include: Pre-evolution briefing, POD, LCO compliance, use of procedures and training/qualification of staff.

Methodology: Document review

Deliverable: Documented verification that the attributes of Conduct of Operations described above are in place and are satisfactorily implemented for HSP 31.11 activities, including, specifically, that the safety basis documentation that supports the activity has been confirmed to be fully implemented. Actionee: A. J. Holifield

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

Criteria: Reference Core Requirements 2 and 8

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

Criteria: Confirm that requirements were addressed and deemed adequate thru the Operational Readiness Review (ORR) for Building 707. (Not applicable to other 700 area buildings)

Methodology: Records review

Deliverable: Documented verification that building facility and procedure modifications are made in compliance with CCCP, COEM, IWCP and PPG requirements. Actionee: A. J. Holifield

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

Criteria: Reference Core Requirement 15

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

Criteria: Reference Core Requirement 3 and 2

8. Methodology

(See methodologies used in Section 7)

9. Operational Interfaces

Teams will be composed of Rocky Flats personnel

Clearances and other access requirements will be supported by Operations Manager

10. Restart Plan approval

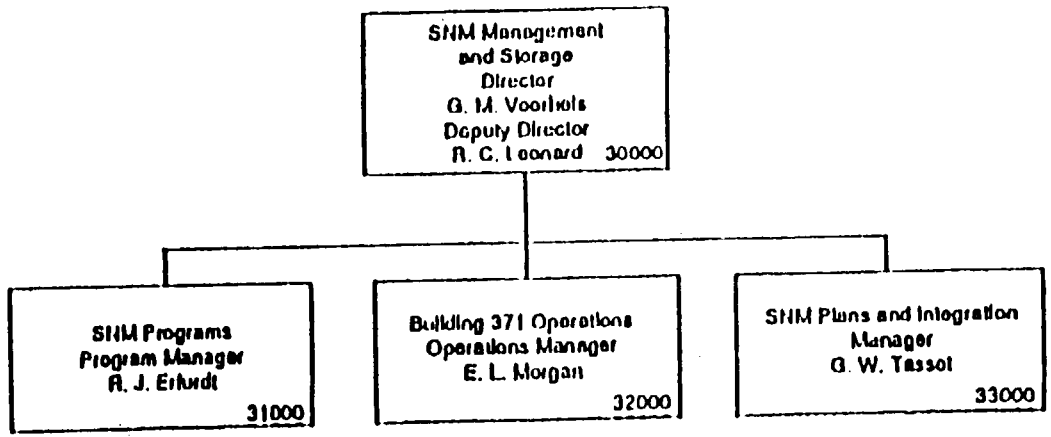
Submitted

G. M. Voorneis
Director, SNM Management and Storage

Submitted

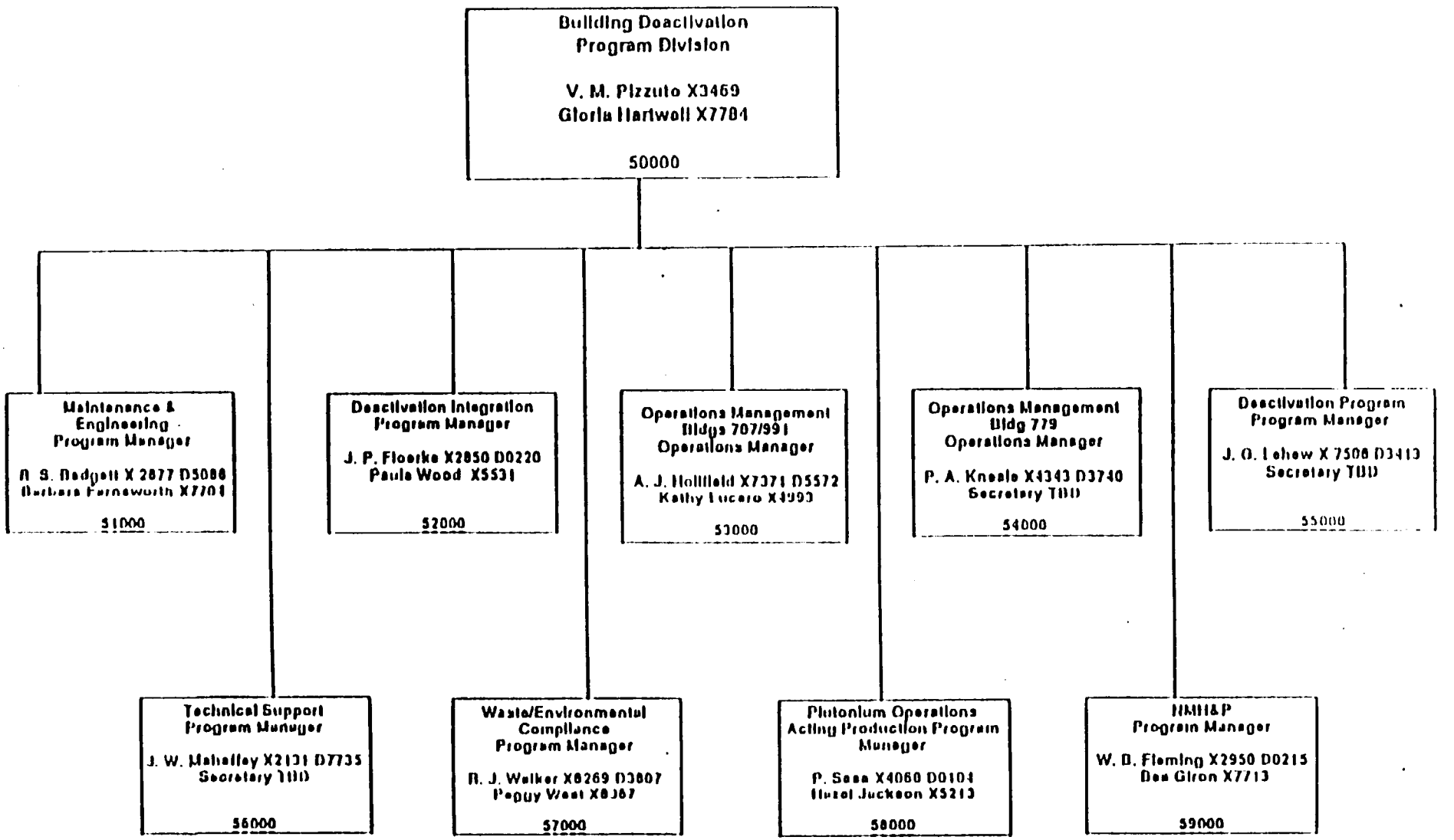
V. M. Pizzuto
Director, Building Deactivation

SNM MANAGEMENT AND STORAGE



BUILDING DEACTIVATION PROGRAM DIVISION
ORGANIZATION CHART

50000



Revised 6-22-94

APPENDIX A

Approved procedures in support of HSP 31.11 brushing and repackaging

Procedure #	Title
4-F89-FO-0002/Rev. 0	XY Retriever, Building 707
4-A82-FO-0077/Rev. 0	Parts cleaning/oxide removal, Building 707
4-30000-FO-0103/Rev. 0	Balances, Building 707/776/777
4-30000-FO-1023/Rev. 0	Gram estimation
4-32PFO-707-002/Rev. 0	Glovebox & XY Retriever differential pressure surveillances
FO-0001/Rev. 0	Decontamination
FO-0028/Rev. 0	Receiving and storing material, Building 707/777
FO-0078/Rev. 0	Transfer of material from Buildings 707 & 777
COOP-011/Rev. 0	Pre-Evolutionary briefings
4-B19-NSM-03.12/Rev. 0	Nuclear material safety limits and criticality safety limits surveillance
4-84300-FO-0018/Rev. 0	Material transfer and storage, Building 707, 776/777 & 779
4-B22-FO-0010/Rev. 0	Building 707 glovebox operations
FO-0020/Rev. 0	Chainveyor operations
4-D18-FO-0010/Rev. 0	Glovebox operations
1-63200-NMT-001/Rev. 0	Transfer of nuclear material between material access areas
NDA-0018/Rev. 0	Material transfer and storage, Buildings 771/371
NMS MT-004/Rev. 0	Nuclear material and drum transfer reports
NMS MT-007Rev. 0	Inter/intra material balance area
NMS MT-008/Rev. 0	Use of the 771/776 & 777/779 tunnels for the movement of nuclear material or equipment

Note: Procedures can be reviewed in the Building 707 SAC. Contact T. C. Adams at x3619. Any changes to procedures numbers/revisions and/or titles are reflected in the deliverable for Core Requirement 1.

APPENDIX B

Trained/Qualified employees that support HSP 31.11 brushing and repackaging

Employee name	Employee #	Group
R. A. Channel (B707)	503024	Task supv.
J. Q. Maes (B707)	512036	Ops. support
D. C. Brill (B707)	513792	"
J. J. Vontersch (B707)	514255	"
K. K. McTaggart (B707)	512500	"
J. F. Hahn (B707)	515962	"
J. C. Dockter (B707)	511953	Task supv.
E. B. Allen (B707)	512970	"
K. L. Newby (B707)	513409	Process spec.
S. Sterkel (B707)	513138	"
T. J. Pfarr (B707)	513322	"
W. A Averill (B779)	510210	Experimental ops.
D. C. Fisher (B779)	512760	Task supv.
S. R. Garrett (B779)	513082	Experimental ops.
R. S. George (B779)	504501	"
M. L. Jasper (B779)	513299	"
C. W. Kranker (B779)	503310	"
D. E. Oliver (B779)	513274	"
E. W. Pierson (B779)	506923	"
R. L. Schempf (B779)	512696	"
J. E. Woodward (B779)	507067	"
R. E. Hodgson (B771)	509220	Task supv.
J. D. Fenwick (B771)	513181	NDA operator
M. W. Phillips (B771)	514139	"

Note: Training/Qualification records can be reviewed in Building 060, contact E. L. McKee at x4160.

APPENDIX C (schedule)

All-hands briefing schedule (E707 personnel)

SHIFT	DATE	TIME	LOCATION
1	10/27/94	9:30 AM	750-A
3	11/1/94	6:30 AM	707 Conf. Room
2	11/3/94	3:30 PM	707 Conf. Room

Note: Briefings will be conducted by V.M. Pizzuto

Attendance can be verified against the list of employees from Appendix B

Building management will ensure that a minimum number of trained/qualified employees have been briefed prior to restart. No hands-on employee will participate in an evolution until he/she has completed the all-hands briefing.

APPENDIX D (schedule)

Management Seminars (Building 707)

NAME

B. E. Woolsey

R. L. Fiore

W. B. Fleming, Jr.

A. J. Holifield, Jr.

P. Sasa

R. D. Slaybaugh

DATE: 11/1/94

TIME: 1:30 PM

LOCATION: B707 conf. room

Note: Seminars will be conducted by V. M. Pizzuto

APPENDIX E

Individual interviews

NAME	DATE	TIME	LOCATION
R. A. Channel (B707)			
J. Q. Maes (B707)			
D. C. Brill (B707)			
J. J. Vontersch (B707)			
K. K. McTaggart (B707)			
J. F. Hahn (B707)			
J. C. Dockter (B707)			
E. B. Allen (B707)			
K. L. Newby (B707)			
S. Sterkel (B707)			
T. J. Pfarr (B707)			
R. E. Hodgson (B771)			
J. D. Fenwick (B771)			
M. W. Phillips (B771)			
W. A Averill (B779)			
D. C. Fisher (B779)			
S. R. Garrett (B779)			
R. S. George (B779)			
C. W. Kranker (B779)			
D. E. Oliver (B779)			
E. W. Pierson (B779)			
R. L. Schempf (B779)			
J. E. Woodward (B779)			
M. L. Jasper (B779)			

Note: Schedule for interviews is yet to be determined.

ENCLOSURE 5

RESTART PLAN FOR
THERMAL STABILIZATION IN BUILDING 707

RESTART PLAN

for

THERMAL STABILIZATION

in

BUILDING 707

Revision 0

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

INTRODUCTION

This Restart Plan is to reaffirm the safety culture and readiness for continuation of the Plutonium Start-Up Test Program in support of Thermal Stabilization of plutonium oxides in Building 707 in order to mitigate the risk of a plutonium fire.

This activity, which is currently suspended under Standing Order 34 since October 7, 1994, has completed Phase I, "Procedure Walkdown and Familiarization", in August 1994. The suspension of this activity was taken as a precautionary measure in response to the Building 771 incident.

The plutonium material affected by this project is stored in and will be processed in Building 707, a building which has a fully reviewed infrastructure as a result of recent Operational Readiness Reviews. The rigorous preparation of this building over the past four years provides a high confidence in its readiness and qualification to perform these activities.

This plan is submitted as directed by A. H. Burlingame letter, AHB-209-94, dated October 12, 1994 .

This Readiness Assessment addresses each Root Cause and Contributing Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, dated October 16, 1994, as follows:

Root Cause A:

> Task performance was Less Than Adequate (LTA) in that one worker knowingly and willfully performed work outside and beyond the scope of Task Information Package (TIP) 5. Additionally, the worker's foreman and manager assisted in the activities and subsequent cover-up once they became aware of the unauthorized activities.

Response

As documented herein, all personnel involved with material handling operations will have been interviewed by management. Additionally, management and supervision will have been interviewed by upper management.These interviews will be conducted to ensure that everyone understands their responsibilities and that procedures must be followed, training is adequate, and that criticality safety is understood.

Root Cause B:

Supervision was LTA.

Response

The level of experience of personnel involved in this project is such that it leads us to be confident in the quality of management and supervision. This will be validated through the oral interview process.

Root Cause C:

Physical Barriers were (LTA)

Response

As noted in this plan, physical barriers will be verified as in place and supportive of the requirements as defined in the CSOLs/NMSLs.

1. Subject area

Readiness assessment for the continuation of thermal stabilization activities in Building 707.

2. Purpose

Confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise plutonium brushing and packaging activities exhibit formality such that these activities are accomplished in a safe manner.

3. Hazard Category

Based on 1-H24-ADM-10.01, Startup and Restart of Nuclear Facilities, Appendix 4, this will be a restart from a "precaution pending review". Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope

In Building 707, where thermal stabilization activities are performed, criticality safety is paramount. To ensure that thermal stabilization activities are accomplished safely, the organizational infrastructure must be verified to be in place. This is accomplished by confirming the following infrastructure is in place to support thermal stabilization.

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility safety
5. Activity supporting hardware systems
6. Crit. Safety deficiencies
7. CSAs/STCSs
8. Criticality Safety training
9. Criticality Safety drills
10. Functional test start-up
11. Knowledge of assignment
12. Conduct of Operations application
13. Sufficient numbers of qualified personnel
14. Safety awareness culture
15. Safety basis
16. Modifications incorporated into procedures
17. Technical and management qualifications

5. Schedule

The execution of this restart plan began on October 27, 1994, with a projected completion date of on or before November 23, 1994.

6. Assessment Specialists

Team members: R. C. Leonard (Team leader)

S. R. Badgett
R. J. Erfurdt
A. J. Holifield
E. L. Morgan
V. M. Pizzuto
P. Sasa
J. W. Stailing
G. W. Tasset
G. M. Voorneis

7. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31. Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

Criteria:	Develop listing of required procedures, (see Appendix A)
Methodology:	Document review
Deliverable:	Documented verification that listed procedures are approved and available and that adequate safety controls are incorporated. Actionee: W. B. Fleming

CORE REQUIREMENT 2:

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented.

Criteria: Develop listing of trained and qualified employees, by function, (see Appendix B)

Methodology: Records review per Training Users Manual (TUM)

Deliverable: Documented verification of adequate training/qualification (with dates for next training due) Actionee: D. M. Shaw

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Criteria: Conduct oral interviews that include a review of the Building 771 incident

Methodology: All-hands briefings (see Appendix C)
Management seminars (see Appendix D)
Individual interviews (see Appendix E)
Feedback sessions (see Appendix F)

Deliverable: Signed off interview questionnaires (with evaluations of sat/unsat) and attendance rosters.
Actionee: Assessment Team

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "Safety Envelope".

Criteria: Verify NSM 3.12 compliance

Methodology: Review of pre evolution briefing records

Deliverable: Documented verification of NSM 3.12 inclusion in pre evolution briefings. Actionee: R. S. Brown

Note: See additional safety basis documentation in Core Requirements 1, 5, and 15.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition and operability of safety systems, including safety related process systems and safety related utility systems. This includes examinations of records of tests and calibration of safety system and other instrumentation which monitor Limiting Conditions of Operations (LCO) or that satisfy Technical Safety Requirements (Operational safety requirements). All systems are currently operable and in a satisfactory condition. For the thermal stabilization project, the focus of this requirement will be on Building 707 only.

Criteria: Verify OSR compliance and surveillance requirements are met

Methodology: Record reviews of applicable VSS LCO surveillances

Deliverable: Documented verification of LCO surveillance compliance. Actionee: A. J. Holifield

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

Criteria: Verify compliance thru Plant Action Tracking System

Methodology: Records review

Deliverable: Documented verification that Criticality Safety deficiencies have been dispositioned. Actionee: R. S. Brown

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

Criteria: Verify thru Compliance Management Records

Methodology: Records review

Deliverable: Documented verification that nonconformances have been dispositioned. Actionee: S. Williams

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

Criteria: Verify that the POD and pre evolution briefings verify adequate management programs, sufficient numbers of qualified personnel, facilities and equipment.

Methodology: Records review

Deliverable: Documented verification that requirements have been met and are being maintained. Additionally, provide documented verification that the most recent inventory of the Emergency Response cabinets (Best Team, Emergency Reentry and Spill Response cabinets) was completed and determined to be satisfactory. Actionee: D. M. Shaw

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented.

Criteria: Review of Building 707 Drill Plan

Methodology: Records review

Deliverable: Documented verification of criticality safety drill compliance. Actionee: S. R. Badgett

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators.

Criteria: Review of the Plutonium Startup Test Program

Methodology: Document review

Deliverable: Documented verification that B707 is in compliance with the Plutonium Startup Test Program. Actionee: A. J. Holifield

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities is adequate for operations.

Criteria: The necessary attributes of the Conduct of Operations Manual are applied to support the activity. These attributes include: Pre-evolution briefing, POD, LCO compliance, use of procedures and training/qualification of staff.

Methodology: Document review

Deliverable: Documented verification that the attributes of Conduct of Operations described above are in place and are satisfactorily implemented for thermal stabilization activities, including, specifically, that the safety basis documentation that supports the activity has been confirmed to be fully implemented. Actionee: A. J. Holifield

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

Criteria: Reference Core Requirements 2 and 8

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

Criteria: Confirm that requirements were addressed and deemed adequate thru the Operational Readiness Review (ORR) for Building 707.

Methodology: Records review

Deliverable: Documented verification that building facility and procedure modifications are made in compliance with CCCP, COEM, IWCP and PPG requirements. Actionee: A. J. Holifield

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

Criteria: Reference Core Requirement 15

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

Criteria: Reference Core Requirement 3 and 2

8. Methodology

(See methodologies used in Section 7)

9. Operational Interfaces

Teams will be composed of Rocky Flats personnel

Clearances and other access requirements will be supported by Operations Manager

10. Restart Plan approval

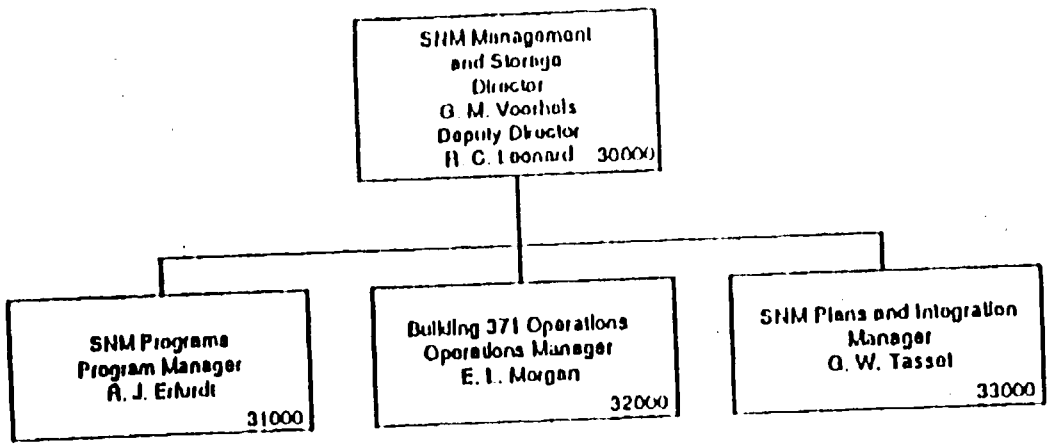
Submitted

G. M. Voorheis
Director, SNM Management and Storage

Submitted

V. M. Pizzuto
Director, Building Deactivation

SNM MANAGEMENT AND STORAGE



BUILDING DEACTIVATION PROGRAM DIVISION ORGANIZATION CHART

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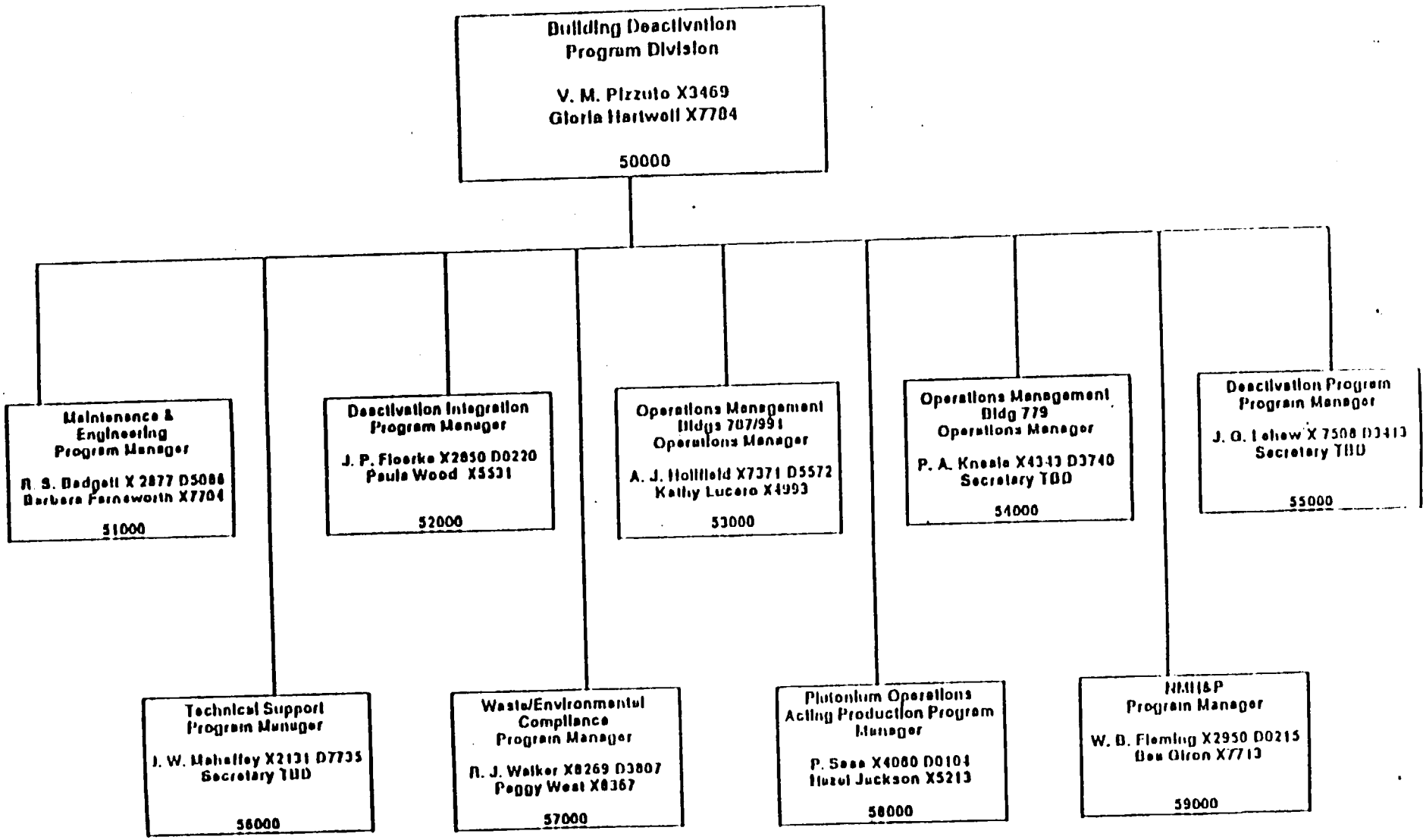

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APPENDIX A

Approved procedures in support of Thermal Stabilization

Procedure #	Title
4-F89-FO-0002/Rev. 0	XY Retriever, Building 707
4-30000-FO-0103/Rev. 0	Balances, Building 707/776/777
4-30000-FO-1023/Rev. 0	Gram estimation
4-32PFO-707-002/Rev. 0	Glovebox & XY Retriever differential pressure surveillances
FO-0001/Rev. 0	Decontamination
4-30000-FO-0023/Rev. 2	Thermal Stabilization of Metallic Oxide, Glovebox J-25
COOP-011/Rev. 0	Pre-Evolutionary briefings
4-B19-NSM-03.12/Rev. 0	Nuclear material safety limits and criticality safety limits surveillance
4-84300-FO-0018/Rev. 0	Material transfer and storage, Building 707, 776/777 & 779
4-B22-FO-0010/Rev. 0	Building 707 glovebox operations
FO-0020/Rev. 0	Chainveyor operations
4-D18-FO-0010/Rev. 0	Glovebox operations
4-30000-FO-0116/Rev. 1	Thermal Stabilization of Metallic Oxide, Glovebox J-60

Note: Procedures can be reviewed in the Building 707 SAC. Contact T. C. Adams at x3619. Any changes to procedures numbers/revisions and/or titles are reflected in the deliverable for Core Requirement 1.

APPENDIX B

Trained/Qualified employees that support Thermal Stabilization

Employee name	Employee #	Group
R. A. Channel (B707)	503024	Task supv.
J. Q. Maes (B707)	512036	Ops. support
D. C. Brill (B707)	513792	"
J. J. Vontersch (B707)	514255	"
K. K. McTaggart (B707)	512500	"
J. F. Hahn (B707)	515962	"
J. C. Dockter (B707)	511953	Task supv.
E. B. Allen (B707)	512970	"
L. A. Atencio	512588	Process spec.
R. D. McCoy	509702	"
T. J. Steinbrunn	513550	"
M. L. Harper	513281	"
D. S. Cross	513273	"

Note: Training/Qualification records can be reviewed in Building 060, contact E. L. McKee at x4160.

APPENDIX C (schedule)

All-hands briefing schedule (B707 personnel)

SHIFT	DATE	TIME	LOCATION
1	10/27/94	9:30 AM	750-A
3	11/1/94	6:30 AM	707 Conf. Room
2	11/3/94	3:30 PM	707 Conf. Room

Note: Briefings will be conducted by V.M. Pizzuto

Attendance can be verified against the list of employees from Appendix B

Building management will ensure that a minimum number of trained/qualified employees have been briefed prior to restart. No hands-on employee will participate in an evolution until he/she has completed the all-hands briefing.

APPENDIX D (schedule)

Management Seminars (Building 707)

NAME

B. E. Woolsey

R. L. Fiore

W. B. Fleming, Jr.

A. J. Holifield, Jr.

P. Sasa

R. D. Slaybaugh

DATE: 11/1/94

TIME: 1:30 PM

LOCATION: B707 conf. room

Note: Seminars will be conducted by V. M. Pizzuto

APPENDIX E

Individual Interviews

NAME	DATE	TIME	LOCATION
R. A. Channel (B707)			
J. Q. Maes (B707)			
D. C. Brill (B707)			
J. J. Vontersch (B707)			
K. K. McTaggart (B707)			
J. F. Hahn (B707)			
J. C. Dockter (B707)			
E. B. Allen (B707)			
L. A. Atencio (B707)			
R. D. McCoy (B707)			
T. J. Steinbrunn (B707)			
M. L. Harper (B707)			
D. S. Cross (B707)			

CORE REQUIREMENT 3
CLOSURE DOCUMENTATION
BUILDING DEACTIVATION PROGRAM DIVISION

CORE REQUIREMENT 3: Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

The purpose of this memorandum is to document that Core Requirement 3 has been completed for the personnel of Buildings 707, 779, and 991. Core Requirement 3 includes all-hands briefings, management seminars, individual interviews, and feedback sessions.

The feedback sessions indicated that, in general, there was an understanding that a criticality was possible within the buildings although the potential is minimized through the use of operating procedures, personnel training, and a positive safety attitude. In addition, the feedback generally supported the management actions taken in response to the Building 771 incident. The feedback sessions were conducted either during or immediately following the Building 771 incident briefings and attendees are documented on the Building 771 incident briefing roster.

V. M. Pizzuto, Director
Building Deactivation Program Division

gjh

APPENDIX G

Criticality Safety training requirements

1. General Employee Training (GET)
2. Nuclear Criticality Safety (Course 023-415)
3. Nuclear Criticality (Course 011-419)
4. Nuclear Criticality Safety Seminar (Course 023-420)

Note: Per procedure 1-NSM-03.02/Rev. 0

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ENCLOSURE 6

READINESS ASSESSMENT OF MOVEMENT OR TRANSFER OF WASTE OR RESIDUE DRUMS, WASTE CRATES OR OTHER CONTAINERS CONTAINING IN EXCESS OF 200 GRAMS OF FISSILE MATERIAL

READINESS ASSESSMENT OF MOVEMENT OR TRANSFER OF WASTE OR RESIDUE DRUMS, WASTE CRATES, OR OTHER WASTE CONTAINERS CONTAINING IN EXCESS OF 200 GRAMS OF FISSILE MATERIAL

Revision 5

Submitted by EG&G Rocky Flats, Inc.
Waste Management

APPROVED: T.G. Hedahl 12-5-94

T. G. Hedahl Date
Director, Waste Management

1. Introduction

This Readiness Assessment of movement or transfer of waste or residue drums, waste crates, or other waste containers containing in excess of 200 grams of fissile materials is submitted to the Department of Energy, Rocky Flats Environmental Technology Site (DOE, Site), as required by the Site Manager's directive [AMOWM:MSM:09160] (Enclosure 1I). The restart of movement of waste or residue containers > 200 grams fissile materials is in support of the Residue Compliance and Residue Elimination Programs.

Movement and transfer of containers with > 200 grams fissile material was suspended (Standing Order #34, Item 6) as a precautionary measure following procedure violations in Building 771 during the transfer of fissile solutions. EG&G Rocky Flats, Inc. intends to restart movement and transfer of all waste/residue containers with > 200 grams fissile material.

This Readiness Assessment addresses the movement of waste/residue within the facilities and includes the transfers of waste/residue containers between buildings. All applicable buildings and the plant support functions are under separate authorization bases in the form of Safety Analysis, Plant Policies and Procedures. All materials proposed for movement under this Plan are coordinated by Program Directorates. These Directorates assure an adequate knowledge base and identification of special conditions or hazards associated with material movement.

The mission of the Residue Compliance Program is to obtain a Resource Conservation Recovery Act (RCRA) permit from the Colorado Department Public Health and Environment (CDPH&E) for storage of mixed residues. EG&G has committed to DOE, Site to meet the permit conditions for compliant storage by December 22, 1994. This task is also driven by Judicial Orders in the Sierra Club and CDPH&E vs. DOE lawsuit (89-B-181). The mission of the Residue Elimination Program is to develop and implement treatment or other means to permanently dispose of residues. To this end, characterization, sampling, and repackaging of residues is required. Both missions require movement of residue containers within buildings and transfer between buildings, and many containers contain in excess of 200 grams fissile materials. The Residue Elimination Program is driven by Settlement Agreement and Compliance Order on consent 93-04-23-01.

This Readiness Assessment documents prerequisites for each Core Requirement, per DOE Order 5480.31 and the satisfaction of each prerequisite. Prerequisites have been established to ensure that the root causes of the 771 incident have been addressed such that the problem will not be repeated in container movement evolutions.

This Readiness Assessment addresses each Root Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, November 23, 1994. The Summary of Causes, Generic Implications, and Associated Recommendations (Enclosure 1K) identifies actions to be completed by EG&G prior to

restart. These immediate actions have been completed for movement of waste or residue containers containing > 200g fissile material as follows:

S.2 Increase senior manager presence during operations.

The Director of Waste Management conducts at least weekly tours of the operational areas of Waste Reduction and Assay (WR&A). The President of EG&G has also toured the work area, specifically observing venting and aspirating of drums. For drum operations under this restart, a member of a team consisting of the following senior managers will observe drum movements for the first four evolutions. Following that, senior managers will observe at their discretion:

T. G. Hedahl
J. A. Geis
R. E. Kell

A.1 Enhance training on nuclear criticality safety.

(First action: Conduct briefings regarding criticality safety as it relates to this event [the 771 incident] for all site personnel).

WR&A has conducted and documented an "all hands" briefing on the 771 incident. The Operations Manager personally participated in a Safety Review Board (SRB) review of the incident and has read the complete Root Cause Analysis. The cognizant Director briefed WR&A managers on the incident. Finally, the Building 776/777 mentor is continuing to conduct small group meetings on the incident.

B.2 Increase independent safety oversight of high risk operations to monitor effectiveness of supervision.

An independent mentor and Conduct of Operations (COOP) Subject Matter Expert has been assigned to WR&A. For the first month of operations under this restart, the mentor or a similarly qualified alternate from another building, will oversee at least half of the evolutions. Beyond the first month, he will oversee operations at his discretion or on special request of the WR&A Operations Manager.

B.4 Consider knowledge of and commitment to COOP as part of the qualification process.

As documented herein, all applicable personnel involved with material handling operations have been interviewed by management. The WR&A Operations Manager, subordinate line managers, and numerous technical supervisors and staff were interviewed by the Waste Management Director. In addition, WR&A interviewed technical supervisors and staff.

Interviews were conducted by the Operations Manager and Unit Managers using the enclosed questionnaire (Enclosure 1A), and documented. The two way process ensures that everyone understands their responsibility. All interviews with

Waste Assay and Storage personnel who will perform the subject container movements have been completed. A list of qualified personnel is attached (Enclosure 1F). The Material Handling procedure governing movement and transfer requires that two qualified people be present for all movement. This minimizes the potential for individual action outside the procedure.

The Joint Company Union Safety Committee (JCUSC) has independently reviewed and verified the Nuclear Safety Awareness Interviewing process. The JCUSC have conducted interviews with facility and operations personnel to review safety awareness and conduct of operations compliance. Interviews were completed on November 2, 1994.

The president of Rocky Flats has also interviewed both salary and hourly employees to assess their level of safety awareness.

C.1 Do not assume COOP is fully implemented in writing work control documents.

Reference Core Requirement 1 for the Material Handling Procedure. This procedure makes no assumptions with regard to COOP, and this statement is supported by two facts. First, the procedure is approved for many buildings in various stages of COOP implementation. Partly for this reason and for completeness, specific elements are included in the procedure, primarily in 5. PREREQUISITE ACTIONS.

C.2 Emphasize the use of physical barriers, supervision, and independent oversight for high risk/priority activities.

Physical barriers are used in that only closed containers are moved. Tamper Indicating Devices (TID) and a two person requirement also prevent uncontrolled activities.

C.3 Re-evaluate adequacy of compensatory measures for Unreviewed Safety Question Determinations (USQDs).

Two USQDs have the potential to affect container movement: An Unreviewed Safety Question on exhaust plenums in Building 371 and Building 771 (USQD-RFP-94.0615-ARS), and an USQD on movement of unvented drums between buildings under Standing Order #36. The first USQD does not affect drum movements within buildings, since drums are sealed or contain filter vent plugs. The only exception is an unvented drum that exhibits signs of pressurization, such as bulging. Such drums are always a special case and cannot be moved under Standing Order #36. The second USQD has determined that an USQ does not exist for movement of unvented drums between buildings. This USQD will be approved and issued prior to movement of Standing Order #36 drums between buildings.

C.4 Assure RCRA compliance is integrated into work controls.

RCRA controls are included in prerequisites, instructions, and post-performance activities of the Material Handling Procedure.

E Assure trained and qualified personnel are assigned to operations.

Reference Core Requirement 2.

G.1 Evaluate and improve, as required, compensatory measures for USQD-RFP-93.1503-GLS.

and

G.2 Discontinue current Lock Out/Tag Out (LO/TO) practice for interrupted activities.

Neither action is applicable to waste and residue container movement. The USQD applies to tanks and piping systems only. No LO/TO is used in the movement of containers.

4.3 Implement protection against knowing and intentional violation of safety requirements until further improvements are implemented.

As noted above, both additional supervision and physical barriers will be used to prevent intentional violations. Physical barriers are always present, and a two person rule will continue to apply once additional supervisory oversight is removed.

II. Facility Definition and Background

Name of Activity Being Started : Movement or transfer of waste or residue drums, waste crates, or other waste containers containing in excess of 200 grams of fissile materials.

Waste or residue containers with > 200 grams fissile materials are currently stored in the following locations:

Current Need to Ship

12 Drums	Relocated from Building 771
10 Drums	Relocated from Building 371
2 Drums	Relocated from Building 776
48 Drums	Relocated from Building 777
1 Drums	Relocated from Building 779

(See Enclosure 1B for more detail)

The Mixed Residue Permit Application (U. S. District Court Order in Sierra Club vs. DOE 89-B-189) proposes storage as follows:

Proposed Storage

37 Drums	To Building 771
3 Drums	To Building 371
8 Drums	To Building 776
25 Drums	To Building 777
68 Drums	To elevate in Building 371
85 Drums	To elevate in Building 771

(See Enclosure 1C for more detail)

Containers must be relocated to this configuration prior to the DOE, Site deadline of December 22, 1994.

In addition, inspections or sampling of waste and residue may occur in the following facilities:

Building 776	Size Reduction Vault
Building 776	Advanced Size Reduction Facility
Building 569	Real Time Radiography Unit/Crate Assay Equipment
Building 371	Nondestructive Assay

Inspection, sampling, and other operations are beyond the scope of this Readiness Assessment. This Readiness Assessment addresses only the movement of containers within these facilities and transfer between them.

The Waste Assay and Storage Manager will supervise the first four container movements. Upon completion the manager will complete a review of the evolution with operating personnel to appraise the lessons learned for future container movements which will be turned over to first line management for continued container movement at the approval of the Operations Manager for Waste Reduction and Assay. The Material Handling Procedure (Enclosure 1D) requires the job supervisor to verify all prerequisites, including a pre-evolution briefing, verify nuclear material quantities do not exceed the NMSL or CSOL, verify proper signatures and chain of custody, sign the transfer document, notify the receiver, and verify proper completion.

III. Process Description

The following activities comprise the movement or transfer process:

Movement of 55 gallon drums, filter coffins, waste crates, 1 gallon containers and 10 gallon cans within the following Buildings: 371, 707, 771, 776, 777, 779, 569, and 664.

Transfer of material through the Transportation Security Officer (TSO) between the listed buildings.

Transfer of material by transfer cart between Buildings 779 and 777 and Buildings 771, 776 and 707.

All activities are covered by Site Procedure 4-C08-A&S-SWH-W0-5220, Revision 0, Material Handling (Enclosure 1D).

Currently, nuclear material safety limits for movement of waste and residues are covered by a 500 gram (moist) or 1,000 gram (dry) limit. Buildings 569, and 664 can only accept containers with less than 200 grams fissile material. There is a request to increase these limits to 1,000 grams in order to transfer containers to Building 569 for Real Time Radiography, and for stacking purposes.

IV. New Process Startup

No new processes will be started for material movement and transfer.

V. Hazard Category

This will be a restart from a precautionary shut down pending review. Based on a hazard potential evaluation, a Medium Hazard Readiness Assessment is appropriate. (Enclosure 1E).

VI. Recent Repairs and Modifications

No Vital Safety Systems have been modified in support of this evolution. Recent modifications in support of the Residue Permit include installation of angle iron to raise drums from the floor in Buildings 371 and 771 and the repair of floor coating in Building 776.

VII. Readiness Assessment Scope

This Readiness Assessment will verify the completion of the prerequisites defined herein, providing the basis to restart normal movement and transfer of waste and residue drums, waste crates, and other waste and residue containers containing in excess of 200 grams of fissile materials. Team members are as follows:

Chris Bernard
Clarence Buchholz
Art Dye
William Franz
Tim Hedahl
Scott Kranker
Enn Titenburg

VIII. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

PREREQUISITES:

1. Procedures are approved per Site procedure process.

   Container movement and transfer are performed in accordance with Procedure 4-C08-A&S-SWH-W0-5220, Rev. 0, Material Handling, issued July 5, 1994. This is a rewrite of the previous procedure, C0-5020, rather than a completely new procedure. The procedure was reviewed under 93-DMR-000211 by Criticality Engineering, Hygiene and Safety, Nuclear Material Safeguards, Site Quality Assurance, Traffic, and a Subject Matter Expert. It was approved by the Waste Operations Review Committee (WORC-94-30) and approved for use in Buildings 371, 569, 664, 707, 771, 776, 777, and 779.

2. Procedures incorporate required criticality safety controls in a manner consistent with the method approved at Rocky Flats.

   Procedures utilized for material movement have prerequisites which require the performance of a pre-operational NMSL surveillance in accordance with 4-B19-NSM-03.12 (see Enclosure 1D).

   In addition, as a compensatory measure to concerns about the currency of the Site Master Criticality Safety Manual, an additional check will be performed. A Shift Order was issued requiring verification that posted limits, building manual limits, and Site Master limits agree. Action in the case that they do not is specified in the Material Handling Procedure. Nuclear Criticality Engineering is currently conducting a site wide audit of the site master limits versus the posted limits and building manual limits. Completion of this audit is not a restart condition. Therefore, the temporary shift order is appropriate.

3. Administrative controls are implemented to assure the current approved revision is used.

   The most current revision of this procedure is located in the Document Control Department for all the areas where this procedure is approved for use.

   Supervisory personnel overseeing material handling activities have been briefed on the new Material Handling Procedure 4-C08-A&S-SWH-W0-5220, Rev. 0. All have read it, and all obsolete copies have been removed from the work areas. (Enclosure 1H).

4. Responsible line management and operators understand the process for obtaining the current revision and for identifying and correcting deficiencies.

   All applicable line managers and operators have been interviewed as discussed in Root Cause A (page 3) response to ensure their understanding of this requirement. The Operations Manager for WR&A and the Managers of the performing groups were interviewed by the Director of Waste Management. A sampling of technical supervisors and operators were also interviewed by the Director. All applicable technical supervisors and operators have been interviewed by these Line Managers according to the attached questionnaire. A record of each interview on this form will be maintained in the individual's training file.

CORE REQUIREMENT 2:

Training and qualification programs for management, operations and operations support personnel have been established, documented, and implemented.

PREREQUISITES:

1. Identify the staff that performs activities. A roster of qualified and verified personnel is enclosed (Enclosure 1F).

2. Identified staff and technical supervisors are trained and qualified to perform the required duties and their training/qualification is documented per the methods authorized by the Training Users Manual (TUM).

   Personnel involved with container movements have been trained to the following:

   - Employees who handle waste containers are trained in Nuclear Criticality Safety requirements, Nuclear Material Handling, and Conduct of Operations. Each department also requires operations personnel to complete Qualification Standard Packages that are specific to the performance of their job duties.

- Training has been verified by WR&A management and Performance Assurance for the identified roster of personnel. Additional staff will be similarly verified prior to participating in container movement until the Director of Waste Management is assured in the process of training compliance and records.

3. The Criticality Safety Engineer supporting the activity is qualified per Site prerequisites for job qualification criteria. The training is documented per the methods authorized by the Training Users Manual (TUM) guidance.

   The Criticality Safety Engineer's qualifications were verified with the Nuclear Criticality Safety Engineering Manager. The Engineer has a number of years experience in the field of Nuclear Safety Engineering. He was hired through an incentive program that mandates additional qualifications and certifications in the field of Nuclear Criticality Safety. These qualifications can be verified by contacting the Nuclear Safety Engineering Manager. WR&A is confident in the abilities of the Engineer.

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

PREREQUISITES:

1. Identified staff and technical supervisors demonstrate in oral interview that they understand their procedures, responsibilities, and accountabilities and authorities relative to compliance, identification and response to deficiencies, and criticality safety.

   As noted above, completion of the interviewing process for all applicable staff and technical supervisors has demonstrated their knowledge in documented interviews per the enclosed questionnaire.

   Key support personnel will also be interviewed prior to restart. Nuclear Materials Control, Radiation Control Technicians, and Transportation Security Officers support these movements under the direction of Waste Reduction and Assay staff. Because they are in support roles, interviews will be conducted in groups rather than individually. Interviews will be documented and will ensure, to the satisfaction of Waste Reduction and Assay management, that the support staff understand their responsibilities for safe operations.

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "safety envelope".

PREREQUISITES:

1. Approved CSCLs or NMSLs are established and posted for the activity.

   Procedure 4-C08-A&S-SWH-W0-5220, enclosed requires verification of limits and verification of compliance to limits prior to container movement.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition of safety systems.

PREREQUISITES:

1. Surveillances are performed on a regularly scheduled basis to verify safety systems as spelled out in the building OSR and Compliance Guide.

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

PREREQUISITES:

1. Issues related to criticality safety limits that are applicable to the performance of the activity have been dispositioned through an approved process.

   Monthly and annual criticality safety limits assessments confirm the safety of container storage and movement. Annual assessments performed in accordance with 1-NSM-02.01 for Buildings 776/777, 371, and 771 have been reviewed with oversight from the Independent Safety Review Committee.

   In the recent annual assessments for Buildings 371 (94-0336) and 771 (94-0242) deficiencies were noted, but none were assigned to WR&A. In the recent assessment in Buildings 776/777 there were deficiencies noted.

   All deficiencies were examined, corrective actions were implemented. There were no impacts to the operations from these deficiencies.

2. Issues identified during the 1989 Criticality Safety Assessment have been appropriately resolved and remain so.

   Scientech, Inc. Assessment - Team Audit, Page 79, Item 1. The primary issue identified in this assessment was the 289 drums stored in Room 127 basement. This room was emptied of drums on March 26, 1992, and remains empty today.

3. Deficiencies identified in Occurrence Reports and Criticality Safety Infractions that apply to the activity have been resolved.

   Occurrence Reports and Criticality Infractions assigned to WR&A since January 1994, have been reviewed by the Operations Manager.

   In calendar year 1994, WR&A has reported the following incidents attributed to material handling:

   Three crates received into Building 777 in violation of a written Shift Order pertaining to opening an exterior door. The Shift Manager was not cognizant of the Shift Order.

   #94-0053 - Corrective Action:

   The Building Manager initiated a formalized shift relief and turnover process. Shift turnovers reviewed prior to each shift All applicable personnel reviewed the Shift Order. Conduct of Operations (COOP) -013 was reviewed by Shift Managers to ensure compliance with Section 4.5.1.

   In another incident several drums were staged to be moved from a 90 day area to a permitted area when it was discovered that the elevator used to transport containers was out of service.

   The drums were moved into a storage unit that was not permitted fo those containers.

   #94-0054 - Corrective Action:

   Supervision conducted an all hands briefing to discuss:

   Root Cause, Corrective Actions, and Lessons Learned - The Unit Manager re-emphasized the importance of careful preparation and scheduling of container movements. Pre-evolution briefings are now conducted with more detailed scrutiny of the evolution being preformed.

In July of 1994, drums were transferred to Building 664 in violation of the onsite shipping procedure requiring onsite radioactive waste labels.

#94-0065 - Corrective Action:

Supervision conducted personal interviews with personnel involved. The unit manager re-established the drum team in Building 776/777. A review of the onsite transportation requirements outlined in the Transportation Safety Manual was conducted.

All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. These movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

Recently a Low Level Mixed Waste drum was transferred to Building 569 in violation of RCRA permit requirements, and in violation of drum coordination process.

#94-0094 - Corrective Action:

Pending completion of Root Cause Analysis and assignment of corrective actions.

All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. The criteria for these movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

94-09 Fourteen drums of Item Description Code (IDC) 405 exceeded the criticality limit of 1,000 grams.

Fourteen drums of IDC 405 are still infracted and are segregated in Building 776, Room 127, which is locked. These drums are waiting to be repacked. However, the basement located within room 127 still remains empty to this day.

94-10 103 Drums of Item Description Code (IDC) 421 were identified as exceeding the drum limit of 1,000 grams.

Corrective Action:

Safeguard & Measurement upgrades to counters has improved the accuracy of the equipment. With the narrower window of deviation, some backlog drums were found to contain higher gram values than previously estimated. This occurred with the drums containing IDC 421 material. As a result, previously counted drums now showed a gram value that exceeded the Nuclear Criticality limit. Nuclear Criticality Engineering evaluated the assay values for each of the 103 drums. A determination was made by Nuclear Criticality Engineering that 96 of the 103 drums could be deposted and moved. The remaining seven drums were moved to Building 777 Room 483, and are still under infraction posting. This room is locked, with limited key distribution.

See Enclosure 1L.

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

PREREQUISITES:

1. Any Compliance Schedule Agreement (CSA) or Short Term Compliance Schedule (STCS) applicable to the activity is implemented as required by the Rocky Flats commitment.

No CSA or STCS apply to material handling.

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

PREREQUISITES:

All support groups as determined by Facilities Operations Management are funced in appropriate work packages.

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented. Facilities are required to schedule these drills annually.

PREREQUISITES:

1. Emergency drill operations are scheduled and coordinated by each Facility.

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators. No special equipment is used in container movement. The only powered equipment items are fork lifts and trucks.

PREREQUISITES:

1. No special equipment is used in container movement. The only powered equipment items are fork lifts and trucks.

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

PREREQUISITES:

1. Identified staff and technical supervisors demonstrate knowledge of assignment, responsibility, and reporting requirements during an oral interview.

   As discussed previously, all applicable line managers, staff, and technical supervisors involved with container movement have been interviewed and the interview documented per the enclosed questionnaire. (See Root Cause A Response, page 3).

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, COOPs Requirements for DOE Facilities is adequate for operations.

PREREQUISITES:

1. The necessary attributes of the COOPs Manual are applied to support the activity.

   COOPs requires that all operations and support activities are conducted in a manner consistent with Site goals, objectives, and approved procedures. Guidance is provided by DOE Order 5480.19, COOP Requirements for DOE Facilities. All facilities and operations personnel are required to adhere to the requirements of COOP.

   Specific COOP implementation for material movement and transfer includes:

   - Procedural control (Enclosure 1D)
   - Specific instructions for off-normal conditions
   - Inclusion of transfers on building Plan-of-the-Day
   - Pre-evolution briefing
   - Staffing and equipment requirements
   - Documentation
   - Formal closure of evolution

   Note: All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. These movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

PREREQUISITES:

1. Staff that will perform the activities to meet requirements established for the personnel categories identified under Core Requirements 2 and 8, and these requirements are consistent with the safety basis and assumptions.

2. Sufficient numbers of qualified personnel defined have been identified by position and name on enclosed roster.

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

PREREQUISITES:

1. Implementation of programs such as COOP, Health Safety and Practices (HS&P), OSR, LCO Tracking, Shift Technical Advisor (STA), and Internal Surveillance, have developed a sitewide culture of safety awareness.

   Interviews conducted with personnel involved with container movement reflects the attitude of safety awareness sitewide.

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

PREREQUISITES:

1. All activities are covered within the Facilities scope.

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

PREREQUISITES:

1. All activities are covered within the Facilities scope.

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

PREREQUISITES:

1. Line Management has demonstrated knowledge of container movement and its relation to criticality safety issues.

2. Line Management have met the training qualifications required to perf container movement under the training and qualification guidelines.

Interviews with Line Managers, staff, and technical supervisors involved with the container movement reflect knowledge of the acti

Qualification Standard Packages (QSPs) are required for Solid Wast Processing personnel in the areas of Waste Isolation Pilot Plant (WIPP) sampling operations, supercompactor and repackaging fac operations.

Waste Assay and Storage personnel have eight active QSPs associated with the operation. Those QSP's are relevant to the operations of th assay equipment in all buildings, as well as the actual gamma scann equipment used by Waste Assay and Storage personnel.

First line supervision is required to be qualified to each QSP as wel operating personnel.

ENCLOSURE 7

OPERATIONAL READINESS REVIEW
LIQUID STABILIZATION TANK DRAINING ACTIVITIES
IN BUILDING 771

(TO BE PROVIDED IN FINAL REPORT)

ENCLOSURE 8

RESTART OF ACTIVITIES SUSPENDED BY EG&G STANDING ORDER 34

United States Government

Department of Energy
Rocky Flats Field Office

memorandum

DATE: NOV 30 1994
REPLY TO ATTN OF: SPA:EJW:07799
SUBJECT: Restart of Activities Suspended By EG&G Standing Order 34
TO: Those on Attached List

Attachment 1 defines the process that the Rocky Flats Field Office will utilize to assess the readiness of the subject activities. This process specifically excludes those activities that will be undergoing an Operational Readiness Review in accordance with DOE Order 5480.31. Attachment 2 is EG&G's Root Cause Analysis for the unauthorized draining of a process line in Building 771. The root cause analysis is provided for your information and to assist you in the performance of your readiness assessments.

Please contact Ed Westbrook at extension 7074 if you have any questions regarding this transmittal.

Dero W. Sargent

Dero W. Sargent, Director
Standards, Performance, and Assurance

Attachments (2)

cc w/Att:
B. Smith, DOE-HQ, EM-64
K. Juroff, DOE-HQ, EM-64
P. Hartmann, ONS, RFFO

cc w/o Att:
M. Silverman, OOM, RFFO
K. Klein, OOM, RFFO
M. McCormick, OWM,RFFO
J. Christ, OWM. RFFO
J. Selan, NSEPD, RFFO
P. Harrington, PME, RFFO

Addressees Memorandum Dated NOV 3 0 1994

David Brockman, Acting Assistant Manager for Environment, Safety and Health, RFFO
Jessie Roberson, Acting Assistant Manager for Environmental Restoration, RFFO
Jerry Howell, Acting Assistant Manager for Site Support and Security, RFFO
Leanne Smith, Assistant Manager for Operations and Waste Management, RFFO
Lenora Lewis, Assistant Manager for Administration, RFFO
Michael Karol, Assistant Manager for Project Management and Engineering, RFFO
George Cannode, Director, Training and Development, RFFO
Joe Wienand, Acting Director, Planning and Integration, RFFO
Dana Lindsay, Office of Chief Counsel, RFFO
Roger Butler, Field Chief Financial Officer, RFFO
Beth Brainard-Jordan, Communications and Economic Development, RFFO
Margaret Day, Manager, Total Quality Management, RFFO
Ricky Newton, Manager, Civil Rights and Diversity Management, RFFO

READINESS ASSESSMENT PROCESS FOR RESTARTING ACTIVITIES SUSPENDED BY STANDING ORDER 34.

BACKGROUND

This plans defines the RFFO process for overseeing the restart of activities suspended by EG&G Standing Order 34. This process does not cover those activities that will be undergoing an Operational Readiness Review per DOE Order 5480.31 (e.g. tank drainage operations, Phase II solution stabilization). The restart of these activities will be addressed by separate documents in accordance with DOE Order 5480.31.

Fissile material handling activities were suspended by EG&G as a result of the Building 771 event in which an unauthorized transfer of fissile material was performed and subsequently was attempted to be covered up by the personnel involved.

The Readiness Assessment (RA) process, as defined in DOE Order 5480.31 and DOE-STD-3006-93, provides substantial flexibility in terms of team composition, breadth and scope of review, sequence of events, and the need for a separate DOE RA. The determining factors are the length of the shutdown, the Hazard Classification of the facilities, and the number and complexity of modifications performed during the shutdown.

OBJECTIVE

To provide a formal process for overseeing EG&G in the restart of the cited activities ensuring that adequate corrective actions are in place to allow the safe restart of suspended activities.

GENERAL REQUIREMENTS

SPA will coordinate the RFFO RA activities associated with the restart of activities suspended by EG&G Standing Order 34. SPA shall ensure that all appropriate/cognizant RFFO organizations are aware of their roles and responsibilities relative to the restart of suspended activities, and that expectations and requirements are clearly defined.

The following general requirements apply to all RFFO organizations involved in the oversight of Standing Order 34 restart activities:

- Prepare an oversight plan based upon the specific requirements listed below for each activity to be restarted. The oversight plan should define the criteria to be assessed, the approach and method of review (surveillance, audit, inspection, etc.), organizational procedures governing the selected methods, and how the reviews will be documented. A copy of each plan is to be provided to the Director, SPA.

- Execute the oversight plan. The reviews should focus on actions performed to address/resolve the root causes of the actions that precipitated the shutdown. A technical justification shall be provided for checklist items that are not reviewed. Reviews performed recently by RFFO may be used to justify why a new review has not been performed. However, in these instances changes that have occurred since the past review must be considered, and the results of these changes should be accounted for when reaching readiness conclusions.

- Prepare a formal record of the RA for each activity to be restarted. This shall identify what was done, the results, and a recommendation concerning the restart of suspended operations. The record shall clearly document which criteria have been satisfied and which have not. This record shall be a summary of the reviews performed, not a reiteration of the individual reviews. The record shall be submitted to the Director, SPA, who shall ensure the preparation of final RFFO RA Report.

- Prepare a briefing for the Manager (for each activity to be restarted) when satisfied that the activity can be restarted in a safe manner. The briefing shall address verifications that corrective actions have been completed, that corrective actions are technically adequate, and organizational readiness to oversee resumed activities (as appropriate).

- RFFO organizations involved in this process are authorized to use a graded approach in the planning and execution of the assessments. The level of rigor and depth of review is to be determined by the individual organizations based upon their level of satisfaction with pre-shutdown conditions, the corrective actions taken during the shutdown, and the risk associated with the activity.

- Schedule considerations shall not compromise the adequacy or integrity of the reviews.

SPECIFIC REQUIREMENTS

The following criteria are to be utilized to assess the contractor's readiness to restart activities suspended by EG&G Standing Order 34. Each assigned organization is responsible for reviewing/assessing their specific criteria. These assignments should be reviewed for acceptability and SPA should be promptly notified of any nonconcurrences. These criteria have been developed utilizing DOE Order 5480.31's "Minimum Core Requirements" and tailored to the circumstances of this shutdown. Assignments have been made to minimize overlapping reviews and maximize utilization of organizational expertise. These assignments can be modified if deemed appropriate.

All Assigned Organizations:

- The Root Cause for the Building 771 event is issued and appropriate corrective actions have been identified, completed and verified in preparation for the operation.

- Written work instructions incorporate criticality safety, radiation safety, nuclear safety, administrative controls, and compensatory measures emanating from agreements such as USQDs and CSAs.

- Knowledge of procedures, accountability, criticality safety, radiological controls, occupational hazards, and proper notification procedures for occurrences have been demonstrated by staff, technical supervisors, and line management through oral interviews. The knowledge level should include and understanding of the basis for controls incorporated in work instructions.

Operations and Waste Management:

- The operation will be performed using written work instruction, such as procedures or Task Information Packages, approved per the current RFETS process.

- Provision has been made to provide Management oversight and supervision of activities at the floor level.

- Management and operators understand the scope of the operation and the process for revision and correcting deficiencies prior to deviating from the operation as approved.

- Personnel have demonstrated performance to approved procedures through successful dry runs.

- Staff and technical supervisors demonstrate knowledge of the assignment, their responsibilities and reporting requirements during an oral interview and through trend analysis of performance indicators such as ORPS.

- Staff and supervisors demonstrate acceptance of the Conduct of Operations principles through oral interviews and trend analysis of performance indicators such as ORPS.

- CSOLs or NMSLs for the activity are current, valid, and posted and verified per NSM 3.12 for the activity. Double contingency has been verified by either the 5B.01 procedure or qualitative analysis reviewed and approved by the Manager of EG&G's Nuclear Safety organization.

Environment, Safety & Health:

- CSOLs or NMSLs for the activity are current, valid, and posted and verified per NSM 3.12 for the activity. Double contingency has been verified by either the 5B.01 procedure or qualitative analysis reviewed and approved by the Manager of EG&G's Nuclear Safety organization.

- A process is in place to identify criticality issues, and other safety concerns and resolve deficiencies to the satisfaction of the identifying personnel before work continues.

- All Criticality Safety infractions that affect the operation, or the room(s) involved in the operation have been addressed.

- Drills related to potential criticality safety issues and other abnormal scenarios that pertain to the activity have been successfully performed and plans and procedures are available.

- Staff and technical supervisors demonstrate their commitment to safety through oral interviews and through trend analysis of performance indicators such as ORPS.

Project Management & Engineering:

- Hardware systems are confirmed able to perform their intended function on demand (OSRs) and a system is in place to evaluate changes to equipment operating status.

Training & Development Office:

- Personnel are trained/qualified in accordance with the RFETS process to perform the operation.

Standards, Performance & Assurance

- A process is in place to identify criticality issues, and other safety concerns and resolve deficiencies to the satisfaction of the identifying personnel before work continues.

ENCLOSURE 9

ROCKY FLATS FIELD OFFICE COMMENTS ON EG&G ROOT CAUSE ANALYSIS BUILDING 771

United States Government

Department of Energy

Rocky Flats Field Office

memorandum

DATE: DEC 1 6 1994

REPLY TO ATTN OF: SPA:DWS:12486

SUBJECT: Rocky Flats Field Office Comments on EG&G Root Cause Analysis Building 771

TO: Anson H. Burlingame
President
EG&G Rocky Flats, Inc.

Attached are the Rocky Flats Field Office comments on the Building 771 Root Cause Analysis. These comments can be classified into two major categories, comments on the root cause and comments on the corrective action plan.

After review of EG&G's Root Cause Analysis, RFFO considers that the root cause and corrective actions are adequate to proceed with the review of the restart plans for lifting the suspension to drum movements, thermal stabilization and HSP 31.11. However, should you identify additional corrective actions as a result of review of the attached comments you are expected to review their applicability and incorporate them into Standing Order 34 restart plans.

The only actions with respect to restart plans that RFFO will review are those actions resulting from the Root Cause Analysis, i.e., we do not plan to independently review or verify all the actions EG&G is undertaking to assure the adequacy of procedures and other prerequisites for undertaking work. Nonetheless, RFFO recognizes and commends the fact that EG&G performed readiness type reviews in areas beyond those identified as problem areas in the Root Cause Analysis. Future Standing Order 34 restart plans should clearly differentiate those areas that are related to root cause corrective actions from those that EG&G performed beyond the root cause to help expedite the RFFO reviews.

Mark N. Silverman
Manager

Attachment

1. The Root Cause Analysis does not appear to address or explain why the management environment allowed these types of situations to exist. DOE perceives the environment in 771 was such that management by its actions created an environment that would allow such actions. This perception is based on:
   - Tanks being infracted for more than a year
   - Raschig Ring compensatory measures being not carried out
   - OSR violations remaining unaddressed

2. The Root Cause Analysis or follow-up actions did not address the apparent mistake of the laboratory, including an OSR violation, procedure violation and performing operations without authorization.

3. The root cause indicates that EG&G assumed that Conduct of Operations would not be fully implemented. DOE RFFO does not understand how the site wide infrastructure should be revised to correct this situation.

4. Corrective action A.1 needs to be broadened to include all safety on the site. Even though the B-771 event was primarily a criticality safety issue, the generic implications indicate that all safety, i.e., industrial, electrical, radiological etc. needs to be addressed. The site experienced a rash of electrical safety issues a couple of years ago that was attributed to failure to follow procedures, inadequate training, and lack of management oversight. These are the same generic indicators that the B-771 event has brought out. Therefore, the training needs to be enhanced not only for criticality safety, but needs to also include training for all safety areas to heighten the worker's ability to transfer classroom theory to work place practice.

5. The root cause indicates that EG&G has recognized that management and operating personnel have failed to achieve an acceptable process level for conducting work that incorporated both Conduct of Operations principles and process knowledge. Due to their perception that some work control documents are inadequate some workers continue to rely on process knowledge rather than procedures as the principle basis for their safety. The current site-wide program for preparing procedures is neither streamlined nor responsive to the needs of the user, and appears to represent different levels of rigor. In addition, workers need to understand the purpose of the procedure and procedural compliance principles. EG&G might consider a training class on procedures that includes procedural compliance, what it means for signatures in procedures, etc. (Such a training class was discussed about two years ago, but was never developed.)

6. Interviews by RFFO personnel indicate that the message that EG&G provided to employees and management could be done more effectively. Now that the root cause has been issued, EG&G is afforded an opportunity to re-do these briefings. EG&G should state management's key findings and expectations with respect to procedure development, testing, use and reviews. Procedures that are overly detailed, too hard to change, not walked own, do not reflect process knowledge, etc. will not be effective and welcomed by the workers. Management needs to acknowledge what it will do to facilitate procedure compliance in addition to laying out its expectation for operator compliance.

7. The lack of discipline in and process for establishing and maintaining appropriate authorization bases for hazardous activities increases the probability of safety controls being inadequately specified or being violated during the conduct of these activities. This lack of discipline and process increases the probability of occurrence of incidents such as the Building 771 unauthorized solution draining incident. There is also a perception in the work force reflecting a disrespect for authorization bases that is very similar to the procedure issue. RFFO does not see corrective actions that will resolve this issue.

8. The root cause fails to identify the safety significance of action taken after the operator left the TIP.

9. RFFO is concerned about the reporting of employee concerns. After the Building 991 tunnel event EG&G took action to establish a system to allow employees to report concerns to management. Very few items were reported. RFFO is concerned that there is still a perception with employees that if they report concerns they will be retaliated against. EG&G must take action to ensure that this does not happen and that the concerns of employees are placed on the table so action can be taken to resolve the concerns. RFFO recognizes that EG&G touched on this in the root cause with "no fault" but feels that the corrective actions do not support fixing this area.

10. Past experience with implementing Conduct of Operations on the site has shown that first line management has been resistant to implementing and believing in Conduct of Operations. Management was not supporting the worker in getting the job done, i.e., overly burdensome formal changes rather than pen and ink changes to procedures under appropriate controls, support to stop work if procedures are inadequate, and consequences of going outside the boundaries of a written procedure

11. In review of corrective action by Facility Representatives, some actions are not clear. These actions should be measurable, and capable of being implemented to prevent reoccurrence (for specifics contact Facility Representatives).

ENCLOSURE 10

SUMMARY OF OUTSTANDING ACTIONS FOR FINAL REPORT AND RESPONSIBLE RFETS MANAGER

Department of Energy
Washington, DC 20585

FEB 07 1995

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:

The enclosure is a preliminary report in response to your letter of November 25, 1994, concerning the Defense Nuclear Facilities Safety Board's Recommendation 94-4. As you suggested, our review of criticality safety related infractions at the Rocky Flats Environmental Technology Site has been expanded. Your requested delivery date for the report has not permitted completion of that review, but the enclosure includes the field information available to date. The late receipt of this information in Headquarters has not yet permitted a detailed review, so the reported information should be treated as pre-decisional. A final report will be provided upon completion of the review.

This report contains contractor privileged information, but may be placed in public reading rooms if Attachment eight of Enclosure three is omitted.

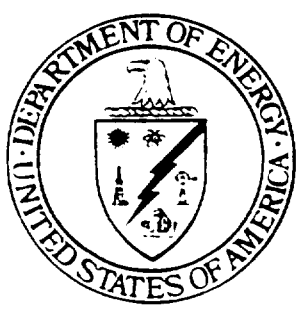
Sincerely,

Thomas P. Grumbly
Assistant Secretary for
Environmental Management

Enclosure

RESPONSE TO
THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB)
RECOMMENDATION 94-4

INTERIM REPORT
January 18, 1995



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RESPONSE TO THE
DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB)
RECOMMENDATION 94-4

The purpose of this paper is to provide a response to the issues and concerns raised in the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4 which covers deficiencies in criticality safety and Conduct of Operations at the Oak Ridge Y-12 Plant as applicable to the criticality safety limit infraction in Building 771 at the Rocky Flats Environmental Technology Site.

Background

On the evening of October 6, 1994, the Building 771 Production Manager reported to the Building 771 Shift Manager that solution draining activities outside the scope of authorized work had been conducted on the backshift on September 29, 1994. As a result, Building 771 nuclear operations were terminated, and an Occurrence Report was filed by the Shift Manager. Subsequent inquiry into the incident identified one employee who deliberately initiated the activity outside the authorized scope of work and two supervisory employees who not only did not stop the activities, but assisted in completing the unauthorized activities and then concealed them for seven days.

This unauthorized operation was reported in occurrence notification report RFO-EGGR-771OPS-1994-0062. Standing Order 34 was issued by EG&G Rocky Flats, Inc., on October 7, 1994, as a precautionary measure to immediately suspend movement, transfer, and operations involving fissile material at the Rocky Flats Environmental Technology Site. Standing Order 34 was subsequently revised to clarify suspended activities and to formalize restart requirements.

On November 25, 1994, the DNFSB Chairman, John T. Conway, requested in a letter to Thomas P. Grumbly that DOE provide a report that addresses the issues and concerns raised in Recommendation 94-4 as applicable to the Rocky Flats Building 771 criticality safety limit infraction. EG&G Rocky Flats and the Department of Energy/Rocky Flats Field Office (DOE/RFFO) had initiated and completed a number of activities as a result of the Occurrence Report and Standing Order 34 at the time this request was made. Many of these activities provide a direct response to the DNFSB specific recommendations.

During the period in which this report was being prepared, a second occurrence in Building 771 was reported (Occurrence RFO-EGGR-771OPS-1995-0003). Similar to the initial incident, this second occurrence constituted a violation of procedures and Conduct of Operations. On December 29, 1994, a technical staff engineer closed five pencil tank sight glass valves while

performing a CSQD valve line-up walkdown and verification. Management approval was not obtained prior to closing the valves nor was any notification made to management after the valves were closed. When questioned later, the technical staff engineer readily admitted closing the valves and stated he had intentions of notifying supervision of his actions. The same five pencil tank sight glass valves were re-opened on December 31, 1994, by a process specialist while performing a RCRA inspection. The valves, in the closed position, were not consistent with RCRA inspection requirements therefore, the process specialist opened them. Although, management approval was not obtained prior to opening the valves, the shift manager was later notified by the process specialist of his actions. This incident is believed to share root causes with the original event. Additional corrective actions were initiated and are considered throughout this response.

This paper is organized to first list each specific part of Recommendation 94-4 followed by the EG&G Rocky Flats and DOE/RFFO associated response. Each recommendation has been modified, shown in italics, to make it specific to Building 771 and the Rocky Flats Environmental Technology Site (the Site). Each related response provides a brief description and references documents enclosed with this paper that provide more detailed information related to the subject.

Recommendation 94-4 (1)

DOE determine the immediate actions necessary to resolve the nuclear criticality safety deficiencies at the Y-12 Plant (*Building 771*), including actions deemed necessary before restarting curtailed operations and any compensatory measures instituted. These actions should be documented, along with an explanation of how the deficiencies remained undetected by MMES (*EG&G*) and DOE (line and oversight).

EG&G Response 94-4 (1)

The immediate action was the termination of liquid transfer operations in Building 771, submission of Occurrence Notification Report RFO-EGGR-771OPS-1994-0062, 771 Operations (Enclosure 1) and the issue of Standing Order 34 to suspend movement, transfer, and process operations involving fissile material on the site. Enclosure 2, J. A. Geis letter JAG-193-94 to D. W. Ferrera, "Basis for Standing Order 34," November 2, 1994, provides some clarification guidance and includes the original and two revisions of Standing Order 34. The Standing Order is revised as restart approval is obtained for the suspended activities. A comprehensive Root Cause Analysis and Generic Implication Study was initiated and completed on November 28, 1994. Enclosure 3, A. H. Burlingame letter AHB-275-94 to Mark N. Silverman, "Root Cause Analysis and Generic Implications of the Unauthorized Draining of a Process Line in Building 771, November 28, 1994," completed the report and forwarded it to DOE/RFFO. The lack of acceptance of Conduct of Operations principles is identified as the first of four generic implications (Enclosure 3, Attachment 2, page 1). An excerpt from this section states "One of the

major improvements at Rocky Flats over the past few years has been to introduce a standards-based approach to work performance. That approach is embodied in the site's Conduct of Operations Program. Information gathered in response to the Building 771 event indicates that there are some personnel in Building 771 and other former production buildings who are not prepared to adhere fully to Conduct of Operations principles and practices. These employees generally believe that they cannot rely on management outside of their work groups to assure their safety and well-being and that they must rely on their own resources and process knowledge to accomplish work and improve their working conditions. As a result, operations personnel sometimes state that they have more faith in the "process knowledge" of experienced personnel in their building than in strict adherence to new procedures to assure their safety". The root cause report includes immediate, short-term, and long-term corrective actions that cover the site including Building 771. An evaluation of the delay in reporting the incident is included in the report.

After the critique of the events of the second occurrence in Building 771 on December 31, 1994, it was concluded that actions in progress but not yet completed from the Root Cause Analysis for the initial draining event were germane to this incident, and that the occurrence was continuing evidence of the failure by building personnel to embrace the concepts of Conduct of Operations. To ensure adequate control of workforce behavior while working toward a full implementation of Conduct of Operations, additional controls including increased levels of supervision and mentoring were instituted in the building.

In parallel with the root cause analysis, each director responsible for an activity involving movement, transfer, and process operations with fissile material suspended by Standing Order 34 was required to prepare a restart plan. The process for restart was initiated with directions [1] to use the Minimum Core Requirements from Attachment 2 of DOE Order 5480.31, Startup and Restart of Nuclear Facilities, as guidance for the preparation of plans. The process ensures completeness and consistency for each plan but permits grading the restart prerequisites to address actions identified in the root cause as applicable to the specific activity. The process uses the existing EG&G Rocky Flats, procedure (Admin 10.01) that implements DOE Order 5480.31 to provide consistent format of the restart plans.

A Safety Review Board subcommittee was established by the President of EG&G Rocky Flats, consisting of senior managers not associated with any of the restart programs to review the restart plans and provide appropriate recommendation to the Safety Review Board. These managers have significant, broad-based, and relevant experience which is being used to

1 J. A. Geis ltr JAG-179-94 to Distribution, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994.

process, and operation of the subcommittee. The Safety Review Board submits the recommendation to the EG&G Rocky Flats, President who has final approval authority prior to submission to the Manager, DOE/RFFO. The restart of suspended operations require approval by the DOE/RFFO manager.

The restart plans are based on an internal Review, Readiness Assessment or Operational Readiness Review as defined in DOE Order 5480.31. The restart plans focus on the causes and generic implications specified in the root cause analysis. As of January 13, 1995, the following restart plans have been or are planned to be submitted to DOE/RFFO:

1) Restart Plan for HSP 31.11 Brushing and Repackaging Revision 0 — 700 Area Only, November 17, 1994 (Enclosure 4).
2) Restart Plan for Thermal Stabilization in Building 707, Revision 0, November 17, 1994 (Enclosure 5).
3) Readiness Assessment of Movement or Transfer of Waste or Residue Drums, Waste Crates, or other Waste Containers Containing in excess of 200 grams of Fissile Material, Revision 5, December 5, 1994 (Enclosure 6).
4) Operational Readiness Review Liquid Stabilization Tank Draining Activities in Building 771 (Enclosure 7, Not included in this interim report).

The restart of operations specified in 1, 2, and 3 have been approved by DOE/RFFO. Restart Plan number 4, which requires an Operational Readiness Reviews (ORR), is being prepared. The plan will be included in the final report following review, comment, and approval by DOE. Additional restart plans for other suspended activities are in preparation and/or internal review by the Safety Review Board and its subcommittee.

DOE/RFFO Response 94-4 (1)

The Site took prompt, appropriate, and conservative actions as a result of the Building 771 event to curtail activities Site-wide until the implications of the event could be addressed. The unauthorized draining of tanks was discovered by EG&G management (Shift Manager) on October 6, 1994, at approximately 7:30 p.m. The Shift Manager immediately terminated operations involving fissile materials in Building 771, posted the affected glovebox as a criticality infraction, and notified DOE and EG&G management. On October 7, 1994, at 7:30 a.m., a critique was held on the event and attended by the RFFO Manager and the President of EG&G Rocky Flats. Immediately after the critique, EG&G suspended movement and handling of all fissile materials site wide.

DOE/RFFO has a formal process for overseeing the contractor restart process for all curtailed activities (Enclosure 8). The process includes walkdowns of spaces involved in the operations; reviews of operating procedures; criticality, nuclear, and operational safety analyses; and

interviews of contractor operating and management personnel. DOE/RFFO review of the root cause determined it was adequate to support the restart of drum movements, HSP 31.11 repack, and thermal stabilization in Building 707. These activities had undergone extensive review (HSP 31.11 and Thermal Stabilization), or were deemed very low risk (drum movements). In addition, DOE/RFFO focused restart reviews for these activities on the problem areas identified in the root cause to ensure that the problems identified were not applicable or corrective actions were in place. The DOE/RFFO comments on the root cause will be addressed as part of the restart process for liquid stabilization in Building 771 (Enclosure 9). The root cause analysis will be further reviewed by a group of independent technical experts commissioned by DOE/RFFO. The results of this review and any actions will be submitted in the final report.

Recommendation 94-4 (2) (a)

DOE perform the following for defense nuclear facilities at the Y-12 Plant (*Rocky Flats Environmental Technology Site*):

An evaluation of compliance with Operational Safety Requirements (OSRs) and Criticality Safety Approvals (CSAs), including a determination of the root cause of any identified violations. In performing this assessment, DOE should use the experience gained during similar reviews at the Los Alamos plutonium facility and during the recent "maintenance mode" at the Pantex Plant.

Editors Note: A combination of EG&G Rocky Flats, Inc., Criticality Safety Evaluations and Nuclear Material Safety Limits (NMSLs) or Criticality Safety Operating Limits (CSOLs) are equivalent to the Criticality Safety Approvals at the Y-12 Plant.

EG&G Response 94-4 (2) (a)

The reports covering similar reviews at the Los Alamos Plutonium Facility [2] and during the maintenance mode at the Pantex Plant [3] were reviewed to determine applicability to the Building 771 incident. The common issue in each report and the Building 771 incident is related to Conduct of Operations. As stated in the letter submitting the root cause ....."the fundamental and direct cause of this (Building 771) incident, that is the willing and knowing violation of the principles of Conduct of Operations and the subsequent non-disclosure of such violation for a period of seven days."

The process established by EG&G Rocky Flats and DOE/RFFO to complete a comprehensive root cause analysis (Enclosure 3) and prepare detailed restart plans, described in responses to Recommendation 94-4 (1), cover the issues raised in the Recommendation 94-4 item 2 (a) and

2 John T. Conway ltr to Victor H. Reis, Regarding the Termination of Normal Operations at Los Alamos National Laboratory TA-55, May 20, 1994

3 John T. Conway ltr to Victor H. Reis, Regarding the Change from an Operating Mode to a Maintenance Mode in the Zone R Facilities at the Pantex Plant, April 29, 1994

referenced reports.

The Conduct of Operations is addressed in core requirement 12 of DOE Order 5480.31, which requires the implementation status of DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," and is addressed in each of the restart plans (Enclosures 4, 5, 6, and 7). The infrastructure for Conduct of Operations was established for Buildings 559 and 707. The issue is the acceptance of the fundamentals of Conduct of Operations by site personnel, which is also addressed in each restart plan.

Another corrective action identified during the root cause analysis (Enclosure 3) was the need to enhance training on Nuclear Criticality Safety. This corrective action is included in the restart plans as part of prerequisites to meet core requirements 1, 2, and 3 in Attachment 2 of DOE Order 5480.31 covering procedures, training and qualification, and level of knowledge of operations and support personnel. The DOE Order 5480.31 core requirements 4 and 5 addressed in the restart plans cover the facility safety documentation, and reconfirm the condition and operability of safety systems including Limiting Conditions of Operation (LCO) and Operational Safety Requirements (OSR's). The restart plans also require review, reaffirmation, and/or revision to existing criticality safety limits. The specific criteria, methodology, and deliverables are described for each DOE Order 5480.31 core requirement in the restart plans (Enclosures 6, 7, 8, and 9).

DOE/RFFO Response 94-4 (2) (a)

Ensuring compliance to OSRs (which include criticality safety limits) is the highest priority of DOE/RFFO Facility Representatives. Facility Representatives observe activity performance and contractor management response on a daily basis.

When criticality safety limit violations or OSR out of tolerance conditions are identified, they are reported per DOE Order 5000.3B, which includes the requirement for a root cause analysis. RFFO facility representatives and ES&H personnel attend all critiques involving OSR violations and most critiques involving potential criticality safety problems. Also, the RFFO process for overseeing the re-start of curtailed activities requires RFFO personnel to independently assess the adequacy of compliance to the OSRs.

Recommendation 94-4 (2) (b)

A comprehensive review of the nuclear criticality safety program at the Y-12 Plant (*Rocky Flats Environmental Technology Site*), including: the adequacy of procedural controls, the utility of the nuclear criticality safety approvals, and a root cause analysis of the extensive level of non-compliance found in recent reviews.

EG&G Response 94-4 (2) (b)

EG&G Rocky Flats, Inc. has two site wide procedures, (NSM-03.12) "Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance" and (NSP-010) "Monthly Criticality

Safety Assessment," which are required controls for all buildings containing special nuclear materials (SNM). Procedure NSM-03.12 is a prerequisite to performing any activity involving movement or handling of fissile material. The Building 771 incident was not a result of inadequate nuclear criticality limits, controls, or approvals, but a deliberate violation of limits applied for the activity. Some additional actions were identified in the root cause analysis (Enclosure 3), including additional criticality training.

The Nuclear Criticality Safety Committee (NCSC) at the site has been collecting a number of documents covering assessments, concerns, evaluations, letters, etc., that are related to nuclear criticality safety. The NCSC was in the process of reviewing this information to identify the causal factors of recurring deficiencies within the criticality safety program at the time of the Building 771 incident. This activity was placed on hold while NCSC members participated in the root cause analysis of the Building 771 incident. Subsequently, a dedicated team of knowledgeable people from EG&G and Los Alamos National Laboratory has been assembled to complete a review of the criticality safety program deficiencies. The review and resulting corrective actions will be provided in the final report. Preliminary findings of this group include issues associated with the operations/criticality safety interface and the over utilization of administrative controls. Actions which relate to restart activities will be incorporated as appropriate into the restart plans at the time of identification. The restart plans (Enclosures 4, 5, 6, and 7) address the criticality safety concerns related to the specific activities.

DOE/RFFO Response 94-4 (2) (b)

The site nuclear criticality safety program was evaluated during the Buildings 559 and 707 Operational Readiness Reviews. The reviews included process specific and programmatic elements. In view of the Building 771 event, DOE/RFFO has requisitioned a team of experts in the nuclear safety field to perform an independent review of the nuclear criticality safety program at the Site which will focus on the implementation of nuclear criticality safety program elements site-wide. The review is scheduled for February 1995, and a final report will be issued and included in the final report.

Recommendation 94-4 (2) (c)

A comparison of the current level of Conduct of Operations to the level expected by DOE in implementing the Board's Recommendation 92-5.

EG&G Response 94-4 (2) (c)

EG&G Rocky Flats, implementation of the "conduct of operations" as related to the Board's recommendation 92-5 is "formality of operations." This includes readiness reviews prior to operation, training and qualification of operations and support personnel, Safety Analysis Reports, Limiting Conditions of Operations, criteria for meeting safety goals, and Conduct of Operations as required per DOE Order 5480.19. Each of the restart plans addresses the

formality of operations by using the Attachment 2 Minimum Core Requirements of DOE Order 5480.31. The determination for restart (e.g., internal review, readiness assessment, or operational readiness review) is made based on the criteria in DOE Order 5480.31 and direction from DOE/RFFO. The completion of the restart plans (Enclosures 4, 5, 6, and 7) provides objective evidence of the formality of operations.

Included in each restart plan are additional compensatory measures such as added management oversight, independent reviews, and meetings with personnel to discuss the incident and lessons learned. Buildings 559 and 707 have demonstrated a higher level of adherence to the formality of operations through an intensive mentoring program for Conduct of Operations. The mentoring program is now being extensively applied to Building 771 to significantly upgrade the culture of adherence to the program infrastructure. This is being accomplished by assigning full time to Building 771 personnel who were instrumental in establishing the Conduct of Operations culture in Buildings 559 and 707.

In addition, a team of internal consultants were assigned to work with specific managers in Building 771 to improve performance in Conduct of Operations. This assignment involved extensive floor level appraisal of behaviors in Building 771. They provided instruction and recommendations to key management personnel regarding needed improvements in Conduct of Operations behavior. The team of consultants assumed the role of mentor to designated managers in Building 771. In this role, the team identified performance measures for each manager, established baselines of performance, evaluated trends, and defined goals for performance in each area. The team worked directly with managers in identifying and removing barriers to performance. The team developed periodic reports on performance and evaluated trends to assist the Operations Manager and Director in identifying problems and resolutions.

Internal consultants have also been working with Support Services (particularly the Steam Plant), SNM Consolidation (particularly Building 371), and Waste Management (particularly Building 776) to facilitate maturing Conduct of Operations in those areas.

DOE/RFFO Response 94-4 (2) (c)

The level of Conduct of Operations implementation is continuously monitored by DOE Facility Representatives. Facility Representatives observe building activity performance and contractor management response to Conduct of Operations issues on a daily basis.
DOE/RFFO has approved the contractors implementation plans for DOE 5480.19. Buildings 707 and 559 have fully implemented the order. In order to accelerate this implementation schedule in Building 771, the contractor has provided additional mentors in Building 771 along with a stronger management team.

RFFO is implementing a Conduct of Operations Assessment Program to systematically assess

contractor performance on a site-wide level. Implementing procedures for the assessment program are scheduled to be completed and included in the final report.

Recommendation 94-4 (2) (d)

Development of plans, including schedules, to address any deficiencies identified in the analyses conducted above.

EG&G Response 94-4 (2) (d)

The corrective actions identified as a result of the root cause analysis and generic implications (Enclosure 3) have been assigned to the responsible organization and entered into the Plant Action Tracking System (PATS) to ensure completion. The corrective actions are divided into three categories: immediate, short term, and long term. Immediate means before restart of activities suspended by Standing Order 34 (Enclosure 2); short term means as soon as practicable within 6 months, and long term means as soon as practicable within 12 months.

The restart plans (Enclosures 4, 5, 6 and 7) provide specific criteria, addressing the Attachment 2 Minimum Core Requirements of DOE Order 5480.31. These criteria will be met and verified prior to the restart of the activity. The combination of corrective actions and restart plans provides the response to this recommendation.

DOE/RFFO Response 94-4 (2) (d)

Plans and schedules will be initiated to address any deficiencies identified in Site reviews. DOE/RFFO monitors contractor commitments and tracks external DOE/RFFO commitments utilizing the RFFO Commitment Tracking System.

Recommendations 94-4 (3) and 94-4 (4)

DOE evaluate the experience, training, and performance of key DOE and contractor personnel involved in safety-related activities at defense nuclear facilities within the Y-12 Plant (*Rocky Flats Environmental Technology Site*) to determine if those personnel have the skills and knowledge required to execute their nuclear safety responsibilities (in this regard, reference should be made to the critical safety elements developed as part of DOE's response to the Board's Recommendation 93-1).

Editors Note: We believe the reference to be to Recommendation 93-3 rather than 93-1 to match the topic and concern.

DOE take whatever actions are necessary to correct any deficiencies identified in (3) above in the experience, training, and performance of DOE and contractor personnel.

EG&G Response 94-4 (3) and 94-4 (4)

The restart plans (Enclosures 4, 5, 6, and 7) provide specific criteria for the training and

qualification for the supervision and assigned workers for each of the activities. The training programs consist of the Training Users Manual (TUM) and approved Training Implementation Matrix (TIM) per DOE Order 5480.20. The training also includes building, functional, and job specific training and qualification. Demonstration of performance and completion of qualification for nuclear operation will occur during the startup plans for each activity.

Specific experience, training level and performance of the criticality safety staff has been addressed by the following steps:

1. Hire a new Manager
2. Hire a Mentor Staff
3. Retain existing personnel and attract criticality safety personnel back from other site positions.

Significant progress has been made:

1. An incentive program is in place that reduced the staff attrition rate (50% less than previous year) to only two additional losses up to the January 1995 time frame. Prior to January 1995, seven additional people were added to the staff from other site positions.
2. Aggressive interviewing for Manager and Mentor positions was done, with one Mentor being hired in early November 1994, and a Manager (recognized in the criticality safety community) who arrived on site in mid-January. Two additional Mentor positions will be filled by the new Manager.
3. Los Alamos National Laboratory's most senior nuclear criticality safety expertise has conducted two tutorials at the site to assist the EG&G Criticality Safety Staff as well as operations and program personnel to understand the importance of the interconnections between process knowledge, and the requirement of criticality safety limits.

The actions taken have resulted in a more stable program with sufficient resources to correctly monitor the necessary contractor staff, respond to mission requirements and, ultimately, Safety Order-driven requirements.

With respect to Criticality Safety Staff training from external sources, LANL Criticality Safety Staff participation in site program efforts is ongoing. This cooperative effort is evidenced by participation in the Waste Management Program restart as well as the continuing programmatic efforts in support of Building 771 liquid stabilization criticality safety evaluations, and on the team created by the NCSC to review the existing criticality safety program and to propose improvements.

EG&G Rocky Flats has previously addressed the DNFSB Recommendations 91-1, 92-7, and 93-3 by establishing the following programs and documents maintained by the Human Resource Department:

1. Generic job descriptions of key personnel contained in the organization manual. This manual

has been submitted to the Department of Energy.

2. Position Information Questionnaires (PIQs), which identifies title, job code, education, and experience of specific positions.

3. A document containing minimum education and experience for technical positions that meets or exceeds the requirements outlined in DOE Order 5480.20.

4. Performance Appraisals that are performed and documented for all salaried positions on an annual schedule. Interim performance appraisals may be conducted when either appreciable improvement or deterioration of performance is noted.

Upon initial hire and with all subsequent promotions, employees are required to meet minimum education and experience guidelines. These guidelines increase progressively with each salary grade. Waivers to these guidelines are granted occasionally by Human Resources only upon management documentation that the employee can perform the job.

In order to fill a position either internally or externally, a Position Staffing Requisition must be initiated by management and approved by title, job code, education and experience as outlined in the PIQ. When a new position is required for which no PIQ exists, a new PIQ must be initiated by management and then reviewed and approved by Human Resources.

The combination of the specific information contained in the restart plans and the documentation and process maintained by Human Resources provides the response to Recommendations 3 and 4.

DOE/RFFO Response 94-4 (3) and 94-4 (4)

As discussed in Section (2) (b), DOE/RFFO has requisitioned a team of experts in the nuclear safety field to perform an independent review of the nuclear criticality safety program at the site. Part of the review will assess the adequacy of the site personnel working on criticality safety related activities. The review is scheduled for February 1995, and a final report will be issued by March 1, 1995. Plans and schedules will be initiated to address any deficiencies in this area and entered in the appropriate tracking system.

Summary

The root cause and generic implication report (Enclosure 3) provides a basis for corrective actions that encompass more than Building 771. Following are actions that have been identified, completed, and/or are underway by DOE/RFFO and EG&G Rocky Flats to address the issues and concerns that were raised by the DNFSB Recommendations.

- The uniform methodology for preparing, completing, and verifying each restart plan will ensure a comprehensive response to the issues and concerns contained in Recommendation 94-4.
- The process for preparing and reviewing restart plans is based on DOE Order 5480.31 and is supplemented by the EG&G Rocky Flats Safety Review Board.
- All restarts are approved by the President of EG&G Rocky Flats and by the DOE/RFFO Manager.
- Root cause analysis and corrective actions as well as core requirements in DOE Order 5480.31 were the primary considerations in preparing each specific restart plan.
- The training and qualification of personnel are addressed within each restart plan.
- Emphasis on Conduct of Operations, including interviews at all levels of management and employee attitude surveys, is included in restart plans.
- Criticality and nuclear safety are specifically addressed in each restart plan.
- Specific actions have been taken to strengthen the criticality safety staff.
- An additional analysis of the causal factors of recurring deficiencies in the criticality safety program is currently underway, and will be provided in the final report.

ENCLOSURE 1

OCCURRENCE REPORT

RFO-EGGR-771OPS-1994-0062, 771 OPERATIONS

OCCURRENCE REPORT

771 Operations

(Name of Facility)

Plutonium Processing and Handling

(Facility Function)

Rocky Flats Plant / EG&G Rocky Flats

(Name of Laboratory, Site or Organization)

Name: MATHIASMEIER, SUE G
Title: TECH SUPPORT INVESTIGATOR Telephone No.: (303)966-8004

(Facility Manager/Designee)

Name: C. Ballinger
Title: Operations/Facility Manager Designee Telephone No.: (303)966-2504

(Originator)

Name: S. G. Mathiasmeier Date: 10/27/1994

(Authorized Classifier (AC))

1. OCCURRENCE REPORT NUMBER: RFO--EGGR-771OPS-1994-0062
#1490/1505/1554/1600:A Pu-containing liquid was drained from a process line. Line draining was not within the scope of procedure being used.

2. REPORT TYPE AND DATE:

	Date	Time
[ ] Notification	10/08/1994	1013 MTZ
[ ] 10 Day	10/25/1994	1619 MTZ
[X] 10 Day Update	10/27/1994	1058 MTZ
[ ] Final		

3. OCCURRENCE CATEGORY:
[ ] Emergency [X] Unusual [ ] Off-Normal [ ] Cancelled

4. DIVISION OR PROJECT: EG&G Rocky Flats Envir. Tech. Site

5. DOE PROGRAM OFFICE:
EM - Environmental Restoration & Waste Management

6. SYSTEM, BLDG., OR EQUIPMENT:
Building 771, Solution Stabilization Operation

7. UCNI?: No

8. PLANT AREA: Waste Stabilization

9. DATE AND TIME DISCOVERED:
10/06/1994 1937 (MTZ)

10. DATE AND TIME CATEGORIZED:
10/06/1994 2044 (MTZ)

11. DOE NOTIFICATION:
10/07/1994 2154 (MTZ) R. Juroff DOE/HQ

12. OTHER NOTIFICATIONS:
10/07/1994 2103 (MTZ) D. Vaughn DOE/RFFO
10/07/1994 2132 (MTZ) B. Kray STATE
10/06/1994 2050 (MTZ) SDO, J. Conti DOE/RFFO

13. SUBJECT OR TITLE OF OCCURRENCE:
#1490/1505/1554/1600:A Pu-containing liquid was drained from a process line. Line draining was not within the scope of procedure being used.

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14. NATURE OF OCCURRENCE:
01) Facility Condition
F. Violation/Inadequate Procedures
01) Facility Condition
A. Nuclear Safety
02) Environmental
E. Agreement/Compliance Activities

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15. DESCRIPTION OF OCCURRENCE:
On October 26, 1994, it was determined that an additional issue existed which would be considered part of the original occurrence reported in SPMS 1490. This 10-Day Update was issued to add this occurrence to the original occurrence report. It was determined that an Operational Safety Requirement (OSR) violation had occurred because liquid samples were removed from Glovebox 42, Room 149, and were subsequently analyzed without the permission of the Building 771 Operations Manager. This issue was reported under SPMS 1600 on October 26, 1994, and this occurrence was combined with the original report with this 10-Day Update. Details were given in the final paragraph of Section 15.

Due to the fact that occurrences, SPMS Numbers 1505 and 1554, were discovered during the investigation into occurrence SPMS 1490, these three incidents have been combined in this report. All three occurrences pertain to the unauthorized draining of the fill lines of Tank 467 and the drain line of Tank 973 in Building 771. Because extensive investigations were necessary to assemble the information required, the 10-Day Report was not transmitted in the required time frame.

At 0025 hours on Tuesday, September 27, 1994, a pre-evolution briefing was held in Building 771, in accordance with the requirements in Conduct of Operations (COOP) procedure 1-31000-COOP-011, Pre-Evolution Briefing. The pre-evolution briefing was held prior to the performance of Task Information Package (TIP) 771-OPS-94-005, Transfer Solution from D-467 to Glovebox 42. All personnel involved in the performance of this TIP were in attendance at the briefing. TIP 771-OPS-94-005 provided instructions for air sparging and vacuum transfer of the actinide solution in Tank D-467, Room 149, into 4-liter narrow mouth bottles. As required by the TIP, these bottles

15. DESCRIPTION OF OCCURRENCE: (continued)

were to be filled to no more than approximately 3.75 liters, and were to be placed in a one-layer planar array inside Glovebox 42, Room 149. At 0320 hours, September 27, 1994, an entry in the Shift Managers' (SMs') Logbook indicated that the performance of the initial portion of the TIP was completed in a commendable manner, and that the samples had been drawn from the first three bottles of solution as required by the TIP.

Step 7.5.3 of the TIP is a Hold Point, and reads as follows, "Verify that operations may continue after the first three narrow mouth bottles have been analyzed and meet the requirements of NMSLs (referenced Appendix 5)." The Production Foreman (PF) signed off on this step on September 28, 1994. An entry in the SMs' Logbook on September 28, 1994, at 0100 hours, states that the continued performance of the TIP would not take place on this date because of the termination of operations due to the Lockout/Tagout (LO/TO) of Fans FN-1 and FN-3. This caused the continuation of the solution transfer operations to be postponed until the following day.

At 0018 hours on Thursday, September 29, 1994, a pre-evolution briefing was held prior to the continuation of TIP 771-OPS-94-005 tank draining activities. The Production Manager acted as SM for this briefing, as the SM was involved in a regularly scheduled shift briefing for midnight shift personnel. All personnel involved in the performance of the TIP were in attendance at the pre-evolution briefing, as all had attended the shift briefing on the preceding day shift. The Process Specialists (PSs) involved in the performance of the TIP had worked the day shift on September 28, 1994, and had returned to the plantsite to work the midnight shift in the morning hours of September 29, 1994. An entry in the SMs' Logbook at 0400 hours on September 29, 1994, states that the SM had observed the performance of the TIP activities, and that the operation had gone well. The entry further stated, "One hour final pull on Tank 467 now in process." There were no further entries in the logbook on this date regarding the performance of the TIP.

There were no logbook entries until October 6, 1994, but a letter written by the PM on October 7, 1994, supplied further information on the actions that followed the performance of TIP 771-OPS-94-005 on September 29, 1994. A portion of the PM's letter read as follows:

> "Tank 467 draining was completed on September 29, 1994 on the Mid Shift. After the last of the Tank 467 solution was collected, the decision was made to verify that additional drain lines connected to the identified lines were free from liquid. This decision was based on a safety factor to reduce the risk of leakage from these lines and elimination of personnel

15. DESCRIPTION OF OCCURRENCE: (continued)

exposure to clean-up and contain a possible leak.

The drain line from Tank 467 is connected to the fill line of Tank 467 and the drain line of Tank 973. Tank 973 is a recycle tank used to collect the same type of solution as that in Tank 467.

After the initial draining of Tank 467 was complete, the drain valve was closed and the fill line valve was opened to assure that all solution was removed. The solution from this line was collected in a 4-liter bottle. The drain line valves to Tank 973 were then opened to verify that this line was empty. This solution was also placed into 4-liter bottles. A total of approximately 5 liters of solution was collected during this operation.*

Because the actinide solution from the drain lines was appreciably darker than that from Tank 467, on Wednesday, October 5, 1994, the PM decided to pull a sample of solution from one of the bottles containing the darker colored solution. This sampling was not authorized by the TIP. Chemical Laboratory personnel performed an unofficial analysis of this sample, but no standards were run with this analysis. The sampling results were 8.52 and 8.58 grams/liter concentration of plutonium in this solution. The PM was aware that these readings were outside the Nuclear Material Safety Limits (NMSL) of 5 grams/liter for Glovebox 42. The limits in NMSL 940037/MFS-002-0/2/C6-13B, Tank D-467 Solution Transfer to Glovebox 42 (For Use with TIP-771-OPS-94-005, Rev. 0 Only), were formulated specifically for use with the TIP Tank 467 draining operations. Additionally, NMSL 940037/MFS-02-0/2/6C-13I, Line 5 Glovebox H-4 Nash Vacuum Pump System Operation for Tank D-467 Solution Transfer to Glovebox 42 (For Use with TIP-OPS-94-005, Rev. 0 Only), states, "NO other operations permitted."

At 1937 hours on October 6, 1994, the PM informed the Building 771 SM that operations had been performed on September 29, 1994, which were outside the scope of TIP 771-OPS-94-005. The PM notified the SM that the NMSL for Glovebox 42 had apparently been violated. The SM immediately notified the Building 771 Operations Manager (OM), and reported the occurrence to the Notification Center. The SM terminated Building 771 operations at 2043 hours, and initiated the preparation of Termination Operations Order 00-771-77. The SM notified the Department of Energy (DOE) Facility Representative, and briefed the DOE Staff Duty Officer (SDO). The SM attempted to notify the Building 771 Criticality Safety Building Support (CSBS) Engineer. Failing to find the CSBS,

15. DESCRIPTION OF OCCURRENCE: (continued)

the SM was able to locate other Nuclear Safety Criticality Engineering personnel who agreed to come to plantsite to investigate the incident. Subsequently, the SM presented a briefing to the midnight shift personnel at 0021 hours on October 7, 1994, to inform them of the termination of operations.

At 0108 hours on October 7, 1994, Nuclear Safety Engineering personnel notified the SM that their investigation had revealed that no imminent danger existed in Building 771 because of this incident. However, the Nuclear Safety Engineer indicated to the SM that a possibility existed that double contingency had been violated because of this incident. A critique was held on this occurrence at 0730 hours, October 7, 1994.

On October 10, 1994, during an independent review and verification of the valve Lockout/Tagout (LO/TO) for TIP 771-OPS-94-005, a PS determined that an air operated valve on the line leading to Tank 467 was incorrectly locked and tagged out. In addition, there was no LO/TO on the valve which should have been locked and tagged out. This incident was reported under SPMS #1505, which was combined with the original report.

On October 18, 1994, it was determined that unauthorized changes had been made to Appendix 7, Initial Valve Lineup, of TIP 771-OPS-94-005. In the Appendix 7 section labeled Deficiencies, hand-written notations were made that some valve numbers and locations in this appendix were incorrect. The entry further stated that the correct numbers and locations of the valves were inserted on pages 5 and 6 of the appendix; this entry was signed by the PM. The pen-and-ink changes were made and were initialed by the PM. Because this occurrence, reported as SPMS #1554, was discovered during the investigation of the original report, this occurrence was also combined with the original report.

At 1340 hours on October 26, 1994, following a further inquiry into the draining and sampling activities in Glovebox 42, it was determined that an OSR violation had occurred on October 6, 1994. When samples were taken from the 4-liter bottles and analyzed, the compensatory measures delineated in Addendum 1 to Termination Shift Order 771-94-075, Attachment 12, were not followed as required. The specific steps which were not followed were as follows:

"2. The Building 771 Operations Manager will give specific daily permission to perform analyses on TIP 5 samples, Building 559 waste samples, and Building 771 Utilities samples.

3. Laboratory personnel will report to the Shift Manager/designee and provide a status of sampling activities every four hours."

These requirements were not met during the sampling and

15. DESCRIPTION OF OCCURRENCE: (continued)
analysis on October 6, 1994. While the compensatory action requirements were administrative in nature, not meeting these requirements violated an established corrective action covering a Limiting Conditions for Operations (LCO) requirement. However, the technical basis for the compensatory measures was not violated. On October 26, 1994, SPMS 1600 was added to this occurrence report as it was considered to be part of the original occurrence.

16. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:
Normal Curtailed Operations

17. ACTIVITY CATEGORY:
Normal Operations

18. IMMEDIATE ACTIONS TAKEN AND RESULTS:
The movement, transfer, and operations involving fissile material in Building 771 were terminated. Following the critique for this occurrence, Standing Order 34 was written, including the entire Rocky Flats plantsite in this termination of operations.

Glovebox 42 was posted as an NMSL Violation as required by the Building 771 NMSL Manual.

Access to Room 149, which contains Glovebox 42, was limited to allow essential operations only, under the direction of the Building 771 OM.

19. DIRECT CAUSE:
3) PERSONNEL ERROR
C. Violation of Requirement or Procedure

20. CONTRIBUTING CAUSE(S):

21. ROOT CAUSE:

22. DESCRIPTION OF CAUSE:
The direct derivation method was used to determine the direct cause of these occurrences. Independent investigations into all four incidents are ongoing at this time, and a more detailed analysis will be provided in the final report.

The direct cause of this occurrence is personnel error, procedural violation. During the performance of TIP 771-OPS-94-005 on September 29, 1994, personnel exceeded the scope of the TIP by the unauthorized draining of actinide solution from the fill and drain lines leading to Tank 467. This occurrence was reported as SPMS 1490. The LO/TO errors, the

22. DESCRIPTION OF CAUSE: (continued)
pen-and-ink changes to Appendix 7 of the TIP, and the sampling activities which violated the Building 771 OSR, as reported under SPMS 1505, SPMS 1554, and SPMS 1600, were also considered to be personnel errors.

23. EVALUATION: (By Facility Manager/Designee)
Multiple investigations and evaluations are being performed on the four incidents detailed in Section 15. These investigations may result in further information being gathered which will be detailed in the final report.

24. IS FURTHER EVALUATION REQUIRED?: Yes [X] No [ ]

IF YES - BEFORE FURTHER OPERATION?: Yes [ ] No [X]

BY WHOM?:

BY WHEN?:

25. CORRECTIVE ACTIONS:
(* = Date added/revised since final report was signed off)

26. IMPACT ON ENVIRONMENT, SAFETY AND HEALTH:
To be submitted in the final report.

27. PROGRAMMATIC IMPACT:
To be submitted in the final report.

28. IMPACT UPON CODES AND STANDARDS:
To be submitted in the final report.

29. FINAL EVALUATION AND LESSONS LEARNED:
To be submitted in the final report.

30. SIMILAR OCCURRENCE REPORT NUMBERS:
1) To be submitted in the final report.

31. DOE FACILITY REPRESENTATIVE INPUT:

Entered by: Date:

32. DOE PROGRAM MANAGER INPUT:

Entered by: Date:

OCCURRENCE REPORT

771 Operations

(Name of Facility)

Plutonium Processing and Handling

(Facility Function)

Rocky Flats Plant / EG&G Rocky Flats

(Name of Laboratory, Site or Organization)

Name: GAFFNEY, RICHARD S
Title: PM SHIFT MANAGER Telephone No.: (303)966-2504

(Facility Manager/Designee)

Name: C. Ballinger
Title: Operations/Facility Manager Designee Telephone No.: (303)966-250

(Originator)

Name: S. L. Cunningham Date: 10/06/1994

(Authorized Classifier (AC))

1. OCCURRENCE REPORT NUMBER: RFO--EGGR-7710PS-1994-0062
   #1490/Procedural Infraction During Solution Stabilization Operation

2. REPORT TYPE AND DATE:

	Date	Time
[X] Notification	10/08/1994	1013 MTZ
[ ] 10 Day		
[ ] 10 Day Update		
[ ] Final		

3. OCCURRENCE CATEGORY:
   [ ] Emergency [X] Unusual [ ] Off-Normal [ ] Cancelled

4. DIVISION OR PROJECT: EG&G Rocky Flats, Inc.

5. DOE PROGRAM OFFICE:
   EM - Environmental Restoration & Waste Management

6. SYSTEM, BLDG., OR EQUIPMENT:
   Building 771, Solution Stabilization Operation

7. UCNI?: No

8. PLANT AREA: Residue Operations

9. DATE AND TIME DISCOVERED:
   10/06/1994 1937 (MTZ)

10. DATE AND TIME CATEGORIZED:
    10/06/1994 2044 (MTZ)

11. DOE NOTIFICATION:

10/07/1994 2154 (MTZ)	K. Juroff	DOE/HQ

12. OTHER NOTIFICATIONS:

10/06/1994 2050 (MTZ)	SDO, J. Conti	DOE/RFFO
10/07/1994 2132 (MTZ)	E. Kray	STATE
10/07/1994 2103 (MTZ)	D. Vaughn	DOE/RFFO

13. SUBJECT OR TITLE OF OCCURRENCE:
#1490/Procedural Infraction During Solution Stabilization Operation

---

14. NATURE OF OCCURRENCE:
01) Facility Condition
F. Violation/Inadequate Procedures
01) Facility Condition
A. Nuclear Safety
02) Environmental
E. Agreement/Compliance Activities

---

15. DESCRIPTION OF OCCURRENCE:
Following the completion of Task Information Package (TIP) #5, additional solutions from process lines outside the scope of the procedure. This violated not only TIP #5, but also the associated Nuclear Material Safety Limit 940037/MFS-002-0/2C6-13A (NMSL), and possibly caused a noncompliance with the temporary storage agreement with the Colorado Department of Public Health and Environment for storage of RCRA Wastes in Glove Box 42. TIP #5 involved the draining of actinide solution from Tank 467 into 4 liter containers located in Glove Box 42 of Building 771, Room 149.

The draining of the fill lines of tank 467 and the drain line of Tank 973 was not covered by TIP #5 or any other approved procedure. This draining resulted in an additional accumulation of 5 liters of solution. Preliminary investigation indicates that the 5 liters was mixed with 14 liters of floor wash solution and accumulated in five 4 liter bottles. The actinide solution drained from the process lines during this unapproved evolution was of a higher concentration than the solution drained from Tank 467. This resulted in 3 of the above mentioned five 4 liter bottles exceeding the solution concentration allowed under the NMSL. The NMSL allowed a maximum of 5 grams per liter total actinide solution. The concentrations found in the three 4 liter containers were 5.12, 7.55, and 8.25 gram per liter total actinide solution.

NMSL 940037/MFS-002-0/2C6-13A was written specifically for TIP #5 and was dependent on the Initial Valve Line Up specified in TIP #5, Appendix 7. The double contingency principle of the NMSL was violated when valves HV-750, HV-817, HV-753, and AV-3 were opened contrary to the requirements of the Initial Valve Line Up in TIP #5.

15. DESCRIPTION OF OCCURRENCE: (continued)

This notification report was not transmitted within the required time period due to ORPS transmission problems caused by upgrading the original occurrence from off-normal to unusual, and delays in classification.

16. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:
Normal Curtailed Operation

17. ACTIVITY CATEGORY:
Normal Operations

18. IMMEDIATE ACTIONS TAKEN AND RESULTS:

1. The movement, transfer, and operations involving fissile material in Building 771 were terminated. Following the critique for this occurrence, this termination was expanded to include the entire plant site.

2. Glove Box 42 was posted as a NMSL Violation as required by the Building 771 NMSL Manual.

3. Access to Room 149, which contains Glove Box 42, was limited to allow essential operations only.

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ENCLOSURE 2

BASIS FOR STANDING ORDER 34

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 2, 1994

TO: D.W.Ferrera, Safety Review Board Chairperson, Bldg. 111, X5008

FROM: J. A. Geis, SRB Subcommittee Chairperson, Bldg. 850, X7088

SUBJECT: BASIS FOR STANDING ORDER 34 - JAG-193-94

The subject Standing Order defines the activities that were either shutdown or suspended due to the unauthorized draining of fissile solution from process piping in Building 771. Since the transfer of fissile solution was performed outside the approved safety basis, solution transfers in Building 771 in support of Phase I Liquid Stabilization were shutdown for cause. Restart of this activity is, therefore, governed by Department of Energy Order 5480.31 and will require a formal Operational Readiness Review prior to receiving authorization to proceed.

The remaining activities described in the Standing Order fall into two categories. First, those activities in progress at the time of the incident were suspended by EG&G Rocky Flats, Inc. management as a precautionary measure to provide management with the opportunity to understand the generic implications and appropriate corrective actions prior to reinitiating the activities. Second, those activities that are not yet started were listed as suspended to assure that the lessons learned from this incident were incorporated into the restart plans for each activity.

The activities suspended all involve the handling of significant quantities of fissile material. Activities not suspended involve very limited quantities of fissile material and thus pose minimal criticality safety risk during continued performance with existing controls. For example, a criticality from the handling of waste containers with <200 grams of fissile material has been qualitatively judged to be incredible. Also analytical samples, which are typically < 2 grams in total weight, are not a credible criticality safety risk. The handling of piped process waste liquids with concentrations < 4E-3 gram/liter fissile material content has been qualitatively shown double contingent for the transfer authorized. There is no apparent credible scenario from handling radioactive sources. For these activities, even if deliberate action outside procedures were taken, criticality risk is minimal. These activities also provide for maintenance of compliance with safety and environmental standards, such that suspension could result in increased safety risks or violation of regulatory statutes.

Revision 0 of Standing Order 34 was issued to assure that the activities known to be ongoing or planned involving significant quantities of fissile material were properly suspended pending a review of the incident at the critique. Revision 1 was issued to more clearly list all of the activities intended to be suspended and Revision 2 was issued to further clarify the specific activity shutdown for cause and to more clearly define those activities not yet started and governed by their own restart readiness review.

If there are any questions concerning this, please contact me at extension 7088.

cc:
A. H. Burlingame
D. W. Croucher
J. G. Davis
R. E. Fray
W. S. Glover
P. M. Golan
T. G. Hedahl
R. E. Kell
M. M. McDonald
V. M. Pizzuto
D. J. Sanstrom
S. G. Stiger
G. M. Voorneis

sl

Standing Order No: 34
Revision: 0
Effective Date: October 7, 1994
Expiration Date: April 7, 1995
Page: 1 of 1

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and operations involving fissile material as defined by the scope and applicability of this order.

Scope and Applicability:

This Standing Order applies to movement of all fissile material except:

(1) all low-level and low-level mixed waste movements (less than 100 nano curies/gram),
(2) all waste/residue containers (55-gallon drums and waste crates only) containing less than 200 grams of dry fissile material, and
(3) analytical samples and analysis.

Directive / Instructions / Information:

1. Effective immediately, movement of all fissile material, with the exception of material specifically excluded above, is suspended.

2. Any exceptions to the above must be approved by the President of EG&G, Rocky Flats Inc., or his designee.

Approved by: Richard B. Kramer, 10/7/94
President Date

INFORMATION ONLY

PADC-94-02054

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INFOR
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Standing Order No: 34
Revision: 1
Effective Date: October 11, 1994
Expiration Date: April 11, 1995
Page: 1 of 1

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and process operations involving fissile material as defined by the scope and applicability of this order.

Draft Revision 1 was issued to list specific activities suspended under the Revision 0 of Standing Order.

Revision 1 final incorporates minor editorial changes to Draft Revision 1 and was approved by the Safety Review Board (SRB).

Scope and Applicability:

This Standing Order specifically prohibits movement, transfer and process operations involving the following fissile material.

1. Phase I and Phase II Solution Stabilization
2. SNM Consolidation
3. Thermal Stabilization
4. Stockpile Reliability Evaluation Program Shipments
5. SNM Inventory
6. Duct Remediation to remove the accumulation of fissile material from ventilation ducts and related systems.
7. HSP 31.11 Activities
8. Movement or Transfer of drums, waste crates, or other containers containing in excess of 200 grams of fissile materials.
9. Handling of HEUN solutions in any quantity.
10. Residue repack and characterization for drums or containers with greater than 200 grams of fissile material.

11. SNM Shipment program including:
    a. 4.5% enriched uranium oxide
    b. Enriched uranium hemishells
    c. Criticality experiment parts

12. No liquid wastes containing or expected to contain more than 4E-3 gram/liter concentration of plutonium or americium may be transferred in piping systems. Liquid wastes in containers are governed by the 200 gram limit described in 8 above.

Directive / Instruction / Information:

1. Effective immediately, all movements, transfers, and other processing operations involving fissile material listed above are suspended.

2. Questions concerning this Standing Order can be directed to the Chief Engineer.

3. Any exceptions to the above shall be submitted by the Cognizant Program Manager to the Chief Engineer for consideration including review by the appropriate SRE sub-committee.

Approved by: _____ 10/11/94
President Date

Standing Order No: 34
Revision: 2
Effective Date: October 20, 1994
Expiration Date: October 20, 1995
Page: 1 of 2

INFORMATION ONLY

SUBJECT SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Purpose:

This Standing Order immediately suspends movement, transfer, and process operations involving fissile material as defined by the scope and applicability of this order.

Revision 2 is issued to list specific activities that are shut down for cause and to list activities that are suspended pending root cause analysis of the shutdown operation.

Scope and Applicability:

This Standing Order shuts down the following operation:

Transferring of fissile liquids from tanks to bottles for Phase I stabilization.

This Standing Order suspends the following operations:

1. SNM Consolidation
2. Stockpile Reliability Evaluation Program Shipments
3. SNM Inventory
4. Duct Remediation to remove the accumulation of fissile material from ventilation ducts and related systems.
5. HSP 31.11 Activities
6. Movement or transfer of drums, waste crates, or other containers containing in excess of 200 grams of fissile materials.
7. Residue repack and characterization for drums or containers with greater than 200 grams of fissile material.
8. SNM Shipment program including:
   a. 4.5% enriched uranium oxide
   b. Enriched uranium hemishells
   c. Criticality experiment parts
9. No liquid wastes containing or expected to contain more than 4E-3 gram/liter concentration of plutonium or americium may be transferred in piping systems. Liquid wastes in containers are governed by the 200-gram limit described in 6 above.

Standing Order No: 24
Revision: 0
Issue Date: October 20, 1994
Expiration Date: October 20, 1995
Page: 2 of 2

SUBJECT: SUSPENSION OF FISSILE MATERIAL MOVEMENTS
Title

Scope and Applicability: (continued)

This Standing Order places on hold the startup of the following activities which are governed by formal startup requirements of their own:

1. Phase II liquid stabilization activities.
2. Thermal Stabilization.
3. Highly Enriched Uranium Nitrate removal and shipment.

Directive / Instructions / Information

1. Effective immediately, all movements, transfers, and other processing operations involving fissile material listed above are suspended.
2. Questions concerning this Standing Order can be directed to the Chief Engineer.
3. Any exceptions to the above shall be submitted by the Cognizant Program Manager to the Chief Engineer for consideration including review by the appropriate SRB subcommittee.

INFORMATION ONLY

Approved by: _____, 10/20/94
President, A.H. Burlingame Date

ENCLOSURE 3

ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC.
ROCKY FLATS PLANT, P.O. BOX 464, GOLDEN, COLORADO 80402-0464 • (303) 966-7000

November 28, 1994

94-RF-11784

Mark N. Silverman
Manager
DOE, RFFO

ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-275-94

This memorandum forwards the subject Root Cause Analysis and Evaluation of Generic Implications (Attachment 1) for the tank draining incident in Building 771 that occurred on September 29, 1994. This information is provided for your information and to assist in your evaluation and ultimate approval of our actions to restart suspended operations.

In addition to the root cause analysis the following additional information/correspondence is provided:

- Attachment (2) documents an independent consultant's evaluation of the process used to conduct the analysis as well as the conclusions reached therein.
- Attachment (3) reflects my direction for the Senior Review Board (SRB) concerning further action in regards to this root cause analysis.
- Attachment (4) reflects my direction to all EG&G Directors concerning a sitewide review and briefings related to this analysis.
- Attachments (5), (6), (7), and (8) document additional action that I have directed to individual senior managers that will be coordinated through the SRB to further respond to the subject analysis.
- Attachment (9) documents the conclusions by the Chief Engineer that the procedure used to control this evolution adequately provided the required nuclear safety until such time that the procedure was willfully and knowingly violated.

I consider the subject analysis to be thorough and insightful. The recommendations are sweeping and if fully and effectively implemented should cause further improvement in the ability to perform work at Rocky Flats. In particular the analysis effectively addresses the fundamental and direct cause of this incident, that is the willing and knowing violation of the Principles of Conduct of Operations and the subsequent non-disclosure of such violations for a period of seven days.

The analysis however, appropriately extends far beyond this immediate and direct cause and provides insightful recommendations to further improve the processes and "culture" that has been progressively implemented over the last five years at Rocky Flats. Specifically, the recommendations fall into three basic categories.They are:

(1) Restart of Suspended Operations in the near-term

(2) Further improvement over the next few months in our processes used to control work at Rocky Flats

(3 Developing facts related to the "safety culture" and taking longer term actions to improve that culture

The EG&G Rocky Flats overall response to this incident and this analysis is to aggressively conduct the necessary reviews and where necessary, implement retraining, put in place applicable compensatory measures to allow prompt restart of suspended operations, to move forward with a careful and thougntful improvement of our processes to control work and to take action to further improve the safety culture at Rocky Flats. The three step process described above implements this approach. I believe it is very important that we continue to build upon our processes as a result of the lessons learned from this incident while at the same time ensuring our ability to quickly move forward with the important risk reduction activities confronting this site.

Attachment (9) documents the fact that the procedure used to conduct the subject operation adequately provided for double contingency and overall nuclear safety until such time as the procedure was intentionally violated. A key element in allowing us to move forward with a wide range of risk reduction activities is the final development and use of "activity based planning" using necessary and sufficient standards. We must aggressively move to finalize that process; however, until it is completed, I see nothing in this analysis that indicates that we cannot safely control work with existing work control documents given proper reviews and appropriate compensatory measures.

I will keep you advised as we continue with our analysis of this incident and the implementation of required corrective actions.

I request your support in acting on my recommendations for restart of suspended operations.

A. H. Burlingame
President
EG&G Rocky Flats, Inc.

plh

Attachments: (9)
As Stated

Orig. and 1 cc to M. N. Silverman

cc:
D. Sargent - DOE, RFFO
L. Smith - " "
K. Klein - " "

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 23, 1994

TO: A. H. Buningame, President, Bldg. 111, X4361

FROM: W. S. Glover, Performance Assurance, Bldg. 111, X6310

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 WSG-317-94

The purpose of this letter is to transmit the Root Cause Analysis of the unauthorized draining of solutions that occurred in Building 771 on September 29, 1994, and my evaluation of generic implications, associated with this event. These evaluations are in response to Occurrence Notification Report RFO-EGGR-771OPS-1994-0062, and in support of development and implementation of restart plans for operations suspended by Standing Order Number 34, Revision 2, dated October 20, 1994. The primary lesson learned from this event is that deliberate actions outside of authorized operations can undo the progress we are making in implementing Conduct of Operations and activity-based planning. The recommendations which flow from this primary lesson can be time phased as shown in Attachment 3, to return us to safe operations shortly, reducing real risks in buildings such as Building 771 with adequate safeguards against deliberate actions. Concurrent with restarting suspended activities, we can refine and improve programmatic process weaknesses which have been identified by the Root Cause Analysis. Compensatory measures are being implemented to support safe work with the continuing existence of the "safety culture" issue. The ultimate resolution of the basic cultural issue will be fashioned following a more complete understanding of the issue. Actions to achieve this better understanding currently are underway.

On the evening of October 6, 1994, the Building 771 Production Manager reported to the Building 771 Shift Manager that solution draining activities outside the scope of authorized work were conducted on the backshift on September 29, 1994. Building 771 nuclear operations were terminated, and an Occurrence Report was filed by the Shift Manager. Subsequent inquiry into the incident identified one employee who deliberately initiated the activity outside the authorized scope of work and two supervisory employees who not only did not stop, but assisted in completing the unauthorized activities and then concealing them for seven days.

The Root Cause Analysis, Attachment 1, focused on the facts and circumstances surrounding the individual event in Building 771 and concluded that there were one summary cause, three root causes, two contributing causes, and two potential problems, listed in order of importance as follows:

Summary Cause

- Personnel failed to fully accept and implement the concepts of Conduct of Operations.

Root Causes

- Task performance was less than adequate in that a worker deliberately performed work outside of the authorized scope of work;
- Supervision of the task was less than adequate to prevent the intentional unauthorized operation; and

- Barriers and controls which would have deterred an unauthorized solution transfer were less than adequate; including those associated with the Resource Conservation and Recovery Act (RCRA).

Contributing Causes

- Corrective actions were not yet implemented or were less than adequate for previously identified events or circumstances that had characteristics similar to this event; and
- The process to ensure that individuals meet current training and qualification requirements prior to assignment to work activities in Building 771 is less than adequate.

Potential Problems

- The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities; and
- Removal of the lockout/tagout per Task Information Package (TIP) 5 was not in compliance with the compensatory measures established for the Raschig Ring tank Unreviewed Safety Question Determination (USQD).

I concur with the causal factors and potential problems which are discussed in detail in the attached Root Cause Analysis report.

The Root Cause Analysis and associated corrective action recommendations focused on the specific event in Building 771. The Generic Implications evaluation was completed by my office and senior personnel familiar with the Root Cause Analysis and considered broader implications which, if corrected, should mitigate or prevent future recurrence of this or related events across the site.

The Generic Implications of this event include:

- Lack of acceptance of Conduct of Operations principles;
- Ineffective management actions in resolving identified problems;
- Additional types of hazards warranting management attention; and
- Inadequate discipline in and process for creating and maintaining authorization bases.

Due to the significance of these Generic Implications, I have recommended actions beyond those covered in the Root Cause Analysis. My recommendations are included in the Evaluation of Generic Implications of Building 771 Incident, Attachment 2.

Once you have concurred with the Root Cause Analysis and Evaluation of Generic Implications they will be forwarded to the responsible manager, Building 771 Operations Manager, for appropriate action per 1-D97-ADM-16.01, Occurrence Reporting and to the Chairman of the Safety Review Board for appropriate inclusion in actions to support suspended operations restart. For convenience, I have assembled the recommendations from the Root Cause Analysis and the Generic Implications evaluation into one summary table, provided as Summary of Root Causes, Generic Implications, and Recommendations, and provided it here as Attachment 3.

I recommend that recommendations 4.3 in the Generic Implications Evaluation and S.2, part of A.1, B.2, B.4, C.1, C.2, C.3, C.4, E, G.1, and G.2 in the Root Cause Analysis be implemented, where applicable, before lifting Standing Order 34, which limits the movement of fissile material. These recommendations have been incorporated in the restart plans which have been submitted to the Department of Energy, Rocky Flats Field Office for approval. The other corrective actions should be scheduled for completion as soon as practicable in the short term (6 months) or long term (12 months) as indicated in Attachment 3.

KDS:ker

Attachments:
1. Root Cause Analysis of Building 771 Unauthorized Draining of Process Lines Reported on Occurrence Report RFO-EGGR-771OPS-1994-0062
2. Evaluation of Generic Implications of Building 771 Incident
3. Summary of Root Causes, Generic Implications, and Associated Recommendations

cc:
J. G. Davis
J. A. Geis

ROOT CAUSE ANALYSIS OF THE BUILDING 771 UNAUTHORIZED OPERATION OF PROCESS LINES REPORTED IN OCCURRENCE REPORT RFO--EGGR-771OPS-1994-0062

Report Number: CA-94-010 Report Date: 11/23/94

1. Description/Date/Time of Event

Summary of Event

The purpose of this section is to provide a brief overview of the event. The background section will contain a more detailed account of the event and the causal factors preceding and following the event.

On September 29, 1994, at approximately 0315, a solution containing Plutonium (Pu) was drained from a process line that was not included within the scope of Task Information Package (TIP) 771-OPS-94-005 (TIP 5). The solution obtained in this unauthorized operation was darker and more viscous than the solution drained from Tank D467 and was placed in five 4-liter bottles and diluted. The material balance card was revised to indicate that the five extra 4-liter bottles came from Tank D467.

Draining of the unauthorized solution into Glovebox 42 was not reported until October 6, 1994, after the Technical Supervisor I (hereafter referred to as the Production Foreman [PF]) obtained a result of a quick analysis of a bottle containing the unauthorized solution. The sample indicated a Pu gram per liter (g/l) concentration of approximately 8.25 g/l which was above the limit listed in TIP 5 (5 g/l) on Nuclear Material Safety Limit (NMSL) NMSL 940037/MFS-002-0/2/C6-13B.

Summary of Root Cause Analysis Conclusions

The unauthorized operation did not comply with the NMSL associated with TIP 5. Also, the unauthorized operation did not comply with Conduct of Operations practices established in the procedures and training at Rocky Flats.

Although the NMSL was not complied with, there was still some safety margin to prevent an actual criticality event. The authorized scope of work resulted in fifty-five 4-liter bottles containing solutions with plutonium concentrations of less than the limit of 5 g/l. The unauthorized operation resulted in accumulation of an additional five 4-liter bottles of solution, three with a plutonium concentration in excess of the 5 g/l NMSL. In order to have a criticality, more solution at a concentration significantly higher than 5 g/l would have been required. Thus, there was a safety margin even in the unauthorized operation, albeit not known or controlled in advance. Information was provided to the root cause analysis team from Engineering and Safety Services (Letter DPS-139-94) indicating that TIP 5 included adequate double contingency and double contingency was achieved during the execution of TIP 5, until the beginning of the unauthorized operation.

1. Description/Date/Time of Event (continued)

The draining of the unauthorized solution also resulted in a non-compliance with the requirements listed in Unreviewed Safety Question Determination (USQD) USQD-RFP-93.1503-GLS, "Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs." This non-compliance occurred when valves were opened that permitted transfer of unauthorized solution from process lines other than those designated in TIP 5.

There are also Resource Conservation and Recovery Act (RCRA) implications for this event. TIP 5 had been reviewed by the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment (CDPH&E) prior to the TIP being implemented. The Division had agreed with draining Tank D467 and with interim storage of the resulting solutions in Glovebox 42 pursuant to Compliance Order No. 93-04-23-01.

The root cause analysis focused on the facts and circumstances surrounding the individual event in Building 771 and concluded that there were one summary cause, three root causes, two contributing causes, and two potential problems. The two potential problems identified did not cause or directly contribute to the event, but were areas of concern identified during the conduct of the analysis. The causes and potential causes are listed below in order of significance in causing or contributing to the unauthorized operation of draining solution from lines outside of the scope of TIP 5. The term less than adequate (LTA) is used in the context of this report to identify processes, performance, or systems that were not adequate enough to prevent or mitigate the consequences of the unauthorized operation.

Summary Cause

- Personnel failed to fully accept and implement the concepts of Conduct of Operations.

Root Causes

- Task performance was LTA in that a worker deliberately performed work outside of the authorized scope of work;
- supervision of the task was LTA to prevent the intentional unauthorized operation; and
- barriers and controls which would have deterred an unauthorized solution transfer were LTA, including those associated with RCRA.

Contributing Causes

- Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event; and
- the process to ensure that individuals meet current training and qualification requirements prior to assignment to work activities in Building 771 is LTA.

1. Description/Date/Time of Event (continued)

Potential Problems

- The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities; and
- removal of the lockout/tagout (LO/TO) per TIP 5 was not in compliance with the compensatory measures established for the Raschig Ring tank non-compliance USQD.

Methodology of Root Cause Analysis

A root cause analysis is an in-depth analysis of a single event or group of similar events to determine the root and contributing causes. Event and Casual Factors (E&CF) Charting (Attachment I) was the main methodology used in the conduct of this root cause analysis. After the development of the E&CF Chart, the main contributing causal factors were evaluated to determine root and contributing causes using the Root Cause Checklist from Procedure 1-11000-ADM-16.03, Cause Analysis. Document reviews and interviews were used as the main fact gathering tools. The facts presented in this report were verified through document reviews and/or personal interviews. Statements made by one individual in an interview were not considered factual until the information was verified in subsequent interviews with other individuals or through document reviews. A listing of the documents reviewed during the conduct of this root cause analysis is provided as Attachment II.

Attachment III provides a listing of the general categories of individuals interviewed. The analysts who conducted the document reviews and interviews also developed the E&CF Chart and this root cause report. The root cause report was also reviewed by a team of managers and consultants to test the completeness and defensibility of the analysis.

Fact gathering by the root cause analysis team did not begin until October 11, 1994, five days after the event was disclosed and twelve days after the event itself. Also, interviews conducted by the team of the individuals involved in the event occurred after they had already been interviewed by others. Interviews by the team of the three key people who were involved in the event occurred while their employment was in the process of being suspended and then terminated. After their employment was terminated, no further interviews were conducted.

The initial schedule for completion of the root cause analysis was three days. As a result, fact gathering for this root cause analysis was initiated without a clearly defined scope for the analysis because of the urgency to quickly identify the causes and associated corrective actions. Later, as the significance of underlying issues became more clear, the scope and schedule were expanded.

1. Description/Date/Time of Event (continued)

Fact gathering for this analysis was hampered by the early inquiries by others. Also, a few people interviewed for this analysis were reluctant to have their names used in connection with the information they provided.

Background

In December 1989, nuclear weapons production activities were curtailed at Rocky Flats. The 1989 curtailment directive stopped all production processes using plutonium in Building 771 without directing specific steps to assure safety during curtailment. During this root cause analysis, it was determined that some workers in Building 771 expressed concerns about the solutions left in the tanks and requested, in early 1990, that the tanks be drained. Tanks were not drained as a result of the workers' concerns because of management's assurance that production would soon resume.

The opinion that resumption would occur soon and that the curtailment was temporary persisted through 1992. In early 1993 the mission of Rocky Flats was changed. The new mission did not include plans for resumption of curtailed plutonium defense production at Rocky Flats. Since the original curtailment was perceived as "temporary," a plan for extended shutdown had not been formulated. Consequently, the curtailment had been essentially a "stop-in-place" without planned management of plutonium (such as, solution stabilization, thermal stabilization, Special Nuclear Material [SNM] storage) for extended shutdown or cessation of production. The "stop-in-place" situation resulted in a growing uncertainty about actual conditions within the process equipment and facilities. This led to increased opportunities for exposure and contamination from leaks and deteriorating equipment and storage containers.

In order to improve control of plutonium and resolve RCRA storage deficiencies, Building 771 Phase I Liquid Stabilization commenced in April 1992 with the completion of TIP-92-006. TIP-92-006 involved the removal and processing of liquid that contained fissile material, stored in 4-liter bottles, that were packaged in drums. A readiness evaluation was completed in May 1994 to expand Phase I to include tank draining activities. As a result of these expanded activities, Tank D454 was drained in June 1994. Subsequently two other tanks were drained (tanks D1001 and D1002) in July 1994. The same manager, foreman, and crew leader that were involved in the draining of tanks D454, D1001, and D1002 were involved in the draining of Tank D467.

1. Description Date Time of Event continued)

As part of the ongoing expanded Phase I activities, TIP 5 was developed and approved in August and September 1994, per procedure APNO-12, entitled Task Information Package (TIP) Preparation Procedures, to drain the solution from Tank D467. The TIP stated that based on process knowledge, there were 203 liters of plutonium nitrate at a concentration of less than 0.5 g/l of plutonium in Tank D467. The process included draining the solution from Tank D467 into a 4-liter glass flask and then hand pouring the solution from the flask into 4-liter narrow-mouth bottles inside of Glovebox 42. TIP 5 included prerequisites, responsibilities, limitations and precautions, and instructions. TIP 5 required that the 4-liter bottles were only filled to the 3.75 liter level in accordance with the Interim Nuclear Material Safety Manual for Intraplant Shipments. As an administrative control for the process, the 4-liter bottles were marked at the 3.75 liter level. All operations met this 3.75 liter administrative control.

On September 26, 1994, after a briefing of the task team on the requirements for performing the job (called a pre-evolution briefing) at 0840, the NMSLs were posted, the LO/TO for the vacuum pump was removed, and the initial valve line-up for TIP 5 was conducted. The initial valve line-up sheets required pen and ink changes to reflect the as-found condition of the valves. (The appropriateness of using pen and ink changes is being evaluated as part of Occurrence Report RFO--EGGR-771OPS-1994-0062. Additionally, a review of the TIP process is being conducted outside of the scope of this root cause analysis. The pen and ink changes are assigned to Building 771 operations and the TIP process review is assigned to Organizational Effectiveness). The LO/TO remained lifted until the completion of the tank draining evolution on September 29, 1994, at 1022. The LO/TO was not re-installed at the end of each shift.

The rest of the TIP 5 tank draining operation, which occurred over several days and involved the same key personnel and several different process specialists, was conducted on the backshift (midnight to 0800) due to electrical safety upgrades that were occurring on the day shift. There were several safety concerns relating to the electrical system in Building 771, and the electrical upgrades were established as the number one priority in Building 771 by the Operations Manager. Building 771 management decided not to conduct tank draining concurrent with the electrical upgrades because the upgrades required some safety equipment (e.g., ventilation system backup power supplies) to be taken out of service. The TIP allowed the draining operation to be conducted over more than one shift.

On September 27, 1994, after the pre-evolution briefing at 0005, the vacuum pump was started, Tank D467 was sparged, three 4-liter bottles were filled, and samples were obtained to determine the fissile material concentration of the solution in the tank. These evolutions were completed in accordance with the TIP 5 requirements. The samples were taken to the Building 771 Laboratory for the required analyses. The analyses were completed on the day shift of September 27, 1994. The results (0.15 to 0.19 g/l of Pu) were within the limit listed in the NMSL.

Description/Date/Time of Event (continued)

On September 28, 1994, after a pre-evolution briefing at 0015, work under TIP 5 was begun to transfer the remaining solution from Tank D467 drain lines, via hand-held flasks, to the 4-liter bottles inside of Glovebox 42. One 4-liter bottle made of polypropylene broke when dropped from the upper to the lower level of Glovebox 42 during an authorized hand-transfer task. After this bottle broke, newer low density polyethylene 4-liter bottles were utilized for this operation. Subsequently, three 4-liter bottles were filled. The operation was then stopped because of concerns about the operability of the building ventilation system due to ongoing electrical upgrades.

The concern about ventilation was resolved, and, after a pre-evolution briefing on September 29, 1994, at 0000, the TIP 5 operation was continued in order to drain the remaining solution from Tank D467. There were six individuals directly involved with the TIP 5 tank draining operation on September 29, 1994. These individuals consisted of three Operators and a Crew Leader (referred to as Process Specialists [PS] in the TIP), one PF (referred to as the Supervisor in the TIP), and one Manufacturing Manager, Building (referred to as the Production Manager [PM] in the TIP). Hereafter, the term PS or Process Specialist is used to denote the Crew Leader who initiated the unauthorized operation.

In the Process Operations Support organization responsible for performing the D467 tank draining, there were 25 operators, three foremen, and one manager working in Building 771. There was a total of 91 persons assigned to Building 771 who reported to the Building 771 Operations Manager. There were an additional 167 persons assigned to Building 771 who performed support activities for the Operations Manager but who did not directly report to the Operations Manager. During the backshift draining operations there were approximately eight EG&G/RF personnel at the work location.

All of the EG&G Rocky Flats individuals directly involved in the TIP 5 tank draining operation on September 29 had received formal COOP training, training to TIP 5, and training in tank draining (except one operator who indicated in interviews that TIP 5 training was not received). While most of the training for the individuals involved in the TIP 5 operation was current, some of the management and supervisory personnel involved in the operations on September 29 had expired training in the following areas:

- Production Manager (PM) - Nuclear Criticality Safety Supervisor training expired on 09/10/94
- Production Specialist (PS) - Glovebox training expired on 02/04/94
- Shift Technical Advisor (STA) - Nuclear Criticality Safety training expired on 07/14/94
- Shift Manager (SM) - RCRA Computer Based Training (CBT) and RCRA On-The-Job Training (OJT) expired on 03/03/94

One of the three Operators had expired RCRA OJT.

1. Description/Date/Time of Event (continued)

TIP 5 required the presence of the Operations Manager or designee in the process area during the performance of activities involving the movement of SNM. The designee was required to be appointed in writing. While the PM acted as the Operations Manager designee in the performance of this requirement, he was not appointed in writing. A written designation for the PM to act for the Operations Manager was found for the two previous TIP tank draining operations in Building 771. Although not required by the TIP, the Operations Manager directed that the TIP 5 operation be observed by a Shift Technical Advisor (STA). In addition, a Department of Energy (DOE) Facility Representative observed portions of the TIP 5 operation. The SM also observed portions of the operation during his rounds.

To continue with the TIP 5 operation the PS drained solution from Tank D467 into the flask in Glovebox 42. The flask was handed to an Operator who poured the solution from the flask into the 4-liter bottles in Glovebox 42. The 4-liter bottles were then handed from Operator to Operator and placed in the bottom level of Glovebox 42. During the process, samples were collected from each 4-liter bottle, and the sample containers were placed in a plastic bag which was stored in Glovebox 42. Forty-nine additional 4-liter (3.75 liters) bottles of solution were collected which resulted in a total number of 55 4-liter bottles resulting from the authorized draining of Tank D467.

At approximately 0315 on September 29, 1994, the draining was complete except for maintaining a vacuum pull on Tank D467 for a one hour period as required by TIP 5. The vacuum pull was maintained to remove any residual liquids that could have been in the process lines or the tank itself. It was previously determined by those performing and observing the tank draining operation that all personnel except the PS would take a break for lunch once the draining operation was complete and the vacuum pull was in progress. The vacuum pull was considered a minor operation, although it was included as a defined step in the solution transfer portion of the TIP, requiring documented evidence of completion by initialing the task step in the TIP by an operator and an independent verifier. The next step in the TIP was to notify supervision that solution transfer was complete. Personnel involved in observing the TIP 5 tank draining, including the assigned management representatives (PM and STA), left before the solution transfer was complete. The PS was assigned to monitor the vacuum pull, clean-up the area, and prepare for bag-out operations because he was the most experienced of the operators. All other personnel then left the area.

1. Description, Date/Time of Event (continued)

After the other personnel had left the area, the PS proceeded, without direction or authorization, to alter the valve line-up required in TIP 5 with the stated intent of draining solution from the drain line leading to Tank D973. Tank D973 was considered operationally empty, that is, the level of Tank D973 is below the capability of the sight glass to measure. Operationally empty tanks could contain up to 30 liters of solution. Since the PS was involved in the development of TIP 5, he said he knew that this operation was outside the scope of the TIP. An interview with the PS indicated that he made a request during the preparation of TIP 5 to include the draining of this drain line within the scope of the TIP. Interviews with other individuals responsible for the development of TIP 5 and a review of the TIP 5 history file failed to verify that the PS requested that the additional drain line be included within the scope of TIP 5.

The drain line from Tank D973 is cross connected with the drain line of Tank D467. Tanks D467 and D973 were used as ion exchange wash/recycle tanks during production and were expected by the PS to contain the same type of solution. Tanks D971 and D972, which are part of a tank farm with Tank D973, were used as raw (batch) feed tanks during production and would be expected to contain a higher Pu concentration than tanks D973 and D467 (see Attachment IV, Drawing From TIP 5).

While conducting his rounds, the SM entered the Glovebox 42 area and noticed that a dark solution was in the flask in Glovebox 42. Presence of the SM was not required by TIP 5; however, the SM said he was making rounds in the building. The PM then returned to the area and observed a flask containing the dark viscous solution and the presence of the SM at Glovebox 42. The SM commented to the PM about the dark color of the solution, and then left the area without any further investigation into the activities. Interviews with the SM did not resolve why he did not further investigate the activities he observed. After the SM left the area, the PM inquired of the PS as to what was going on. The PS stated that he was draining the drain line from Tank D973. When asked if the PM wanted the PS to continue with the unauthorized operation, the PM stated that since he had probably lost his job anyway, they might as well continue. The PM was then asked if the PM wanted the PS to put the liquid back where it came from. The PM said no. The PM then assisted the PS with the unauthorized operation by helping dilute the unauthorized solution.

During interviews the PS stated that he drained the drain line from Tank D973 because of problems related to contamination from leaking valves, radiation exposure, and RCRA issues. The PM stated during the interview process that he knew draining the additional line was not within the scope of TIP 5, but he assisted because of concern over losing his job, his friendship with the PS, and also because he thought it was a good idea and should have been included within the scope of the TIP.

1. Description/Date/Time of Event (continued)

The PF returned to the area and observed the unauthorized operation in progress. He realized that the work being done was outside of the scope of TIP 5. He became very upset and had to leave the area until he could regain composure. After the PF regained his composure, he returned to the area but did not stop the unauthorized operation. During interviews conducted for this root cause analysis, the PF's motivation for not stopping the unauthorized operation and later assisting in concealing the event was not explored. Follow-up interviews were not conducted because employment of the PS, PM, and PF was terminated. Neither level of supervision stopped the operation, and all three of the personnel then participated in an attempt to conceal this activity. As a result of interviews conducted for this root cause analysis, it was determined that these three individuals did not know they may also have been in non-compliance with the USQD compensatory measures for Raschig Ring Tanks in the course of the unauthorized operation.

The unauthorized solution that was collected in the flask located inside Glovebox 42 was of a darker color and more viscous than that from Tank D467. Based upon experience and a knowledge of the process, the involved personnel believed that this darker color indicated a higher level of Pu concentration. The interview process provided information that the liquid contained in the flask was then distributed between five 4-liter bottles and diluted, utilizing residual solution obtained from the floor of the glovebox that was spilled during the Tank D467 bottle filling and sampling operations. The PM and PS stated that the unauthorized solution was diluted in an attempt to give the appearance that the liquid came from Tank D467. However, the STA indicated that the floor of the glovebox was dry when he exited the room, prior to the unauthorized operation. Also, the DOE Facility Representative who observed most of the solution transfer from Tank D467, except for the vacuum pull, stated that at most, one pint of liquid was on the glovebox floor when she left.

The unauthorized operation of draining the drain line from Tank D973 increased the number of 4-liter bottles in the glovebox by five, to a total of 60. There is a total of approximately 224.75 liters of solution contained in the 60 4-liter bottles (each filled to 3.75 liters). The volume recorded in TIP 5 for Tank D467 was 210 liters. There is a difference of approximately 14.75 liters between the amount of solution estimated to be in Tank D467 and the amount of solution contained in the 60 4-liter bottles in Glovebox 42. The information obtained from interviews with the PF, PM, and PS indicated that the amount of solution drained from the drain line to Tank D973 was no more than five liters. Therefore, there are approximately 9.75 liters of extra solution, the source of which is not established, assuming that the five liters came from the D973 drain line.

1. Description Date/Time of Event (continued)

A review conducted by the senior manager of the organization responsible for performing TIP 5, postulated three possible scenarios for the additional solution listed in Letter REF-107-94, as identified below:

- the darker solution was diluted with nitric acid from the nitric acid supply line connected to the glovebox;
- a fraction of solution was taken from each of the 55 4-liter bottles containing the solution from Tank D467 and added to the five darker 4-liter bottles containing the solution from the unauthorized operation; or
- additional lines outside the scope of TIP 5 were drained in addition to, or other than the ancillary lines to Tank D973.

Another scenario was identified by the Liquid Stabilization Group on October 31, 1994, (Letter RSS-127-94) postulating the use of a process water line in Glovebox 42 to dilute the darker solution. Nothing uncovered by the root cause analysis team substantiated any of the identified scenarios. Therefore, the actual source of the liquid used for dilution has not been established, and this casts some doubt that the full facts of the unauthorized operation are known.

The PM entered the additional 4-liter bottle numbers and amounts of solution on the material balance card as if they had come from Tank D467, and the PF verified the card. The TIP was then completed and the equipment was returned to the original configuration, as required by TIP 5.

To determine if there was a potential to have a Pu concentration above the requirements of the NMSL, the PF went to the Building 771 Analytical Laboratory on September 30, 1994, and reviewed the history files for sample results related to Tank D973. He stated that he was still concerned about the dark color of the unauthorized solution. He believed that if the record review indicated the Pu concentrations were below the associated NMSL, then the unauthorized operation could go undiscovered. The records he was able to review were from December 1989, and indicated that the Pu gram per liter concentrations of the solutions that were contained in the tank in 1989 were well within the current NMSL requirements for this operation. The records he was able to review indicated that at the time of sampling in 1989, the tank contained in excess of 100 liters of solution. During Aqueous Recovery Operations, tanks were sampled by operations personnel prior to transferring to another tank within the same Material Balance Area. At the time of the unauthorized operation, the tank was considered to be operationally empty.

1. Description/Date/Time of Event (continued)

On October 6, 1994, the PM asked the PF to take a sample from one of the five 4-liter bottles containing the unauthorized solution from the unauthorized operation. The sample was taken at this time because the laboratory had been shut down for several days and was unable to run the 60 samples from the TIP 5 operation. The PM was concerned that the darker liquid was in fact at a higher level of Pu concentration than the five grams per liter that the NMSL permitted. The PM believed that if the sample of the unauthorized solution indicated the Pu concentration was below the associated NMSL, then the unauthorized operation would go undiscovered. The sample was taken to the Analytical Laboratory and run to obtain a quick result without using a laboratory requisition. Historically, quick result samples were run by the Analytical Laboratory prior to receiving a laboratory requisition, with the understanding that a laboratory requisition would follow. However, in this instance, appropriate notifications were not made to building management requesting permission to run the sample, contrary to the requirements of COOP-1. The result of the sample indicated a Pu concentration of approximately 8.25 g/l.

In an interview with the root cause analysis team, the PM stated that he was called at home by the PF and told of the sample results. The PM returned to Building 771 and reported the unauthorized operation to the SM. The SM immediately terminated operations and made the appropriate notifications to the Emergency Operations Center Notification Officer, per procedure. The Operations Manager was briefed on the occurrence at approximately 2000. The Staff Duty Officer for the DOE, Rocky Flats Field Office (RFFO) was notified at 2050. Senior management was made aware at 2133. By this time, the unauthorized operation had been kept silent for seven days.

A critique of the event was conducted at 0730 on October 7, 1994, in Building 111. As a result of the information from the critique, management initiated a formal investigation of possible wrong doing in connection with the unauthorized operation. During the root cause analysis, it was determined that much of the information presented at the critique meeting, concerning who was involved and what specifically happened, was not accurate. Other investigations conducted of this event substantiate this determination.

Interviews conducted with individuals in Building 771, taken collectively, indicated that there were several COOP concerns within the building. Operations management was of the opinion that COOP was implemented to a 70% level in the building based on Building 771 mentor reports of how many COOP procedure elements were in place. Even so, COOP was ineffective, for during interviews it was stated by some individuals that they also would have drained the drain line from Tank D973, even if it was outside the scope of the TIP. These individuals said they had more faith in their knowledge of the processes and experienced operators than in procedural compliance. Further, interviews identified the existence of cliques and tightly knit groups in the building who expressed a willingness to cover for each other.

1. Description/Date/Time of Event (continued)

As part of the root cause analysis interview sheet, those interviewed were asked what the concepts "Empowerment," "Just Do It," and "Barrier Busters" meant to them. Many of those interviewed had not heard of nor did they understand the concepts "Empowerment" and "Barrier Busters." Those interviewed responded that "Just Do It" meant to get it done, but do it safely.

Interviews included questions to determine if there were perceptions of schedule pressure for completion of TIP 5. Most of the people interviewed by this team stated there were both state regulatory compliance and award fee motivations to have Tank D467 drained before the end of the fiscal year. Only one person said this motivation caused pressure on timing of the operation. However, since the unauthorized operation went beyond draining of Tank D467, pressure, whether real or not, to drain Tank D467 cannot be said to be a cause for the unauthorized operation.

During the root cause analysis, documents were found that identified previous reviews, assessments, and memoranda identifying events or circumstances with characteristic similar to the causal factors of this event. These documents had been provided to various levels of management.

Time records were also checked to determine if involved individuals had worked excessive hours during this evolution. They had not.

2. Root and Contributing Causes, Potential Problems

The following definitions apply to categorization of causes in this report.

Contributing Cause: A cause that increased or potentially increased the consequences or severity of the event or condition. Correction of contributing causes will not, by itself, prevent recurrence of the event or condition, but contributing causes are important enough to require corrective action to improve the quality of the process, equipment, or product.

Corrective Action: Corrective actions identified in Section 3 of this report are provided as recommendations from those who performed the root cause analysis. Corrective actions are required to be recommended for each identified root or contributing cause by the Cause Analysis procedure. The purpose of the recommended corrective actions is to provide management with recommendations which will prevent or minimize the likelihood of recurrence of the event or condition root cause analyzed.

MORT Cause Code: A code listed in the Cause Analysis procedure and originating from document WP-27 (SSDC), MORT Based Root Cause Analysis. The purpose of the MORT Cause Code is to facilitate the tracking and trending of causes of identified adverse events of conditions.

ORPS Cause Code: A code from the Occurrence Reporting and Processing System used to track and trend causes associated with occurrences and required by DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.

Root Cause: The fundamental cause(s) that, if corrected, will preclude recurrence of an event or condition.

Summary Cause

Based upon a review of the root and contributing causes of this analysis, the sum of these root and contributing causes indicates a failure of involved personnel to fully accept and implement the concepts of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities:

- Root Cause A demonstrates noncompliance with portions of Chapter I, Operations Organization and Administration, and Chapter XVI, Operations Procedures;
- Root Cause B demonstrates noncompliance with portions of Chapter I, Operations Organization and Administration, and Chapter II, Shift Routines and Operating Practices;
- Root Cause C and Potential Problem G demonstrate noncompliance with portions of Chapter IX, Lockouts and Tagouts;
- Contributing Cause D demonstrates noncompliance with portions of Chapter VI, Investigation of Abnormal Events; and
- Contributing Cause E demonstrates noncompliance with portions of Chapter V, Control of On-Shift Training.

The causes below are presented in order of significance in causing or contributing to the unauthorized operation of draining solution from lines outside of the scope of TIP 5.

Root Cause

A. Task performance was LTA in that one worker deliberately performed work outside and beyond the scope of TIP 5. Additionally, the worker's foreman and manager not only did not stop but assisted in the activities and subsequent concealment of the event once they became aware of the unauthorized operation.

Discussion

- Upon completion of TIP 5, the PS assigned to drain the solution from Tank D467 drained additional solution from the lines attached to Glovebox 42. He stated that he wanted to mitigate leaks, reduce future radiological exposures to personnel, and reduce potential decontamination efforts. Reviews of associated documentation and an interview with a Building 771 manager indicated that the Tank D973 drain line did not have a history of leaks during the previous year.

2. Root and Contributing Causes, Potential Problems (continued)

- The PM and PF stated that they decided to assist in the completion and concealment of the activity to protect the PS and themselves from disciplinary action. Additionally, all three individuals were of the opinion that the Tank D973 drain line needed draining and were convinced that they knew what they were doing was safe based upon experience and a knowledge of the processes involved.

- All three individuals stated that they were aware of the TIP 5 requirements and understood COOP concepts. In addition, other individuals interviewed also stated that they understood COOP concepts. However, some of these individuals stated they had a higher reliance on experience and process knowledge than procedures or COOP.

- None of the three individuals involved in the unauthorized operation expressed concern about any potential criticality accident.

ORPS Cause Code - 3C, "Violation of Procedure or Requirement"
MORT Cause Code - 21, "Task Performance"

B. Supervision was LTA to prevent one person from deliberately undertaking an unauthorized operation. The PM, PF, and STA left the area prior to the end of the TIP 5 operation. Additionally, the SM entered the area of Glovebox 42 during the unauthorized operation and took no action when he saw the dark solution in the flask in Glovebox 42.

Discussion

- At the completion of the draining of Tank D467, all supervision left the area for lunch and the PS was alone at Glovebox 42. Neither the PM nor PF, who had supervisory responsibilities, stayed in the area until TIP 5 was completed. They both left prior to the completion of the one hour vacuum pull and the re-establishment of the vacuum pump LO/TO.

- Although not required by TIP 5, an STA was verbally assigned by his management to observe the TIP 5 evolution. The STA also left prior to the completion of the one hour vacuum pull and the re-establishment of the vacuum pump LO/TO.

- At the time that the SM entered the area, a dark solution was in the flask in Glovebox 42. He noted the solution was a darker color and commented on the color to the PM when the PM returned to the area. The SM then left the area without any further investigation into the activities.

2. Root and Contributing Causes, Potential Problems (continued)

- TIP 5 required the presence of the Operations Manager or designee in the process area during the performance of activities involving the movement of SNM. After completion of the Tank D467 draining and prior to the vacuum pull to remove any residual solution in the drain line and tank, the PM left the area, even though SNM could have been transferred during the vacuum pull. Also, the vacuum pull was included in the solution transfer portion of TIP 5.

- TIP 5 required that the Operations Manager or a designee appointed in writing observe the operation. The PM was not appointed in writing to act for the Operations Manager. However, on the two previous tank draining operations, the PM was designated in writing to act for the Operations Manager in observing operations during the movement of SNM.

- Through interviews, it was discovered that the PS assigned to perform TIP 5 was previously known by management as not completely supportive of COOP. It was known that he did not think COOP controls were necessary in order to drain the tanks and associated lines. He also was known to have a lack of respect for authority. These factors were apparently not considered in leaving the PS alone during the vacuum pull.

- Due to expired training, the PS, PM, and STA assigned to observe the TIP 5 operation were not qualified to participate in the TIP 5 operation. This condition was not recognized by management prior to the performance of TIP 5.

ORPS Cause Code - 6C, "Inadequate Supervision"
MORT Cause Code - 20, "Supervision"

C. The barriers and controls established in TIP 5 for the draining of Tank D467 were LTA and allowed the unauthorized draining of lines other than those described in TIP 5. This lack of barriers and controls adversely affected compliance with nuclear criticality safety, USQD compensatory measures, and had implications under RCRA.

Discussion

- In order to provide adequate protection for individuals, the facility, or the environment from harm, barriers and controls are placed between the hazard and the potential target. The concept of establishing barriers and controls is sometimes called defense-in-depth. Defense-in-depth can consist of physical and administrative barriers and controls as well as process knowledge and supervisory oversight. In the development of TIP 5, physical barriers were not specified. Instead, administrative barriers in the form of a procedure (TIP 5), the process knowledge of the operators, and supervisory oversight by the PM and PF were relied upon.

- The decision not to use physical barriers (e. g., LO/TO) was made, according to interviews, because it was assumed by those who developed TIP 5 and the supporting Criticality Safety Evaluation that personnel executing TIP 5 would do so in accordance with COOP concepts. Since no physical barriers were used and supervisory oversight was absent during the unauthorized operation, defense-in-depth to prevent the willful actions was defeated. After the PS decided to work outside the scope of TIP 5, the supervisory oversight assisted in the unauthorized operation. Process knowledge failed the PS, PM, and PF when a solution of a higher than expected Pu concentration was obtained. The root cause analysis team does not know if foreknowledge of the plutonium concentration in the actual solution drained would have prevented the unauthorized operation by the PS.

ORPS Cause Code - 4A, "Barriers LTA"
MORT cause code - 16, "Barriers and Controls"

Contributing Causes:

D. Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event.

Discussion

Previous reviews, assessments, and memoranda provided management with opportunities to implement effective corrective actions to preclude this type of event. The following examples are not intended to be all inclusive.

2. Root and Contributing Causes, Potential Problems (continued)

- An informal memo from the Manager, Criticality Analysis Engineering to the Director, Nuclear Safety Engineering, dated March 8, 1993, discussed many concerns relating to criticality safety. The broad concerns discussed in the memo were immature conduct of operations, reliance on procedure compliance in a system not yet ready to ensure procedural compliance, and inadequate independent oversight of operations within EG&G.

- A collective significance evaluation of criticality safety procedural infractions at RFETS was conducted in the second quarter 1994. This report was issued to the Associate General Manager, Standards, Audits, and Assurance on May 16, 1994 with a copy to the Chairman of the Nuclear Criticality Safety Committee. This evaluation identified LTA implementation of policies; LTA accountability of management/personnel; task performance errors; and ineffective corrective actions to identified deficiencies.

ORPS Cause Code - 6A, "Inadequate Administrative Control"
MORT Cause Code - 14, "QA/QC"

E. The process to ensure that individuals meet the current training and qualification requirements prior to assignment of work activities in Building 771 is LTA in that several individuals involved in the TIP 5 operation had expired training and qualifications. Due to expired training and qualification, the PS and PM were not qualified to participate in the TIP 5 operation. Also, the STA's nuclear criticality safety training had expired.

- The PM's Nuclear Criticality Supervisor training expired on 09/10/94. The PS's Glovebox training expired on 02/04/94. The STA's Nuclear Criticality Safety training expired on 07/14/94. The SM's RCRA CBT and RCRA OJT training expired on 03/03/94. Additionally, some of the other individuals signed into the area had expired RCRA OJT, Hazardous Waste, Radiation Worker, Glovebox, Nuclear Material Safeguards, and Hazardous Communication training.

- The annual Nuclear Criticality Safety Committee appraisal of Building 771 operations, conducted on June 24, 1993, identified 30 individuals who did not have current nuclear criticality training. The appraisal report recommended the development of a program to ensure that worker training requirements are monitored to prevent deficiencies before they occur. The corrective action to address this concern was either not implemented or ineffective.

ORPS Cause Code - 5D, "Insufficient Refresher Training"
MORT Cause Code - 23, "Training"

2. Root and Contributing Causes, Potential Problems (continued)

Potential Problems:

F. The perception of the inconsistent application of discipline at Rocky Flats is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities.

Discussion

- During interviews, the PM stated that one of the reasons he didn't stop the unauthorized operation was because he felt that he had lost his job already.

- Interviews conducted with other workers at Rocky Flats indicated that some would stop unauthorized operations while others would not, but that both groups expected to be disciplined and criticized for reporting the noncompliance.

- Evidence of consistent implementation of rewards and sanctions could not be obtained. Individuals interviewed spoke of inconsistent application of discipline, but could not to provide specific supporting facts.

- Where fear of reprisal exists for reporting safety problems, these unreported safety problems (whether valid or not) will likely remain unknown to management, therefore, precluding taking effective corrective actions.

ORPS Cause Code - 6E, "Policy Not Adequately Defined, Disseminated, or Enforced"
MORT Cause Code - 3, "Policy Implementation"

G. The removal of the LO/TO as required in TIP 5 did not comply with the compensatory measures established for USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs.

- USQD-RFP-93.1503-GLS requires compensatory actions to establish controls that ensure no physical movement of solution occurs through gravity feed and by mechanical transfer means. The recommended compensatory measures include the use of physical restraints to prevent all possible methods of solution transfer (e. g. gravity feed, mechanical, etc.). Examples given include separating and blanking off all lines into and out of vessels which could transfer solution, a verified LO/TO of all vacuum/vent valves to the vent position, and the LO/TO of the valves and pumps required for solution transfer, where solution transfer could only occur through active mechanical means.

2. Root and Contributing Causes, Potential Problems (continued)

- Letter BDL-019-94 from the Building 771 Assistant Operations Manager to the Rasnig Ring Action Plan Program Manager states that compensatory measures taken were to electrically LO/TO the vacuum pumps and the vacuum header root isolation valve.

- The LO/TO of the vacuum pump consists of closing valve HV-1331 and placing the Line 5 Nash Pump Local Disconnect in the OFF position. The LO/TO was removed when the Line 5 Nash Pump Local Disconnect was placed in the ON position on September 26, 1994, at 1034 and Valve HV-1331 was opened on September 27, 1994, at 0120. The LO/TO was not replaced until completion of the tank draining evolution on September 29, 1994, at 1025. The TIP 5 end-of-shift instructions did not require that the LO/TO be replaced at the completion of activities each day. The controls to ensure that the vacuum pump was not operated except during the scheduled tank draining were less than adequate in that there were no physical barriers in place to preclude activities outside the scope of the TIP. Interviews indicated that not replacing a LO/TO until completion of the activity, even if the activity lasted several days, was normal for Building 771. During the actual performance of the TIP 5 activities the removal of the LO/TO was acceptable as adequate controls were in place.

ORPS Cause Code - 6E, "Policy Not Adequately Defined, Disseminated, or Enforced"
MORT Cause Code - 3, "Policy Implementation"

3. Corrective Actions/Assumed Risks

The corrective actions listed are related to each identified cause through the assigned number (i.e., Corrective Actions S1 and S2 relate to the Summary Cause, Corrective Actions A1 and A2 relate to Cause A, Corrective Actions B1 and B2 relate to Cause B, etc.).

Summary Cause:

Based upon a review of the root and contributing causes of this analysis, the sum of these root and contributing causes indicates a failure of involved personnel to fully accept and implement the concepts of DOE Order 5480.19, Conduct of Operations Requirements For DOE Facilities.

3. Corrective Actions/Assumed Risks (continued)

Corrective Actions:

S1. Ensure that the "New Directions" message (focus on getting high priority/high hazard "real work" done safely by using the site infrastructure and necessary and sufficient standards) reaches the workers. Accomplish this through the development of special teams using credible Subject Matter Experts (SMEs) to outline the current EG&G Rocky Flats management position relating to COOP and process knowledge for liquid stabilization, thermal stabilization, etc. The purpose of these teams is to establish a trust between management and workers by discussing the issues leading to the current conditions and solutions for moving forward, emphasizing the need for help and suggestions from workers.

S2. Improve senior management visibility by an increased presence and involvement during operations to demonstrate management's interest through personal involvement and to show their concern and respect for all levels of management and employees.

S3. Survey the employees in all fissile materials process buildings to confirm that management understands the extent and nature of differences of opinion, practices, attitudes, and behavior regarding conduct of operations. Evaluate the results of the survey and implement additional actions relating to the human factors that are at the root of this event.

Root Cause A:

Task performance was LTA in that one worker deliberately performed work outside and beyond the scope of TIP 5. Additionally, the worker's foreman and manager not only did not stop but assisted in the activities and subsequent concealment of the event once they became aware of the unauthorized operation.

Corrective Actions:

While it is difficult to positively stop individuals from intentional non-compliance with procedures, the corrective actions for Root Cause A will concentrate on those actions necessary to improve the overall understanding of COOP and the need to follow procedures.

A1. Enhance training for all site employees requiring a knowledge of nuclear and criticality safety. Include the following two specific improvements to training:

- Conduct briefings regarding criticality safety as it relates to this event for all site personnel. Clearly identify this event as a criticality safety issue and stress how the intentional non-compliance with procedures to drain a process solution line resulted in the collection of a solution which unexpectedly exceeded the NMSL established for personnel safety.

3. Corrective Actions/Assumed Risks (continued)

- Include lessons learned information in appropriate site training (criticality lessons learned in Nuclear Criticality Safety Training, radiological lessons learned in Radiation Worker/Safety Training, etc.).

A2. Increase the effectiveness of the implementation of COOP at RFETS as it relates to culture and individual behavior, and make procedures properly reflect process knowledge so that workers trust and follow the procedures.

Root Cause B:

Supervision was LTA to prevent one person from deliberately undertaking an unauthorized operation. The PM, PF, and STA left the area prior to the end of the TIP 5 operation. Additionally, the SM entered the area of Glovebox 42 during the unauthorized operation and took no action when he saw the dark solution in the flask in Glovebox 42.

Corrective Actions:

B1. Develop guidance for the minimum levels of supervision based upon potential risks. Incorporate this guidance into the processes which control the development of work control documents.

B2. Increase independent safety oversight for high risk/priority activities to monitor the effectiveness of supervision.

B3. Improve Senior Management's training of lower level management through the following methods:

- continue to fully utilize the Leadership Academy to train lower level management in all organizations;
- provide routine coaching of lower level management by senior management; and
- each senior manager should develop a management development program to instruct lower level management on how to become effective managers.

B4. Strengthen the qualification process to ensure that management qualifies and selects operators/specialists who have demonstrated adequate knowledge of and commitment to COOP concepts and that these individuals are assigned to high risk/priority evolutions.

3. Corrective Actions Assumed Risks (continued)

Root Cause C:

The barriers and controls established in TIP 5 for the draining of Tank D467 were LTA and allowed the unauthorized draining of lines other than those described in TIP 5. This lack of barriers and controls adversely affected compliance with nuclear criticality safety, USCD compensatory measures, and RCRA.

Corrective Actions:

C1. Revise the assumptions used in the development of work control documents and various evaluations so that COOP is not assumed to be fully implemented.

C2. Emphasize the use of physical barriers and/or increase independent oversight or supervision for work activities involving high or potentially high risk/priority activities.

C3. Re-evaluate the adequacy of compensatory measures in use for previously evaluated USQDs and correct when necessary. Consider that COOP is not fully implemented when evaluating the compensatory measures for adequacy.

C4. Implement measures that ensure RCRA compliance is integrated into work planning, briefing, and controls including those controls identified in C2 above.

Contributing Cause D:

Corrective actions were not yet implemented or were LTA for previously identified events or circumstances with characteristics similar to the causal factors of this event.

Corrective Actions:

D1. Complete actions already in progress to modify the Corrective Action Program and train employees in the use of the modified program.

D2. Develop performance indicators for individual managers to evaluate management performance in driving high priority issues to closure.

Contributing Cause E:

The process to ensure that individuals meet the current training and qualification requirements prior to assignment of work activities in Building 771 is LTA in that several individuals involved in the TIP 5 operation had expired training and qualifications. Due to expired training and qualifications, the PS and PM were not qualified to participate in the TIP 5 operation. Also, the STA's nuclear criticality safety training had expired.

3. Corrective Actions/Assumed Risks (continued)

Corrective Actions:

E. Develop a process to track personnel training and qualifications to ensure that only those individuals with current training and qualifications are assigned work activities.

Potential Problem F:

The perception of the inconsistent application of discipline at Rocky Flats is so strong that some workers may be afraid to stop and report unauthorized or unsafe activities.

F1. Perform an analysis of the consistency of disciplinary actions during the past two years and implement corrective actions that result.

F2. Assure that all RFETS personnel understand that the process for holding individuals accountable for adherence to policy, procedures, and requirements is even-handed and professional.

- Train management in the RFETS disciplinary process.
- Brief Rocky Flats personnel on the RFETS disciplinary process.
- Encourage the reporting of problems through the development of a "no-fault" reporting process and provide training in the use of this process.
- Periodically communicate the facts associated with the reporting of adverse safety information - correct the perception that people are punished for reporting unsafe operations.

Potential Problem G:

The removal of the LO/TO as required in TIP 5 was not in compliance with the compensatory measures established for USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance With NMSLs/CSOLs.

Corrective Actions:

G1. Evaluate the compensatory measures required in USQD-RFP-93.1503-GLS to ensure the adequacy of controls for tanks and associated lines not in compliance with NMSLs. Implement any new compensatory measures deemed necessary to ensure adequate controls for tanks and associated lines not in compliance with NMSLs

G2. Discontinue the LO/TO practice that allows the removal of LO/TOs at the beginning of a task without replacing the LO/TO until task completion, when the task is interrupted.

4. Attachments

I. Event and Causal Factor Chart (5 pages)

II. Documents Reviewed During Root Cause Analysis (4 pages)

III. Personnel Interviewed During Root Cause Analysis (1 page)

IV. Drawing From TIP 5 (1 page)

Lead Root Cause Analyst — J. A. McLaughlin — Date 11/23/94

Root Cause Analyst — R. S. Bird — Date

Root Cause Analyst — S. M. Lehman — Date 11/23/94

Root Cause Analyst — D. L. Mayfield — Date 11/23/94

Root Cause Analyst — E. R. Swanson — Date

Root Cause Analyst — T. J. Tegeler — Date 11-23-94

Responsible Manager — K. D. Stovall — Date 11/23/94

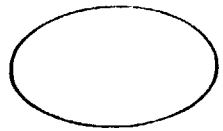
EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

Abbreviations

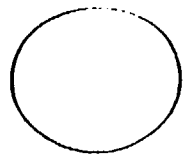
Bldg	-	Building
Crit	-	Criticality
DOE	-	Department of Energy
GB	-	Glovebox
g/l	-	Grams per Liter
Liq Sta	-	Liquid Stabilization
LO/TO	-	Lockout/Tagout
L/U	-	Line-up
PEB	-	Pre-evolution Brief
PF	-	Production Foreman
PM	-	Production Manager
PS	-	Production Specialist
RCRA	-	Resource Conservation and Recovery Act
SM	-	Shift Manager
STA	-	Shift Technical Advisor
Tk	-	Tank
TIP	-	Task Information Package
4L	-	Four Liters

Legend

Items within rectangles represent events and are presented in chronological order. These events can precede the incident or occur after the incident.



Items within ovals are causal factors or conditions and contribute to the events to which they are linked.



Items within circles represent the incidents which occurred

Ovals, rectangles, or circles with dashed lines are presumptive conclusions

Solid arrows link events

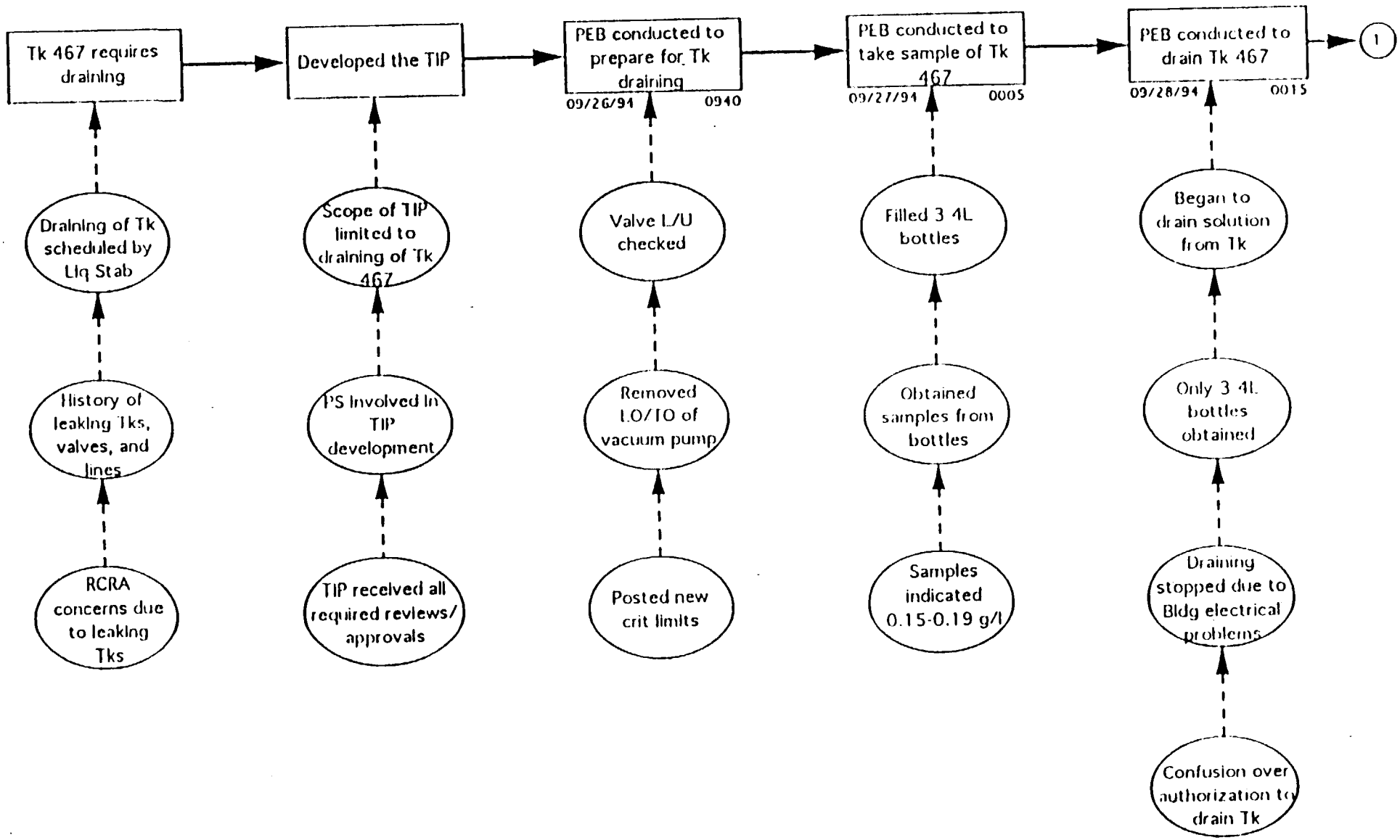
Dashed arrows link causal factors with events

A

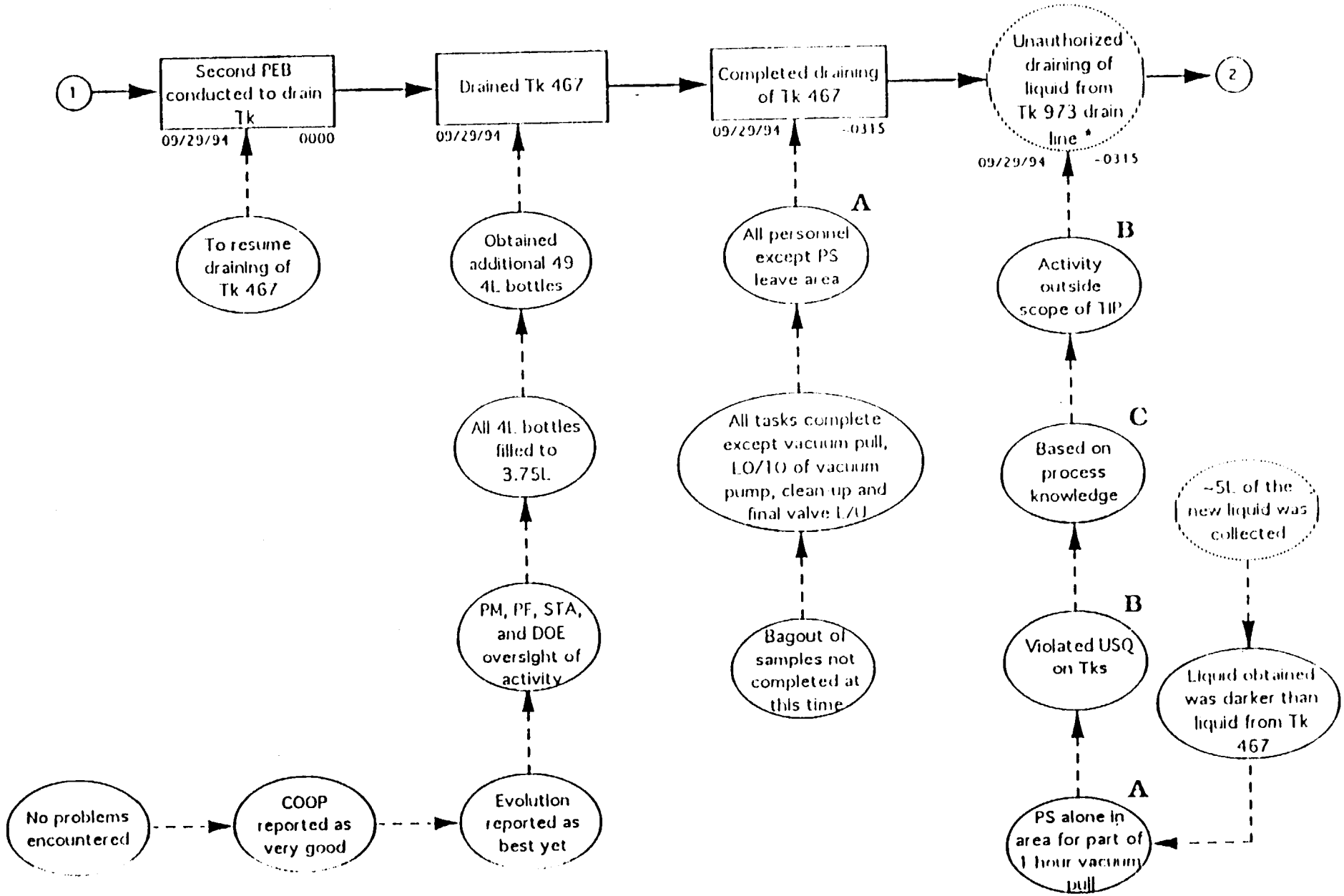
Causal factor selected for evaluation using the Root Cause Checklist. The letter corresponds to the specific Root Cause Checklist

ATTACHMENT 1

EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

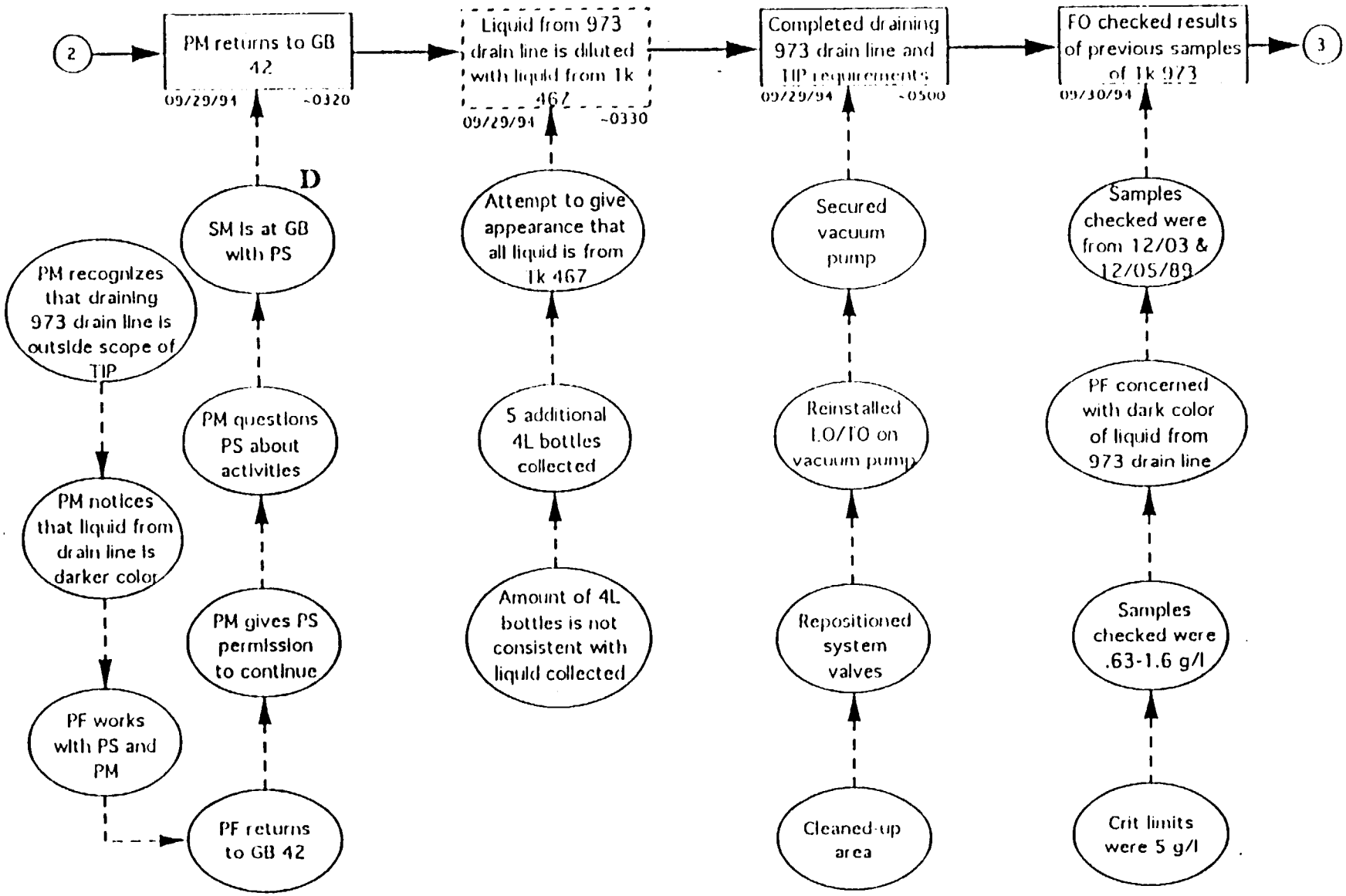


EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINII EVENT OF 09/29/94

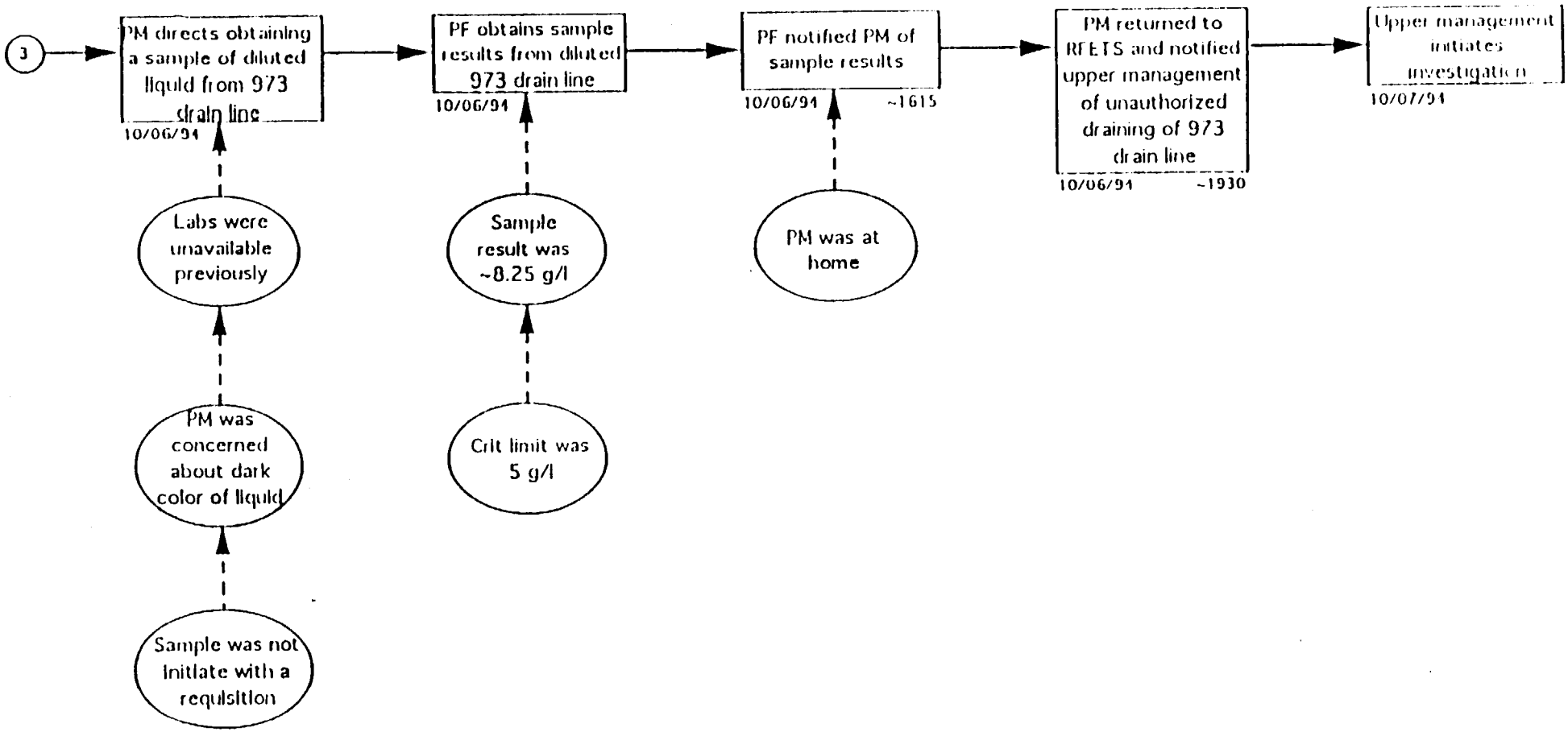


* Additional liquid assumed to be from 973 Tk drain line

BUILDING 771 TANK DRAININ[illegible] VENT OF 09/29/94



EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94



ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

1. Critique Meeting Attendance Sheet, Tracking Number 94-1490, T. Lepke-Critique Meeting Director, dated 10/07/94
2. Standing Order No. 34, Suspension of Fissile Material Movements, dated 10/07/94, Expires 04/07/95
3. Shift Superintendent's Daily Summary, dated 10/07/94
4. Shift Superintendent's Daily Summary, dated 10/08/94
5. Analytical Requisitions from 1989, for Tank D973:(52939, 52154, 52973, & 52251)
6. Figure 7, Appendix 6, from TIP No. 771-OPS-94-005
7. Occurrence Fact Sheet from D. C. Bailey with attachment, dated 10/06/94
8. Copy of the Building 771 Shift Manager Log for 10/06/94, from 1800 hours through 0301 hours on 10/07/94
9. Draft Critique Meeting Minutes, dated 10/07/94
10. Task Information Package No. 771-OPS-94-005, Transfer Solution from D-467 to Glovebox 42, approval date 09/16/94
11. Electronic Massaging to Mark Silverman, From Russell E. Fray, Corrective Actions for Occurrence 94-1490 (Tank D-467), dated 10/07/94
12. Occurrence Notification Report, RFO--EGGR-771OPS-1994-0062, dated 10/08/94
13. M. V. Mitchell ltr, MVM-037-94, to D. B. Hensley, Possible Nuclear Materials Safety Procedural Infraction Involving Glovebox 42, dated 10/08/94
14. D. M. Chavez ltr, (unsigned) to Lessons Learned, Procedural Violation-Line 42, dated 10/12/94
15. D. T. Jackson ltr, DTJ-173-94, to R. E. Frey, Administrative Inquiries Unit Report on Procedural Violation (Case 95-11), dated 10/12/94
16. Critique Meeting Minutes, Possible Criticality Infraction, Tank 467, dated 10/07/94
17. Corrective Action List, dated 10/12/94
18. R. E. Fray ltr, REF-107-94, to A. H. Burlingame, Summary of Building 771 Tank Draining Violations, dated 10/12/94
19. Hazardous Waste Management Storage/Treatment Tank Bi-Weekly Inspection Log Sheet, dated 09/93-09/94
20. Inspection Log Sheet For Mixed Residue Tank Systems, from 10/93 to 10/94
21. G. E. Francis ltr, GEF-042-94, to W. A. Kirby, Task Information Package (TIP) 771-OPS-94-003 Required Actions, dated 05/12/94
22. J. N. McKamy memo, to D. G. Satterwhite, My Personal "Gut Feel" Criticality Concerns at EG&G RF, dated 03/08/93
23. Lockout/Tagout Permit 25811, page 3 of 3
24. USQD-RFP-93.1503-GLS, Raschig Ring Tanks Non-Compliance with NMSLs/CSOLs RFO-EGGR-RFP-111993-0005 # 1310, dated 03/30/94
25. R. L. Moore ltr, RLM-013-94, to Distribution, Raschig Ring-Filled Tank Compliance with Compensatory Measures, dated 20/08/94
26. D. B. Hensley ltr, DBH-157-93, to W. A. Kirby, Controls on Raschig Ring Filled Tanks, dated 09/29/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

27. D. G. Satterwhite ltr, 94-RF-06669, to James C. Selan, DOE, RFFO, Isolation of Raschig Ring Tanks for Double Contingency with Respect to the Raschig Ring Unreviewed Safety Question Determination, dated 09/19/94
28. B. D. Larsen ltr, BDL-019-94, to R. L. Moore, Rashig Ring Tank Compensatory Measures B771/774, dated 02/11/94
29. Root Cause for 771 Questionnaire (Example)
30. Radiation Work Permit No. 94-771-00108, dated 07/12/94
31. Shift Superintendent's Daily Summary, dated 10/11/94
32. Shift Superintendent's Daily Summary, Page 1 of 2, dated 10/19/94
33. Shift Superintendent's Daily Summary, dated 10/27/94
34. RFO--EGGR-771OPS-1994-0062 10-Day Update Report, dated 10/27/94
35. M. N. Silverman ltr, 03641-RF-94, to A. H. Burlingame, Management of Nuclear and Criticality Safety Control, dated 09/22/94
36. R. S. Schmidt ltr, RSS-127-94, to R. E. Fray, Incependent Look Into The Building 771 Tank 467 Draining Incident, dated 10/31/94
37. R. E. Kell ltr, REK-593-94, to Distribution, Control of Valve and Switch Positions Important to Criticality Safety, dated 10/21/94
38. The Current Discipline System paper, dated 10/28/94
39. J. G. Davis ltr, JGD-1253-93, to W. A. Kirby, Annual Nuclear Criticality Safety Committee (NCSC) Appraisal of Building 771 Operations, dated 08/25/93
40. D. W. Ferrera ltr, DWF-970-94, to Distribution, Membership of Safety Review Board (SRB) Subcommittee for Material Movement Restart Plan Review, dated 10/20/94
41. 771/774 Operations Shift Orders, Number 771-93-046, Rev. 5, Suspension of Tank Activity, dated 07/13/94
42. USQD-771-94.1187-SDG, Transfer of Solution From D-467 to Glovebox 42, Task Information Package TIP 771-OPS-94-005, Rev. 0, dated 09/16/94
43. D. B. Hensley ltr, DBH-267-94, to Distribution, Authority to Supervise Evolution for TIP 22, dated 08/19/94
44. D. B. Hensley ltr, DBH-284-94, to Distribution, Authority to Supervise Evolution For TIP 22, dated 08/27/94
45. D. B. Hensley ltr, DBH-157-94, to Distribution, Designated Operations Management Oversight for TIP 003, dated 04/25/94
46. Appendix 8, TOP 771-OPS-94-003, Independent Verification Alignment Checklist, Valve Line-Up Sparging and Draining D-454, pages 8 and 9 of 10, dated 06/14/94
47. Appendix G, TIP# 771-OPS-94-008, Section 7.3, Initial Valve Line-Up, pages 1 & 2 of 5, dated 09/29/94
48. Plant Action Tracking System Location Query for Bldg. 771 Sorted by Prefix, Origin, Commitment, Plan No., page 278, dated 10/25/94
49. RFO--EGGR-771OPS-1992-0058, Final Occurrence Report, dated 10/01/94
50. RFO--EGGR-771OPS-1993-0096, 10-Day Update, dated 05/17/94
51. #31 Shift Manager Log Review for Trends Which Would Have Alerted Us, E. R. Swanson, dated 10/28/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

52. 771/774 Operations Order Number 00-771-09, Work Control Actions, dated 09/13/94
53. 771/774/886 Operations Organizational Structure, dated 08/11/94
54. J. Fox ltr, JF-25-94, to Distribution, Area Personnel For Buildings 771/774, dated 10/31/94
55. Time Card Review Data
56. Training Review Notes and Data
57. D. M. Chavez ltr, (unsigned) to Performance Assurance, Nuclear Criticality Potential in Glovebox 42 of Bldg. 771, dated 11/02/94
58. Criticality Safety Evaluation, NMSL Number: 940037, Evaluation Number: MFS-2 (UCNI)
59. K. D. Stovall ltr, KDS-205-94, to M.E. Amaral, Reporting and Discipline, dated 11/15/94
60. M.E. Amaral ltr, MEA-672-94 to K. D. Stovall, Reporting and Discipline, dated 11/17/94
61. D. E. Guthrie ltr to J. A. McLaughlin, Task: What Policies, Stancards, & Procedures Were Violated by Workers?, dated 11/10/94
62. Inside Energy, Grumoly Orders Shakedown After Criticality Scare at Rocky Flats, dated 10/31/94
63. M. N. Silverman ltr, 03641-RF-94, to A. H. Burlingame, Management of Nuclear and Criticality Safety Controls, dated 09/22/94 with responses (1) A. H. Burlingame ltr, 94-RF-10503, to M. N. Silverman, Management of Nuclear and Criticality Safety Controls, dated 10/14/94 and (2) R. E. Kell ltr, 94-RF-11219, to D. A. Brockman, Management of Nuclear and Criticality Safety Controls, dated 11/08/94
64. M. V. Mitchell ltr, MVM-038-94, to D. B. Hensley, Possible Nuclear Materials Safety Procedural Infraction Involving Glovebox D-2 in Building 771, dated 10/12/94
65. Substantive Notes of Safety Review Board Meeting No. 94-8, Pages 1 through 4 of 7, dated 08/15/94
66. D. B. Branch ltr, DBB-071-94, to Distribution, Mentor Report for the Period August 22, 1994 to September 23, 1994, Report Number Twenty-Eight, dated 09/23/94
67. D. B. Hensley ltr, DBH-161-94, to D. B. Branch, Conduct of Operations Implementation Plan for B-771, dated 05/16/94
68. Safeguards Measurements, Safeguards Measurements Holdup Team ltr, SMDA-94.098, to B. D. Larsen, Preliminary Measurement Results for Tank 467 in Bldg. 771, dated 08/09/94
69. H. P. Mann ltr, HPM-411-94, to D. W. Ferrera, Nuclear Criticality Safety Issues Detected Through EG&G Rocky Flats, Inc. Oversight Organizations, dated 05/09/94
70. D. W. Croucher ltr, NCSC-04-94, to Distribution, Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990, At the Rocky Flats Plant, dated 06/03/94
71. K. D. Stovall ltr, KDS-138-94, to D. W. Ferrera, Collective Significance Analysis of Criticality Safety Procecural Infractions 1990 Through 1993, dated 06/14/94

ATTACHMENT II
DOCUMENTS REVIEWED DURING ROOT CAUSE ANALYSIS

72. C. A. Finleon ltr, CAF-067-94, to S. D. Chestnut, Solution Accountability in Building 771, dated 11/10/94
73. D. P. Snyder ltr, DPS-139-94, to A. H. Burlingame, Review of Criticality Safety Related to System Configuration and Valve Lineups for TIP-005, Building 771, D-467 Tank Draining, dated 11/03/94
74. D. P. Snyder ltr, DPS-137-94, to A. H. Burlingame, Review of Criticality Safety Related to System Configuration and Valve Lineups for TIP-005, Building 771, D-467 Tank Draining, dated 11/02/94
75. D. P. Snyder ltr, DPS-138-94, to Distribution, Review of TIP-005, Building 771, D-467 Tank Draining, dated 11/01/94
76. Assessment Report, Assessment No. 94-0002, Building 771 Conduct of Operations, dated 03/07/94
77. Assessment Report, Assessment No. 94-0242, Annual Nuclear Criticality Safety Assessment of Building 771, dated 06/28/94
78. Information Only Lessons Learned, Lessons Learned Document Number: 10-94-009, Criticality Safety Procedural Infractions at Rocky Flats Plant, dated 06/28/94
79. M. E. Amaral ltr, MEA-235-94, to G. E. Marx, Disciplinary Actions, dated 04/08/94
80. D. C. Bailey ltr, (unsigned), to B. D. Larsen, Bottle Failure Report, dated 09/29/94

ATTACHMENT III
PERSONNEL INTERVIEWED DURING ROOT CAUSE ANALYSIS

Due to the sensitive nature of this analysis and the other simultaneous investigations into potential wrongdoing, the individuals interviewed during the conduct of this root cause analysis were promised anonymity. Therefore, the individuals interviewed during this analysis are not identified as part of this report. The Lead Root Cause Analyst will maintain a listing of those interviewed as part of the history file. The categories of individuals interviewed included the following:

- Three individuals directly involved in the unauthorized operation,
- Four Building 771 management personnel,
- Two operators not involved in the unauthorized operation,
- Three individuals involved in the development of TIP 5,
- Two DOE, RFFO Facility Representatives,
- One DOE, RFFO contractor, and
- Other individuals as required to establish the facts relating to the unauthorized operation and/or Building 771 controls.

ATTACHMENT IV - DRAWING FROM TIP-5

APPENDIX 6

Figure 2

TIP# 771-OPS-94-005

FOR INFORMATION ONLY

Evaluation of Generic Implications of Building 771 Incident

With the assistance of several senior staff members, the Director of Performance Assurance completed an evaluation of the generic implications of the Building 771 event involving unauthorized draining of a process line and subsequent concealment by three EG&G employees. The evaluation was performed to identify any broader implications that arise from the root and contributing causes of this event and to recommend corrective actions that should be taken to address the generic implications beyond those recommended in the Root Cause Analysis. The information that was collected by the team that performed the Root Cause Analysis, the Root Cause Analysis Report itself, and further information that was gathered by the Performance Assurance staff were considered during the evaluation of generic implications.

The four generic implications we have identified are discussed below, along with recommendations for corrective actions.

1. Lack of Acceptance of Conduct of Operations Principles

One of the major improvements at Rocky Flats over the past few years has been to introduce a standards-based approach to work performance. That approach is embodied in the site's Conduct of Operations Program. Information gathered in response to the Building 771 event indicates that there are some personnel in Building 771 and other former production buildings who are not prepared to adhere fully to Conduct of Operations principles and practices. These employees generally believe that they cannot rely on management outside of their work groups to assure their safety and well-being and that they must rely on their own resources and process knowledge to accomplish work and improve their working conditions. As a result, operations personnel sometimes state that they have more faith in the "process knowledge" of experienced personnel in their building than in strict adherence to new procedures to assure their safety. Their dissatisfaction with the procedures that they are supposed to use is compounded by a perception that the procedures sometimes do not reflect adequately the process and systems knowledge that workers in the buildings possess.

In summary, a number of factors contribute to some personnel in the former production buildings distrusting both the motives and level of knowledge of management. These personnel have not accepted the new standards-based approach to conducting work at Rocky Flats for the following reasons:

- With regard specifically to Building 771, the 1989 curtailment directive resulted in the stoppage of all production processes using plutonium in the building without providing for an orderly and planned shutdown. Given the conditions in the building at the time, the "stop-in-place" shutdown was perceived by many workers in Building 771 to have disregarded consideration of their health and safety.

- A conviction on the part of some individuals that the approach they used to conduct activities in the production buildings prior to the FBI raid was good enough, given the success in the national defense mission that was achieved using that approach. The approach relied heavily on knowledge of the various processes and involved a minimum of formal procedures and paperwork.

- A conviction that the accomplishments of the past and the knowledge and skills of the workers were ignored and that they were treated with disrespect by some outside personnel brought to the site during the 1990-91 time frame.

- Failure by workers and management to reconcile the two cultures now found at Rocky Flats. Without the new culture for Conduct of Operations, work cannot go forward. Without process knowledge, the new Conduct of Operations is hollow. In reality, the two cultures are mutually dependent upon one another, but this fact has not been made clear to or been well understood by workers and managers in nonresumption buildings.

- Distrust of both the motives and level of knowledge of senior management because they inadequately communicated the basis for their decision to target Buildings 559 and 707 for initial resumption activities that first ignored and then stripped resources from higher risk facilities such as Building 771. The workforce did not understand that Buildings 559 and 707 resumption efforts were to provide a template for other buildings and that management intended to rapidly move toward resumption of Building 771 and other buildings after Buildings 559 and 707 were up and running. This issue was exacerbated by the fact that, because of the intense focus of resources on Buildings 559 and 707, personnel in other buildings received little of the training that was ultimately determined to be necessary to achieve success in the new Conduct of Operations culture. Unlike Buildings 559 and 707, the old and new cultures in the nonresumption buildings were not forced to work together and come to grips with their mutual dependence upon each other as part of a resumption effort.

- The long-standing national defense mission of the plant was determined to be obsolete due to emerging international events. Decisions being made about new missions often occur outside of the plant and lead to divisions among personnel at the site. Many employees believe there is no common purpose for activities conducted at the site.

- Dissatisfaction with the new procedures because they sometimes do not reflect adequately the status of equipment or the process knowledge possessed by the personnel in the buildings. Failure to adequately incorporate process and equipment status knowledge results in incorrect or difficult-to-use procedures.

- A failure of the workers to accept that they have a responsibility to make the new approach for Conduct of Operations work. The workforce must be actively involved to assure that process and status knowledge are incorporated in new procedures.

- A belief that at least some members of management, including senior management, are not themselves fully committed to Conduct of Operations principles. This belief results from perceptions that some managers fail to consistently follow procedures.

- A belief, common to DOE sites, that M&O contractors and their management styles come and go, but site culture and process knowledge endure.

The generic implication of these conditions can be stated as follows:

> Management and operations personnel have failed to achieve an acceptable process for conducting work that incorporates both Conduct of Operations principles and process knowledge. Due to their perception that some work control documentation (procedures, TIPs, etc.) is inadequate, some workers continue to rely on "process knowledge" rather than procedures as the principal basis for their safety. As a result, the potential exists for additional events to occur where failure to follow Conduct of Operations principles leads to unsafe conditions.

Recommendations:

1.1 Based on the results of the survey, in Corrective Action S.3 of the Root Cause Analysis, design and implement team building exercises to achieve a method for developing and implementing procedures, work instructions, and work practices, acceptable to management and workers, that fully reflect process and equipment status knowledge. This recommendation should be implemented in connection with Corrective Action S.1 of the Root Cause Analysis.

1.2 Institute training in situational ethics for all employees of Rocky Flats Environmental Technology Site. This training will aid personnel in making ethical choices in a complex, highly regulated, industrial environment controlled by overlapping and sometimes conflicting technical standards.

2. Ineffective Management Actions in Resolving Identified Problems

Several internal and external assessments of site activities have cited failure of management to take effective corrective action for identified deficiencies as a recurring problem. These assessments include the Root Cause Analysis of Special Nuclear Material Storage Nonconformances at Rocky Flats in August 1993, an EG&G Corporate review of operations in April 1994, a DOE, RFFO QA assessment in October 1994, and an in-process independent QA assessment expected to be completed in November 1994.

This Root Cause Analysis and a review of related data similarly highlighted instances where management has failed to take effective corrective action for previously identified events or circumstances that had characteristics similar to those which contributed to the events in Building 771.

- The Root Cause Analysis for this unauthorized solution draining event describes several situations where problems in the site's nuclear safety program have been identified in the recent past. Despite attention by high level management oversight organizations, including the Nuclear Criticality Safety Committee and the Safety Review Board, many of the discrepancies remain unresolved.

- A review of occurrence reports for Building 771 identified two past events involving deficiencies which indicate weaknesses in implementation of required programs (Occurrence Reports RFO-EGGR-771OP-1992-0058, a Nuclear Material Safety Limit violation which occurred because bottles containing plutonium solution were improperly spaced; and RFO-EGGR-771OP-1993-0096, proper procedures were not followed when transferring Special Nuclear Material (SNM) from Room 159 to Room 146, Building 771). More effective corrective actions for these occurrences may have prevented the unauthorized solution draining activities on September 29, 1994.

- Review of the site's Issues Management system identified a number of category 2 issues that relate to implementation weaknesses in the criticality safety program that have not been corrected in a timely manner.

Based on the foregoing, there appear to be two generic problems to be addressed in the area of management effectiveness:

1. A number of issues with characteristics similar to those which contributed to this event had been identified through the various problem reporting, audit and assessment, and corrective action programs. Management had not assured that effective corrective actions were taken.

2. The several management oversight organizations, including the Nuclear Criticality Safety Committee, the Safety Review Board and the Executive Safety Committee, have not adequately supported management in assuring that effective corrections are implemented.

The net result is less than adequate and timely corrective action, leading to recurring safety problems.

A contributing factor to both of these issues is a historical lack of effective tracking and trending of deficiencies and generation and use of associated performance indicators. As part of New Directions, EG&G has been aggressively pursuing the development of effective Performance Indicators with significant success. When these indicators are fully in place and mature, they will better focus management attention on key problem areas and facilitate timely corrective actions.

The generic implications of this situation are as follows:

> *Management's failure to assure effective and timely corrective actions and the failure of the site's senior safety oversight committees to adequately support management in assuring effective corrective actions are implemented increase the likelihood of potentially unsafe conditions.*

Recommendations:

2.1 Redefine and strengthen the safety oversight functions of the Safety Review Board, Nuclear Criticality Safety Committee, and Executive Safety Committee, and monitor effective implementation of these functions.

2.2 Institute a monthly line management review of the effectiveness of corrective actions for significant conditions adverse to quality, safety, and environmental protection.

3. Additional Types of Hazards Warranting Management Attention

The potential hazard that existed in the specific case of the Building 771 solution draining incident was a criticality safety hazard. There are several other types of hazards that exist at the site, including, but not limited to fire hazards, electrical hazards, occupational safety hazards, pressure hazards, radiological hazards, toxic chemical hazards, and environmental insult. The root causes of the Building 771 solution draining incident could lead to unsatisfactory conditions or practices for the programs that control these other hazards. This conclusion gives rise to the following generic implication:

> *The site's programs that control other types of hazards, including, but not limited to fire hazards, electrical hazards, occupational safety hazards, pressure hazards, radiological hazards, toxic chemical hazards, and environmental insult, may not be operating effectively due to inadequate implementation of Conduct of Operations.*

Recommendations:

3.1 Provide early dissemination of the circumstances, root causes, and recommendations connected with this Building 771 solution draining incident to program managers responsible for these other hazards, specifically, and to site personnel, generally.

3.2 After completion of the team building exercises and survey in recommendations S.1 and S.3 of the Root Cause Analysis and 1.1 of this Generic Implications Evaluation, apply lessons learned to other safety and environmental compliance programs at Rocky Flats.

4. Inadequate Discipline in and Process for Creating and Maintaining Authorization Bases

Review of the conditions surrounding this Building 771 incident and other incidents that have occurred leads to the conclusion that the site continues to suffer from inadequate discipline in and process for creating and maintaining authorization bases for conducting work. Some specific examples are listed below:

- The TIP process is implemented in Building 771 in a manner that lacks the discipline intended by the site's Level 1 procedure development and implementation processes. For example, TIP implementation in Building 771 allows management to modify TIPs in the field without benefit of a review of the proposed changes by personnel or disciplines who prepared the original TIP. This violates a fundamental safety principle of defense in depth. In the case of TIP 5, valve lineups were changed in the field that had been previously relied upon in the criticality safety analysis for the activity. In addition, TIP 5 contained no evidence that prerequisites were verified as new daily operations started. TIP 5 did not require reimplementation of the lockout/tagout required as a compensatory measure for a USQD at the end of each daily operation.

- An Unreviewed Safety Question Determination (USQD) was written for TIP 5 that did not acknowledge the need for controls that were specified in another USQD for Raschig Ring Tanks.

- Although the TIP process is perceived to be less formal than the procedure process, the TIP process contains most of the same safeguards. However, guidance on TIP implementation is not consistent and the TIP generation procedure (APNO-12) is out of date. Both of these conditions reflect a lack of discipline with respect to the authorization basis.

- Occasionally, Shift Orders, Operations Orders, and management letters are being used as part of the authorization basis in ways that were not intended. More formal documents such as procedures are the appropriate mechanism in most cases. The use of these less formal documents apparently arises from the belief that it takes too much effort and time to develop procedures.

- Criticality engineers report that the requirement to validate assumptions used in nuclear criticality safety analyses has been replaced by a requirement for operations personnel to concur with the overall criticality safety physical and administrative controls specified for an activity. This change in practice was designed to increase the efficiency of the process, but it reduces specific attention to technical bases for criticality safety.

- An assumption used in developing the criticality safety analysis for Building 771 solution draining per TIP 5 was that the Conduct of Operations Program was implemented in the building. This assumption was used, in part, to justify the use of administrative controls in lieu of physical controls of the boundary conditions on TIP 5 operations.

- Criticality safety engineers say they have been encouraged to specify administrative controls rather than physical controls due to cost and schedule implications and because of the one-time nature of many of the operations they evaluate.

One of the key objectives of the resumption program was to establish an adequate and documented authorization basis for hazardous activities. For the buildings that completed resumption, revised OSRs and various procedures were used to assure that the authorization basis was maintained once established. For a variety of reasons consistent with the site's new mission, we have relaxed our approach to authorization basis for the nonresumption buildings and have been evolving toward a formal activity-based planning approach, which is targeted for future implementation. Activity-based planning includes performing hazards analyses and preparing an

appropriate activity control envelope. Activity-based planning will consistently incorporate the development of appropriate authorization bases for activities; however, its implementation will require a degree of discipline not currently being displayed.

The generic implications of this situation are as follows:

> *The lack of discipline in and process for establishing and maintaining appropriate authorization bases for hazardous activities increases the probability of safety controls being inadequately specified or being violated during the conduct of these activities. This lack of discipline and process increases the probability of occurrence of incidents such as the Building 771 unauthorized solution draining incident.*

Recommendations:

4.1 Complete development of and implement a formal activity-based planning process for authorizing high risk or high priority work at Rocky Flats.

4.2 Improve processes for confirming building status is in compliance with the approved authorization basis including not only the Final Safety Analysis Report (FSAR), but also Unreviewed Safety Question Determination (USQD), Justification for Continued Operations (JCO), Standing Orders, Shift Orders, etc., and maintaining conformance during authorized work.

4.3 In the interim, until recommendations 4.1 and 4.2 in this evaluation and B.1 of the Root Cause Analysis are implemented, there should be additional protection against deliberate violations of safety requirements. This additional protection should be provided by requiring the presence of supervision and the use of physical barriers or other measures to ensure that safety is maintained and authorization basis is adhered to throughout all operations and activities of significant risk or priority involving fissile materials.

SUMMARY OF CAUSES, GENERIC IMPLICATIONS, AND ASSOCIATED RECOMMENDATIONS

Causes & Implications	Corrective Actions	Priority*
Summary Root Cause: Conduct of Operations (COOP) was less than adequate.	S.1 Team building with workers, experts, and managers.	Short Term
	S.2 Increase senior manager presence during operations.	Immediate
	S.3 Survey opinions, practices, attitudes, and behavior regarding COOP and implement recommendations.	Short Term
Root Cause A: Performance of task was less than adequate.	A.1 Enhance training on nuclear criticality safety.	Immediate & Short Term
	A.2 Increase effectiveness of COOP implementation and procedures.	Long Term
Root Cause B: Supervision of work was less than adequate.	B.1 Develop and implement guidance for minimum levels of supervision.	Short Term
	B.2 Increase independent safety oversight of high risk operations to monitor effectiveness of supervision.	Immediate
	B.3 Improve senior managers' training of lower level managers.	Long Term
	B.4 Consider knowledge of and commitment to COOP as part of qualification process.	Immediate
Root Cause C: Inadequate barriers and controls were established in work control document (TIP 5).	C.1 Do not assume COOP is fully implemented in writing work control documents.	Immediate

Causes & Implications	Corrective Actions	Priority*
	C.2 Emphasize use of physical barriers, supervision and independent oversight for high risk/priority activities.	Immediate
	C.3 Re-evaluate adequacy of compensatory measures for USQDs.	Immediate
	C.4 Assure RCRA compliance integrated into work controls.	Immediate
Contributing Cause D: Ineffective corrective action for previously identified weaknesses.	D1. Complete actions already underway to modify corrective action program, and train people in the revised program.	Short Term
	D2. Develop performance indicators for managers to evaluate their performance in driving high priority issues to closure.	Short Term
Contributing Cause E: Participants had expired qualifications.	E. Assure trained and qualified personnel assigned to operations.	Immediate
Potential Problem F: Perception of inconsistent discipline may hinder reporting of safety information.	F.1 Analyze consistency of disciplinary actions and implement identified actions.	Short Term
	F.2 Assure understanding of accountability for adherence to requirements, including "no fault" reporting of safety information.	Short Term
Potential Problem G: Removal of Lockout/Tagout (LO/TO) was not in compliance with compensatory measures for USQD.	G.1 Evaluate and improve, as required, compensatory measures for USQD-RFP-93.1503-GLS.	Immediate
	G.2 Discontinue current LO/TO practice for interrupted activities.	Immediate

Causes & Implications	Corrective Actions	Priority*
Generic Implication 1: Lack of acceptable process for conducting work which effectively combines COOP principles and process knowledge.	1.1 Team building exercises to implement lessons learned from survey in S.3. Combine with actions under S.1.	Long Term
	1.2 Institute situational ethics training.	Long Term
Generic Implication 2: Ineffective implementation of corrective action.	2.1 Redefine, strengthen, and monitor safety oversight functions of SRB, NCSC, and ESC.	Short Term
	2.2 Institute monthly line management review of corrective action implementation.	Short Term
Generic Implication 3: Other types of hazards warrant attention for COOP weaknesses.	3.1 Disseminate information about this event to program managers and other site personnel.	Short Term
	3.2 Apply lessons learned from S.1, S.3, and 1.1 to other types of hazards.	Long Term
Generic Implication 4: Absence of discipline in and process for creating and maintaining authorization bases.	4.1 Develop and implement activity-based planning process.	Short Term
	4.2 Improve processes for maintaining building status in compliance with approved authorization bases.	Short Term
	4.3 Implement protection against knowing and intentional violation of safety requirements until other improvements are implemented.	Immediate

*Priorities are defined as follows: Immediate means before restart of activities suspended by Standing Order 34; Short Term means as soon as practicable within 6 months from this date; and Long Term means as soon as practicable within 12 months from this date.

SCIENTECH, INC.

[illegible] BLVD SUITE 225 ■ GOLDEN COLORADO 80401 ■ PHONE 303-278-4338 ■ FAX 303-278-0092

November 23, 1994

Anson H. Burlingame
President
EG&G Rocky Flats, Inc.
P.O. Box 464

Subject: RJM-32-94: Review of Root Cause Analysis and Generic Implications Evaluation

Dear Mr. Burlingame:

At the Request of your Safety Review Board (SRB), I was asked to review the Root Cause Analysis and implementation of associated corrective actions regarding the unauthorized draining of plutonium solution in Building 771 on September 29, 1994. This letter is to tell you and the SRB of the results of my review of the Root Cause Analysis and the Evaluation of Generic Implications of that incident, which are being transmitted to you by William Glover, Director of Performance Assurance.

The Root Cause Analysis and the Evaluation of Generic Implications were both conducted in an open and thorough manner, consistent with practice in the nuclear industry. The casual factors, generic implications, and related recommendations identified in the evaluations are complete and well considered. Effective implementation of the recommendations should preclude further incidents of this type and will also assist implementation of an improved conduct of operations culture at Rocky Flats.

A return to plutonium handling operations should be possible in the very near term with implementation of recommendations outlined by Mr. Glover. This is possible because he has effectively dealt with the central need for improvement identified by this incident. That is, there is a need for additional protection against deliberate acts by individuals conducted outside of approved operations. The additional protection needed for a return to operations in the immediate future will be provided by the items so identified by Mr. Glover.

I also call your attention to the longer term corrective actions recommended as a result of this incident. The most important of these actions will lead to a reconciliation of the two cultures that have struggled with one another for

the past several years at Rocky Flats. It is now clear to me that conduct of operations that does not effectively account for process knowledge will fail. Just as we have known since 1990 that proceeding without conduct of operations is unacceptable, so now we know that proceeding without reconciliation of process knowledge is unacceptable. Over the longer term we must unite the two cultures, as we did in Buildings 559 and 707. Obviously, the challenge is to achieve that goal with improved efficiency.

Finally, I call your attention to the idea of "no fault" reporting of new safety information that is contained in the recommendations of the Root Cause Analysis. At this stage of the maturation of safety culture at Rocky Flats it is imperative that this idea be give prominence and full management support. It appears from the Root Cause Analysis that workers and managers are not clear in their minds that new safety information must be reported candidly and rapidly whenever it occurs. Experience of the Federal Aviation Administration showed the way for the commercial nuclear industry in this policy area. That experience taught us that there must be immunity from punishment for anyone that reports new safety information. As we progress along this road at Rocky Flats, we will also learn, as have others before us, that we must teach people not to correct their own mistakes. But first, and foremost, we must teach them not to hide their mistakes.

I will continue in my assignment with the SRB to assist in implementation of the recommendations of these evaluations. If you have any questions, please call me at (303)278-4338. Thank you for the opportunity to be of service.

Sincerely,

Roger J. Mattson

Roger J. Mattson, Ph.D.
Senior Vice President

cc: William Glover
Art Geis
Dennis Ferrera
Kevin Stovall
Root Cause Analysis Team

File: 4506-001

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: W. S. Glover, Performance Assurance, Bldg. 111, X6310

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-268-94

I have reviewed the subject root cause analysis which you forwarded to me on November 23, 1994. You and your team are to be commended for a thorough and insightful evaluation.

By separate correspondence I am directing the Senior Review Board (SRB) to continue to analyze the issues related to this incident, to track and trend through the use of performance indicators the issues identified in your root cause analysis, and to provide recommendations for closure of all of the corrective actions related to this incident.

I request that you work with the Director of Organizational Effectiveness to proceed with the Employee Survey contained in Recommendation S.3. This survey should be conducted for all personnel who routinely perform work in Buildings 559, 707, 779, 776/777, 771, 371, and 886. When you have completed that survey I request that you provide me with a recommendation concerning expanding the survey sitewide. I also request that you compare the results of this survey with a similar survey that was conducted in 1992 and evaluate the trends indicated by such an evaluation.

Again, I commend you and your team for a job well done.

plh

cc:
R. S. Bird
J. A. Geis
W. S. Glover
S. M. Lehman
D. Mayfield
M. M. McDonald
J. A. McLaughlin
K. E. Rocky
L. C. Smith
K. D. Stovall
E. R. Swanson
T. J. Tegler

This analysis should not be viewed as an indictment of the progress that has been made over the last five years at Rocky Flats in implementing the principles of Conduct of Operations. Rather, it should be used as a valuable tool to help us further improve in all areas of our operations.

plh

Attachment:
As Stated

cc:
J. G. Davis
D. W. Ferrera
R. E. Fray
J. A. Geis
W. S. Glover
P. M. Golan
T. J. Healy
T. G. Hecahl
D. T. Jackson
R. E. Kell
G. E. Marx
M. M. McDonald
G. McKenna
J. G. Paukert
V. M. Pizzuto
J. K. Schwartz
S. G. Stiger
G. M. Voorheis

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: Distribution

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-269-94

Attachment (1) is a thoughtful and insightful analysis into the criticality infraction incident in Building 771 that occurred on September 29, 1994. I want to ensure that this analysis receives the broadest possible review by EG&G Rocky Flats personnel. Accordingly, you are requested to include this root cause analysis in your required reading program. Additionally, you should ensure that this analysis is briefed to all personnel within your organization.

By separate correspondence I have directed the Safety Review Board (SRB) to control the corrective actions resulting from this incident. Such corrective actions falls into three distinctive phases. They are:

(a) Restart of Suspended Operations in the near-term

(b) Further improvement over the next few months in our processes used to control work at Rocky Flats

(c) Developing facts related to the "safety culture" and taking longer term actions to improve that culture

Your briefings on this root cause analysis should emphasize that the direct cause of this incident was a willful and knowing violation of the principles of Conduct of Operations and an intentional non-disclosure of such violations for a period of seven days. You should emphasize that such actions cannot and will not be tolerated.

The root cause analysis appropriately goes far beyond this immediate cause and provides insightful recommendations to further improve our ability to safely conduct work at Rocky Flats. These recommendations are applicable sitewide using the graded approach.

In particular, you should make it clear that we cannot conduct operations at Rocky flats unless the principles of Conduct of Operations are followed. However, you should also emphasize that applying Conduct of Operations in the absence of "process knowledge" is a hollow effort that will ultimately fail.

Principal Technical Advisor assume the permanent positions as Co-Chairmen of the SRB. This action is being initiated in order to provide very senior personnel that do not have day-to-day line management responsibilities in leadership positions of the SRB. They will have the experience to deal with and the time to devote to the complex issues being confronted by the SRB.

I am concerned with the apparent continuing inability to effectively and efficiently close all issues related to nuclear safety. It is clear that better teamwork and leadership is needed between senior nuclear safety and operations personnel to improve in this area. I request that the SRB give this issue strong attention.

Line organizations have implemented recent improvements in the manner in which performance indicators are used to track and trend operations at Rocky Flats. The root cause analysis suggests that improved use of performance indicators by the SRB and its subcommittees could provide precursors of future mistakes and allow management to take corrective action before such mistakes occur. I request that the SRB take immediate action to enhance this important area.

I am particularly pleased with the manner in which the subcommittee to the SRB has managed recent restart activities. I encourage the SRB to consider the use of additional subcommittees (virtual teams) in future activities.

As noted in Generic Implication (3), additional management attention using the lessons learned from the incident in 771 should be taken to control other types of hazards. Using the graded approach the SRB should carefully evaluate how to deal with this issue.

The actions requested herein, are intended to further improve on an already credible and effective effort by EG&G Rocky Flats senior managers. The actions in the past by this board have provided valuable advice and direction to all senior managers to improve in their individual areas of responsibility. These actions are intended to add additional value to an already capable process.

plh

cc:
D. W. Croucher
J. G. Davis
D. W. Ferrera
R. E. Fray
J. A. Geis
W. S. Glover
P. M. Golan
T. G. Hedahl
R. E. Kell
V. M. Pizzuto
D. J. Sanderstrom
S. G. Stiger
G. M. Voorhees

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: SRB Chairman

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-273-94

The subject analysis is hereby forwarded to you for further action by the Senior Review Board (SRB). Such action should include the following:

(a) Using this root cause analysis as a baseline, continue to analyze the issues related to this incident. Maintain a database of all such issues including the specific recommendations contained in the root cause analysis.

(b) Establish appropriate performance indicators (where applicable) and track and trend these issues to evaluate the effectiveness of the actions being taken.

(c) Provide recommendations to me for closure of all of the individual corrective actions, particularly those contained within the root cause analysis, related to this incident.

This root cause analysis, and particularly the Generic Implications Evaluation, are very thorough and insightful. The recommendations are sweeping and if fully and effectively implemented should cause further improvement in the ability to safely perform work at Rocky Flats. The root cause analysis recognizes three essential elements of action to be taken. They are:

(1) Restart of suspended operations which can be promptly undertaken with the application of appropriate compensatory measures in areas requiring further improvement.

(2) Concurrent with restart activities additional improvements can be achieved on actions that EG&G has progressively taken over the last 5 years to achieve the appropriate formality of operations.

(3) In the longer term, develop facts related to the "safety culture" at Rocky Flats and develop plans to effectively deal with this issue.

Your approach should recognize that restart activities can, with proper compensatory actions, proceed while the actions related to subparagraphs 2 and 3 above are being implemented.

The root cause analysis points out weaknesses in our ability to effectively close issues related, in this case to nuclear safety. However, I am concerned that this weakness is more broadly based than only the nuclear safety issue. Some of those weaknesses, I believe, are historic in nature, particularly those related to the Senior Oversight Committee. Recent improvements in the SRB process, particularly the actions related to restart of suspended activities, have been impressive. However, further improvement is needed and a better focus on addressing "non-crisis" issues on a routine basis is required. Accordingly, I request that, effective immediately, the Vice President for Standards and the Los Alamos

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: R. E. Fray

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-270-94

The subject root cause analysis leaves two issues directly related to operations under your responsibility that have not been fully addressed. They are:

(a) On September 29, 1994, the Shift Manager noted a darker colored liquid in a flask in glovebox 42. It is not clear what action he took to investigate or resolve his questions related to this liquid. I am concerned that the senior line manager in the facility may have noted an unusual condition and then failed to adequately follow up on his observations.

(b) The subject analysis also leaves unresolved the source of approximately 14.75 liters of liquid contained in the sixty four-liter bottles in glovebox 42.

You are requested to conduct a further review of these two issues and provide the Safety Review Board (SRB) your conclusions and the action that you will take based upon those conclusions.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: D. Jackson, Internal Audit, Bldg. 850, X2434

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-271-94

The subject root cause analysis identifies weaknesses in the manner in which your investigation of this incident was documented. This should not be viewed as a criticism of the professionalism of your investigators. Rather, I encourage you to consider ways to improve on an already credible investigative process. It is my understanding that the Federal Bureau of Investigation (FBI) provides field team training to assist organizations such as yours in conducting investigations of this nature.

I request that after you have reviewed this root cause analysis you develop a training program to further enhance your organization's investigative skills. I further request that you provide the Safety Review Board (SRB) with a written analysis of your review and the description of the actions that you will take in this regard.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

EG&G ROCKY FLATS
INTEROFFICE CORRESPONDENCE

DATE: November 28, 1994

TO: F. G. McKenna, General Counsel, Bldg. 111, X2342

FROM: A. H. Burlingame, President, Bldg. 111, X4361

SUBJECT: ROOT CAUSE ANALYSIS AND GENERIC IMPLICATIONS OF THE UNAUTHORIZED DRAINING OF A PROCESS LINE IN BUILDING 771 AHB-272-94

The subject root cause analysis identifies two issues related to discipline at Rocky Flats that warrant further consideration. They are:

(a) Confirm that EG&G has a "no fault" policy related to reporting safety violations and that such a policy has prominence and full management support.

(b) Conduct a review of disciplinary actions taken over the last two years to identify potential inconsistencies and/or weaknesses in the disciplinary process.

I request that you take action to deal with both of these issues. With regard to the "no fault' policy please work closely with the EG&G consultant Dr. Roger Mattson. The commercial nuclear industry evidently has such a policy in place that may be applicable at Rocky Flats.

Please provide directly to me the results of your actions related to the above two issues as well as your recommendations for further improvements. Particularly with respect to your review of past disciplinary actions you should consider collecting and reporting such results as "privileged" information. Except in the case of "privileged" information, I request that you keep the SRB fully appraised of your actions in this matter.

plh

cc:
J. G. Davis
D. W. Ferrera
D. J. Sandstrom

PRIVILEGED INFORMATION

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: November 3, 1994

TO: A. H. Burlingame, Building 111, X 4361

FROM: D. P. Snyder, Engineering & Safety Services, Bldg. 130, X5420 D P Snyder

SUBJECT: REVIEW OF CRITICALITY SAFETY RELATED TO SYSTEM CONFIGURATION AND VALVE LINEUPS FOR TIP-005, BUILDING 771, D-467 TANK DRAINING - DPS-139-94

Ref: D. P. Snyder ltr, DPS-137-94, to A. H. Burlingame, Same Subject, November 2, 1994

PURPOSE

The purpose of this memo is to replace the referenced letter and provide clarification concerning the Double Contingency Criticality Safety review of TIP-005, Building 771, Tank 467 draining.

DISCUSSION

I conducted a review of TIP-005 to determine if Double Contingency related to Criticality Safety existed. My review included walkdowns by Criticality Safety Engineering, table top reviews with Operations, Engineering and Criticality Safety and a personal review of the TIP-005 procedure.

The basic focus of my review was to understand what constitutes double contingency for TIP-005 in the eyes of Criticality Safety Engineering and to review the lineups and system diagrams to determine if these double contingency principles were adequately and accurately implemented.

In the simplest of terms, double contingency for credible criticality accident scenarios was established for activities that could potentially affect Raschig Rink tank solution transfers and for any activities within Glovebox 42, such as draining, sampling, storage, etc.

For activities that could potentially affect Raschig Ring tanks, double contingency included LO/TO of the vacuum system (motive force for solution transfer) and closing fill and drain valves and opening vent valves on affected tanks.

Double contingency during TIP-005 execution, when the vacuum system (motive force) was in operation, included closed drain and fill valves and open vent valves for tanks which could be affected. The second contingency was to further isolate the vacuum header to other Raschig Ring tanks. As a precaution, a physical watch was posted to observe liquid level on any tank which was not isolated by two valves.

Operations within Glovebox 42 were controlled by the posted NMSL.

CONCLUSION

TIP-005, as approved, provided Double Contingency for credible criticality accident scenarios.

Additionally, the TIP, as executed, ensured Double Contingency was achieved until the point when Process Operators commenced an unauthorized draining evolution beyond the scope of the approved procedure.

RESPONSE REQUIREMENTS
No response is required.

dgb

cc:
W. L. Coulter
R. E. Fray
W. S. Glover
D. B. Hensley
R. E. Kell
D. G. Satterwhite

ENCLOSURE 4

RESTART PLAN FOR HSP 31.11
BRUSHING AND REPACKAGING (BUILDING 707)

RESTART PLAN

for

HSP 31.11

BRUSHING and REPACKAGING

Revision 0 - 700 Area Only

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

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RESTART PLAN FOR HSP 31.11 BRUSHING AND REPACKAGING

INTRODUCTION

This Restart Plan is to reaffirm the safety culture and readiness for continuation of the brushing of oxide and repackaging of plutonium metal items which are currently out of compliance with Health and Safety Practices Manual, Section 31.11, "Transfer and Storage of Plutonium for Fire Safety", in order to mitigate the risk of a plutonium fire.

This activity, which is currently suspended under Standing Order 34 since October 7, 1994, has been in successful operation in Building 707 since May 1994 and has safely dispositioned 188 plutonium items. [Three additional items were safely dispositioned under this project in Building 779 in January 1994.] The suspension of this activity was taken as a precautionary measure in response to the Building 771 incident.

The plutonium material affected by this project is stored in Buildings 707, 771, 776/7, and 779. However, the brushing and repackaging activities are only planned to be performed in Building 707, a building which has a fully reviewed infrastructure as a result of recent Operational Readiness Reviews. The rigorous preparation of this building over the past four years provides a high confidence in its readiness and qualification to perform these activities. The material in the other buildings is only planned to be retrieved from storage and transferred to Building 707, in sealed containers, for processing, and then returned to the originating building for storage.

This Restart Plan documents the Core Requirements for Readiness Assessment, as described in DOE Order 5480.31, and the Criteria, Methodology, and Deliverables for each Requirement. All verification documentation in support of the Deliverables for this Plan are included as appendixes to this Plan as that documentation becomes available.

This plan is submitted as directed by A. H. Burlingame letter, AHB-209-94, dated October 12, 1994 .

This Readiness Assessment addresses each Root Cause and Contributing Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, dated October 16, 1994, as follows:

Root Cause A:

> Task performance was Less Than Adequate (LTA) in that one worker knowingly and willfully performed work outside and beyond the scope of Task Information Package (TIP) 5. Additionally, the worker's foreman and manager assisted in the activities and subsequent cover-up once they became aware of the unauthorized activities.

Response

As documented herein, all personnel involved with material handling operations will have been interviewed by management. Additionally, management and supervision will have been interviewed by upper management.These interviews will be conducted to ensure that everyone understands their responsibilities and that procedures must be followed, training is adequate, and that criticality safety is understood.

Root Cause B:

Supervision was LTA.

Response

The level of experience of personnel involved in this project is such that it leads us to be confident in the quality of management and supervision. This will be validated through the oral interview process.

Root Cause C:

Physical Barriers were (LTA)

Response

As noted in this plan, physical barriers will be verified as in place and supportive of the requirements as defined in the CSOL's/NMSL's.

1. Subject area

Readiness assessment for the continuation of HSP 31.11 brushing and repackaging activities in Building 707, including the transfer of material from Buildings 771, 776/777 and 779.

2. Purpose

Confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise plutonium brushing and packaging activities exhibit formality such that these activities are accomplished in a safe manner.

3. Hazard Category

Based on 1-H24-ADM-10.01, Startup and Restart of Nuclear Facilities, Appendix 4, this will be a restart from a "precaution pending review". Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope

In Building 707, where HSP 31.11 activities are performed, criticality safety is paramount. To ensure that brushing and repackaging activities are accomplished safely, the organizational infrastructure must be verified to be in place. This is accomplished by confirming the following infrastructure is in place to support HSP 31.11 brushing and repackaging:

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility safety
5. Activity supporting hardware systems
6. Crit. Safety deficiencies
7. CSAs/STCSs
8. Criticality Safety training
9. Criticality Safety drills
10. Functional test start-up
11. Knowledge of assignment
12. Conduct of Operations application
13. Sufficient numbers of qualified personnel
14. Safety awareness culture
15. Safety basis
16. Modifications incorporated into procedures
17. Technical and management qualifications

Buildings 771, 776/777 and 779 have material stored in them that must be transferred to Building 707 for brushing and repackaging. The assessment for Buildings 771, 776/777 and 779, in addition to the oral interviews, will include reviews of : (1) procedures, (2) CSOLs/NMSLs, (3) training and qualifications. No brushing and repackaging activities will be performed in Buildings 771, 776/777, and 779.

5. Schedule

The execution of this restart plan began on October 27, 1994, with a projected completion date of on or before November 23, 1994.

6. Assessment Specialists

Team members: R. C. Leonard (Team leader)
S. R. Badgett
R. J. Erfurdt
A. J. Holifield
E. L. Morgan
V. M. Pizzuto
P. Sasa
J. W. Stailing
G. W. Tasset
G. M. Voorheis

7. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

Criteria: Develop listing of required procedures, (see Appendix A)

Methodology: Document review

Deliverable: Documented verification that listed procedures are approved and available and that adequate safety controls are incorporated.
Actionee: W. S. Fleming

CORE REQUIREMENT 2:

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented.

Criteria: Develop listing of trained and qualified employees, by function, (see Appendix B)

Methodology: Records review per Training Users Manual (TUM)

Deliverable: Documented verification of adequate training/qualification (with dates for next training due) Actionee: D. M. Shaw

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Criteria: Conduct oral interviews that include a review of the Building 771 incident

Methodology: All-hands briefings (see Appendix C)
Management seminars (see Appendix D)
Individual interviews (see Appendix E)
Feedback sessions (see Appendix F)

Deliverable: Signed off interview questionnaires (with evaluations of sat/unsat) and attendance rosters.
Actionee: Assessment Team

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "Safety Envelope".

Criteria: Verify NSM 3.12 compliance

Methodology: Review of pre evolution briefing records

Deliverable: Documented verification of NSM 3.12 inclusion in pre evolution briefings. Actionee: R. S. Brown

Note: See additional safety basis documentation in Core Requirements 1, 5, and 15.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition and operability of safety systems, including safety related process systems and safety related utility systems. This includes examinations of records of tests and calibration of safety system and other instrumentation which monitor Limiting Conditions of Operations (LCO) or that satisfy Technical Safety Requirements (Operational safety requirements). All systems are currently operable and in a satisfactory condition. For the HSP 31.11 project, the focus of this requirement will be on Building 707 only.

Criteria:	Verify OSR compliance and surveillance requirements are met
Methodology:	Record reviews of applicable VSS LCO surveillances
Deliverable:	Documented verification of LCO surveillance compliance. Actionee: A. J. Holifield

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

Criteria:	Verify compliance thru Plant Action Tracking System
Methodology:	Records review
Deliverable:	Documented verification that Criticality Safety deficiencies have been dispositioned. Actionee: R. S. Brown

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

Criteria:	Verify thru Compliance Management Records
Methodology:	Records review
Deliverable:	Documented verification that nonconformances have been dispositioned. Actionee: S. Williams

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

Criteria: Verify that the POD and pre evolution briefings verify adequate management programs, sufficient numbers of qualified personnel, facilities and equipment.

Methodology: Records review

Deliverable: Documented verification that requirements have been met and are being maintained.. Additionally, provide documented verification that the most recent inventory of the Emergency Response cabinets (Best Team, Emergency Reentry and Spill Response cabinets) was completed and determined to be satisfactory. Actionee: D. M. Shaw

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented.

Criteria: Review of Building 707 Drill Plan

Methodology: Records review

Deliverable: Documented verification of criticality safety drill compliance. Actionee: S. R. Badgett

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators.

Criteria: Review of the Graded Start-up Test Program

Methodology: Document review

Deliverable: Documented verification that B707 is in compliance with the Graded Start-up Test Program requirements.
Actionee: A. J. Holifield

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities is adequate for operations.

Criteria: The necessary attributes of the Conduct of Operations Manual are applied to support the activity. These attributes include: Pre-evolution briefing, POD, LCO compliance, use of procedures and training/qualification of staff.

Methodology: Document review

Deliverable: Documented verification that the attributes of Conduct of Operations described above are in place and are satisfactorily implemented for HSP 31.11 activities, including, specifically, that the safety basis documentation that supports the activity has been confirmed to be fully implemented. Actionee: A. J. Holifield

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

Criteria: Reference Core Requirements 2 and 8

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

Criteria: Confirm that requirements were addressed and deemed adequate thru the Operational Readiness Review (ORR) for Building 707. (Not applicable to other 700 area buildings)

Methodology: Records review

Deliverable: Documented verification that building facility and procedure modifications are made in compliance with CCCP, COEM, IWCP and PPG requirements. Actionee: A. J. Holifield

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

Criteria: Reference Core Requirement 15

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

Criteria: Reference Core Requirement 3 and 2

8. Methodology

(See methodologies used in Section 7)

9. Operational Interfaces

Teams will be composed of Rocky Flats personnel

Clearances and other access requirements will be supported by Operations Manager

10. Restart Plan approval

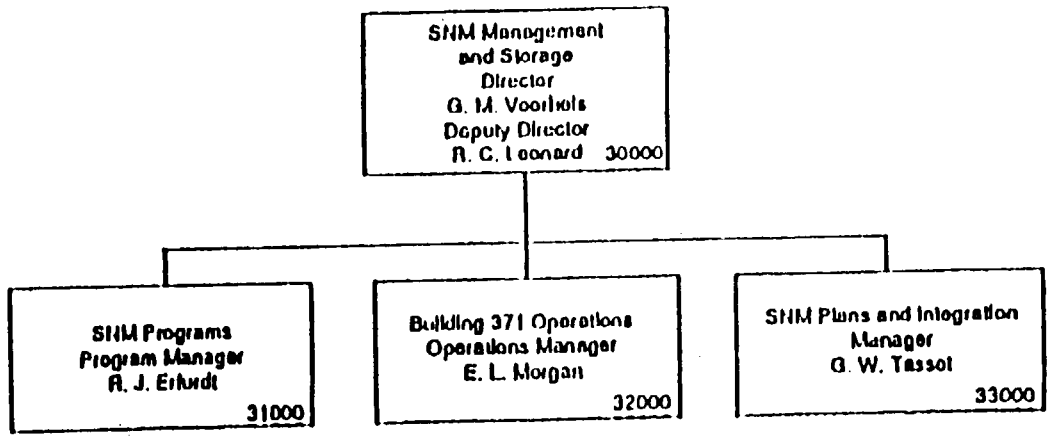
Submitted

G. M. Voorneis
Director, SNM Management and Storage

Submitted

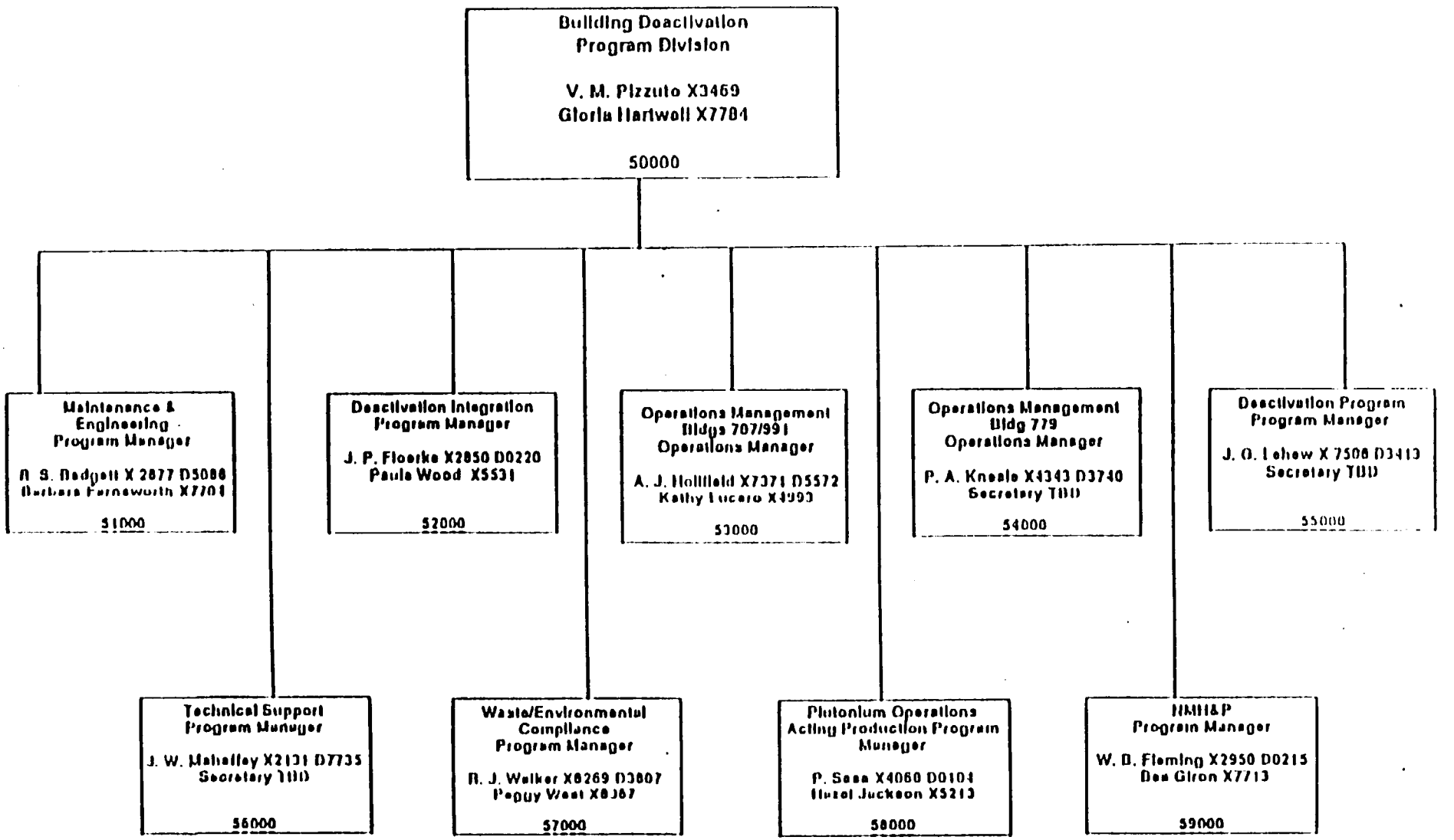
V. M. Pizzuto
Director, Building Deactivation

SNM MANAGEMENT AND STORAGE



BUILDING DEACTIVATION PROGRAM DIVISION
ORGANIZATION CHART

50000



Revised 6-22-94

APPENDIX A

Approved procedures in support of HSP 31.11 brushing and repackaging

Procedure #	Title
4-F89-FO-0002/Rev. 0	XY Retriever, Building 707
4-A82-FO-0077/Rev. 0	Parts cleaning/oxide removal, Building 707
4-30000-FO-0103/Rev. 0	Balances, Building 707/776/777
4-30000-FO-1023/Rev. 0	Gram estimation
4-32PFO-707-002/Rev. 0	Glovebox & XY Retriever differential pressure surveillances
FO-0001/Rev. 0	Decontamination
FO-0028/Rev. 0	Receiving and storing material, Building 707/777
FO-0078/Rev. 0	Transfer of material from Buildings 707 & 777
COOP-011/Rev. 0	Pre-Evolutionary briefings
4-B19-NSM-03.12/Rev. 0	Nuclear material safety limits and criticality safety limits surveillance
4-84300-FO-0018/Rev. 0	Material transfer and storage, Building 707, 776/777 & 779
4-B22-FO-0010/Rev. 0	Building 707 glovebox operations
FO-0020/Rev. 0	Chainveyor operations
4-D18-FO-0010/Rev. 0	Glovebox operations
1-63200-NMT-001/Rev. 0	Transfer of nuclear material between material access areas
NDA-0018/Rev. 0	Material transfer and storage, Buildings 771/371
NMS MT-004/Rev. 0	Nuclear material and drum transfer reports
NMS MT-007Rev. 0	Inter/intra material balance area
NMS MT-008/Rev. 0	Use of the 771/776 & 777/779 tunnels for the movement of nuclear material or equipment

Note: Procedures can be reviewed in the Building 707 SAC. Contact T. C. Adams at x3619. Any changes to procedures numbers/revisions and/or titles are reflected in the deliverable for Core Requirement 1.

APPENDIX B

Trained/Qualified employees that support HSP 31.11 brushing and repackaging

Employee name	Employee #	Group
R. A. Channel (B707)	503024	Task supv.
J. Q. Maes (B707)	512036	Ops. support
D. C. Brill (B707)	513792	"
J. J. Vontersch (B707)	514255	"
K. K. McTaggart (B707)	512500	"
J. F. Hahn (B707)	515962	"
J. C. Dockter (B707)	511953	Task supv.
E. B. Allen (B707)	512970	"
K. L. Newby (B707)	513409	Process spec.
S. Sterkel (B707)	513138	"
T. J. Pfarr (B707)	513322	"
W. A Averill (B779)	510210	Experimental ops.
D. C. Fisher (B779)	512760	Task supv.
S. R. Garrett (B779)	513082	Experimental ops.
R. S. George (B779)	504501	"
M. L. Jasper (B779)	513299	"
C. W. Kranker (B779)	503310	"
D. E. Oliver (B779)	513274	"
E. W. Pierson (B779)	506923	"
R. L. Schempf (B779)	512696	"
J. E. Woodward (B779)	507067	"
R. E. Hodgson (B771)	509220	Task supv.
J. D. Fenwick (B771)	513181	NDA operator
M. W. Phillips (B771)	514139	"

Note: Training/Qualification records can be reviewed in Building 060, contact E. L. McKee at x4160.

APPENDIX C (schedule)

All-hands briefing schedule (E707 personnel)

SHIFT	DATE	TIME	LOCATION
1	10/27/94	9:30 AM	750-A
3	11/1/94	6:30 AM	707 Conf. Room
2	11/3/94	3:30 PM	707 Conf. Room

Note: Briefings will be conducted by V.M. Pizzuto

Attendance can be verified against the list of employees from Appendix B

Building management will ensure that a minimum number of trained/qualified employees have been briefed prior to restart. No hands-on employee will participate in an evolution until he/she has completed the all-hands briefing.

APPENDIX D (schedule)

Management Seminars (Building 707)

NAME

B. E. Woolsey

R. L. Fiore

W. B. Fleming, Jr.

A. J. Holifield, Jr.

P. Sasa

R. D. Slaybaugh

DATE: 11/1/94

TIME: 1:30 PM

LOCATION: B707 conf. room

Note: Seminars will be conducted by V. M. Pizzuto

APPENDIX E

Individual interviews

NAME	DATE	TIME	LOCATION
R. A. Channel (B707)			
J. Q. Maes (B707)			
D. C. Brill (B707)			
J. J. Vontersch (B707)			
K. K. McTaggart (B707)			
J. F. Hahn (B707)			
J. C. Dockter (B707)			
E. B. Allen (B707)			
K. L. Newby (B707)			
S. Sterkel (B707)			
T. J. Pfarr (B707)			
R. E. Hodgson (B771)			
J. D. Fenwick (B771)			
M. W. Phillips (B771)			
W. A Averill (B779)			
D. C. Fisher (B779)			
S. R. Garrett (B779)			
R. S. George (B779)			
C. W. Kranker (B779)			
D. E. Oliver (B779)			
E. W. Pierson (B779)			
R. L. Schempf (B779)			
J. E. Woodward (B779)			
M. L. Jasper (B779)			

Note: Schedule for interviews is yet to be determined.

ENCLOSURE 5

RESTART PLAN FOR
THERMAL STABILIZATION IN BUILDING 707

RESTART PLAN

for

THERMAL STABILIZATION

in

BUILDING 707

Revision 0

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

INTRODUCTION

This Restart Plan is to reaffirm the safety culture and readiness for continuation of the Plutonium Start-Up Test Program in support of Thermal Stabilization of plutonium oxides in Building 707 in order to mitigate the risk of a plutonium fire.

This activity, which is currently suspended under Standing Order 34 since October 7, 1994, has completed Phase I, "Procedure Walkdown and Familiarization", in August 1994. The suspension of this activity was taken as a precautionary measure in response to the Building 771 incident.

The plutonium material affected by this project is stored in and will be processed in Building 707, a building which has a fully reviewed infrastructure as a result of recent Operational Readiness Reviews. The rigorous preparation of this building over the past four years provides a high confidence in its readiness and qualification to perform these activities.

This plan is submitted as directed by A. H. Burlingame letter, AHB-209-94, dated October 12, 1994 .

This Readiness Assessment addresses each Root Cause and Contributing Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, dated October 16, 1994, as follows:

Root Cause A:

> Task performance was Less Than Adequate (LTA) in that one worker knowingly and willfully performed work outside and beyond the scope of Task Information Package (TIP) 5. Additionally, the worker's foreman and manager assisted in the activities and subsequent cover-up once they became aware of the unauthorized activities.

Response

As documented herein, all personnel involved with material handling operations will have been interviewed by management. Additionally, management and supervision will have been interviewed by upper management.These interviews will be conducted to ensure that everyone understands their responsibilities and that procedures must be followed, training is adequate, and that criticality safety is understood.

Root Cause B:

Supervision was LTA.

Response

The level of experience of personnel involved in this project is such that it leads us to be confident in the quality of management and supervision. This will be validated through the oral interview process.

Root Cause C:

Physical Barriers were (LTA)

Response

As noted in this plan, physical barriers will be verified as in place and supportive of the requirements as defined in the CSOLs/NMSLs.

1. Subject area

Readiness assessment for the continuation of thermal stabilization activities in Building 707.

2. Purpose

Confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise plutonium brushing and packaging activities exhibit formality such that these activities are accomplished in a safe manner.

3. Hazard Category

Based on 1-H24-ADM-10.01, Startup and Restart of Nuclear Facilities, Appendix 4, this will be a restart from a "precaution pending review". Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope

In Building 707, where thermal stabilization activities are performed, criticality safety is paramount. To ensure that thermal stabilization activities are accomplished safely, the organizational infrastructure must be verified to be in place. This is accomplished by confirming the following infrastructure is in place to support thermal stabilization.

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility safety
5. Activity supporting hardware systems
6. Crit. Safety deficiencies
7. CSAs/STCSs
8. Criticality Safety training
9. Criticality Safety drills
10. Functional test start-up
11. Knowledge of assignment
12. Conduct of Operations application
13. Sufficient numbers of qualified personnel
14. Safety awareness culture
15. Safety basis
16. Modifications incorporated into procedures
17. Technical and management qualifications

5. Schedule

The execution of this restart plan began on October 27, 1994, with a projected completion date of on or before November 23, 1994.

6. Assessment Specialists

Team members: R. C. Leonard (Team leader)

S. R. Badgett
R. J. Erfurdt
A. J. Holifield
E. L. Morgan
V. M. Pizzuto
P. Sasa
J. W. Stailing
G. W. Tasset
G. M. Voorneis

7. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31. Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

Criteria:	Develop listing of required procedures, (see Appendix A)
Methodology:	Document review
Deliverable:	Documented verification that listed procedures are approved and available and that adequate safety controls are incorporated. Actionee: W. B. Fleming

CORE REQUIREMENT 2:

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented.

Criteria: Develop listing of trained and qualified employees, by function, (see Appendix B)

Methodology: Records review per Training Users Manual (TUM)

Deliverable: Documented verification of adequate training/qualification (with dates for next training due) Actionee: D. M. Shaw

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

Criteria: Conduct oral interviews that include a review of the Building 771 incident

Methodology: All-hands briefings (see Appendix C)
Management seminars (see Appendix D)
Individual interviews (see Appendix E)
Feedback sessions (see Appendix F)

Deliverable: Signed off interview questionnaires (with evaluations of sat/unsat) and attendance rosters.
Actionee: Assessment Team

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "Safety Envelope".

Criteria: Verify NSM 3.12 compliance

Methodology: Review of pre evolution briefing records

Deliverable: Documented verification of NSM 3.12 inclusion in pre evolution briefings. Actionee: R. S. Brown

Note: See additional safety basis documentation in Core Requirements 1, 5, and 15.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition and operability of safety systems, including safety related process systems and safety related utility systems. This includes examinations of records of tests and calibration of safety system and other instrumentation which monitor Limiting Conditions of Operations (LCO) or that satisfy Technical Safety Requirements (Operational safety requirements). All systems are currently operable and in a satisfactory condition. For the thermal stabilization project, the focus of this requirement will be on Building 707 only.

Criteria: Verify OSR compliance and surveillance requirements are met

Methodology: Record reviews of applicable VSS LCO surveillances

Deliverable: Documented verification of LCO surveillance compliance. Actionee: A. J. Holifield

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

Criteria: Verify compliance thru Plant Action Tracking System

Methodology: Records review

Deliverable: Documented verification that Criticality Safety deficiencies have been dispositioned. Actionee: R. S. Brown

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

Criteria: Verify thru Compliance Management Records

Methodology: Records review

Deliverable: Documented verification that nonconformances have been dispositioned. Actionee: S. Williams

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

Criteria: Verify that the POD and pre evolution briefings verify adequate management programs, sufficient numbers of qualified personnel, facilities and equipment.

Methodology: Records review

Deliverable: Documented verification that requirements have been met and are being maintained. Additionally, provide documented verification that the most recent inventory of the Emergency Response cabinets (Best Team, Emergency Reentry and Spill Response cabinets) was completed and determined to be satisfactory. Actionee: D. M. Shaw

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented.

Criteria: Review of Building 707 Drill Plan

Methodology: Records review

Deliverable: Documented verification of criticality safety drill compliance. Actionee: S. R. Badgett

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators.

Criteria: Review of the Plutonium Startup Test Program

Methodology: Document review

Deliverable: Documented verification that B707 is in compliance with the Plutonium Startup Test Program. Actionee: A. J. Holifield

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities is adequate for operations.

Criteria: The necessary attributes of the Conduct of Operations Manual are applied to support the activity. These attributes include: Pre-evolution briefing, POD, LCO compliance, use of procedures and training/qualification of staff.

Methodology: Document review

Deliverable: Documented verification that the attributes of Conduct of Operations described above are in place and are satisfactorily implemented for thermal stabilization activities, including, specifically, that the safety basis documentation that supports the activity has been confirmed to be fully implemented. Actionee: A. J. Holifield

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

Criteria: Reference Core Requirements 2 and 8

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

Criteria: Reference Core Requirement 3

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

Criteria: Confirm that requirements were addressed and deemed adequate thru the Operational Readiness Review (ORR) for Building 707.

Methodology: Records review

Deliverable: Documented verification that building facility and procedure modifications are made in compliance with CCCP, COEM, IWCP and PPG requirements. Actionee: A. J. Holifield

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

Criteria: Reference Core Requirement 15

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

Criteria: Reference Core Requirement 3 and 2

8. Methodology

(See methodologies used in Section 7)

9. Operational Interfaces

Teams will be composed of Rocky Flats personnel

Clearances and other access requirements will be supported by Operations Manager

10. Restart Plan approval

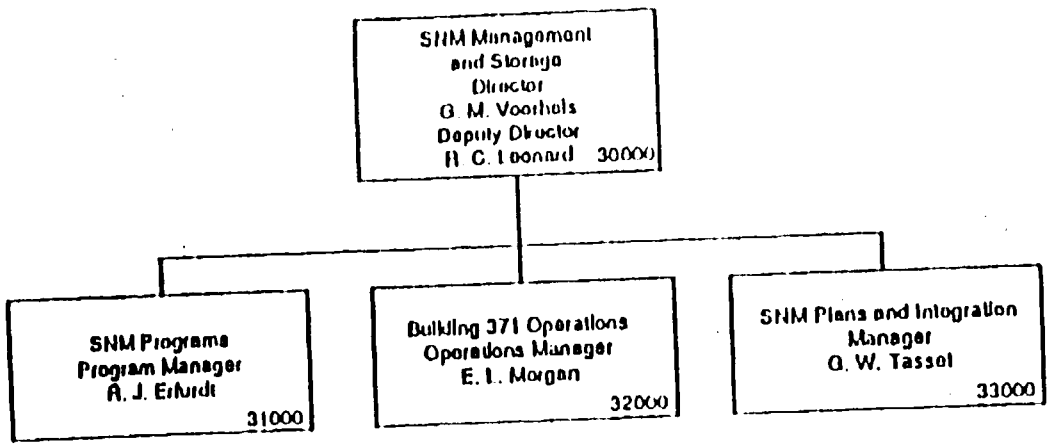
Submitted

G. M. Voorheis
Director, SNM Management and Storage

Submitted

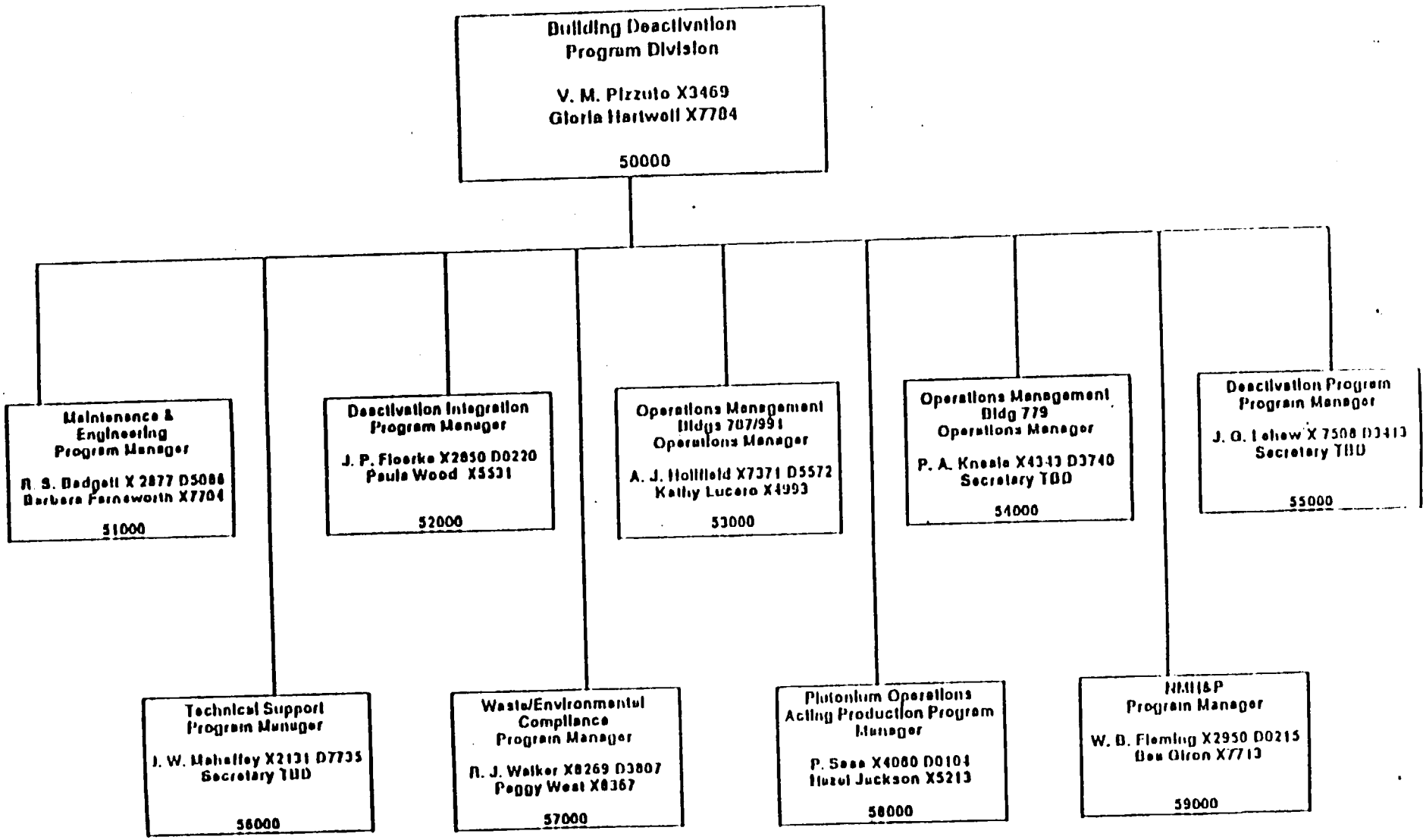
V. M. Pizzuto
Director, Building Deactivation

SNM MANAGEMENT AND STORAGE



BUILDING DEACTIVATION PROGRAM DIVISION ORGANIZATION CHART

50000



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APPENDIX A

Approved procedures in support of Thermal Stabilization

Procedure #	Title
4-F89-FO-0002/Rev. 0	XY Retriever, Building 707
4-30000-FO-0103/Rev. 0	Balances, Building 707/776/777
4-30000-FO-1023/Rev. 0	Gram estimation
4-32PFO-707-002/Rev. 0	Glovebox & XY Retriever differential pressure surveillances
FO-0001/Rev. 0	Decontamination
4-30000-FO-0023/Rev. 2	Thermal Stabilization of Metallic Oxide, Glovebox J-25
COOP-011/Rev. 0	Pre-Evolutionary briefings
4-B19-NSM-03.12/Rev. 0	Nuclear material safety limits and criticality safety limits surveillance
4-84300-FO-0018/Rev. 0	Material transfer and storage, Building 707, 776/777 & 779
4-B22-FO-0010/Rev. 0	Building 707 glovebox operations
FO-0020/Rev. 0	Chainveyor operations
4-D18-FO-0010/Rev. 0	Glovebox operations
4-30000-FO-0116/Rev. 1	Thermal Stabilization of Metallic Oxide, Glovebox J-60

Note: Procedures can be reviewed in the Building 707 SAC. Contact T. C. Adams at x3619. Any changes to procedures numbers/revisions and/or titles are reflected in the deliverable for Core Requirement 1.

APPENDIX B

Trained/Qualified employees that support Thermal Stabilization

Employee name	Employee #	Group
R. A. Channel (B707)	503024	Task supv.
J. Q. Maes (B707)	512036	Ops. support
D. C. Brill (B707)	513792	"
J. J. Vontersch (B707)	514255	"
K. K. McTaggart (B707)	512500	"
J. F. Hahn (B707)	515962	"
J. C. Dockter (B707)	511953	Task supv.
E. B. Allen (B707)	512970	"
L. A. Atencio	512588	Process spec.
R. D. McCoy	509702	"
T. J. Steinbrunn	513550	"
M. L. Harper	513281	"
D. S. Cross	513273	"

Note: Training/Qualification records can be reviewed in Building 060, contact E. L. McKee at x4160.

APPENDIX C (schedule)

All-hands briefing schedule (B707 personnel)

SHIFT	DATE	TIME	LOCATION
1	10/27/94	9:30 AM	750-A
3	11/1/94	6:30 AM	707 Conf. Room
2	11/3/94	3:30 PM	707 Conf. Room

Note: Briefings will be conducted by V.M. Pizzuto

Attendance can be verified against the list of employees from Appendix B

Building management will ensure that a minimum number of trained/qualified employees have been briefed prior to restart. No hands-on employee will participate in an evolution until he/she has completed the all-hands briefing.

APPENDIX D (schedule)

Management Seminars (Building 707)

NAME

B. E. Woolsey

R. L. Fiore

W. B. Fleming, Jr.

A. J. Holifield, Jr.

P. Sasa

R. D. Slaybaugh

DATE: 11/1/94

TIME: 1:30 PM

LOCATION: B707 conf. room

Note: Seminars will be conducted by V. M. Pizzuto

APPENDIX E

Individual Interviews

NAME	DATE	TIME	LOCATION
R. A. Channel (B707)			
J. Q. Maes (B707)			
D. C. Brill (B707)			
J. J. Vontersch (B707)			
K. K. McTaggart (B707)			
J. F. Hahn (B707)			
J. C. Dockter (B707)			
E. B. Allen (B707)			
L. A. Atencio (B707)			
R. D. McCoy (B707)			
T. J. Steinbrunn (B707)			
M. L. Harper (B707)			
D. S. Cross (B707)			

CORE REQUIREMENT 3
CLOSURE DOCUMENTATION
BUILDING DEACTIVATION PROGRAM DIVISION

CORE REQUIREMENT 3: Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

The purpose of this memorandum is to document that Core Requirement 3 has been completed for the personnel of Buildings 707, 779, and 991. Core Requirement 3 includes all-hands briefings, management seminars, individual interviews, and feedback sessions.

The feedback sessions indicated that, in general, there was an understanding that a criticality was possible within the buildings although the potential is minimized through the use of operating procedures, personnel training, and a positive safety attitude. In addition, the feedback generally supported the management actions taken in response to the Building 771 incident. The feedback sessions were conducted either during or immediately following the Building 771 incident briefings and attendees are documented on the Building 771 incident briefing roster.

V. M. Pizzuto, Director
Building Deactivation Program Division

gjh

APPENDIX G

Criticality Safety training requirements

1. General Employee Training (GET)
2. Nuclear Criticality Safety (Course 023-415)
3. Nuclear Criticality (Course 011-419)
4. Nuclear Criticality Safety Seminar (Course 023-420)

Note: Per procedure 1-NSM-03.02/Rev. 0

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ENCLOSURE 6

READINESS ASSESSMENT OF MOVEMENT OR TRANSFER OF WASTE OR RESIDUE DRUMS, WASTE CRATES OR OTHER CONTAINERS CONTAINING IN EXCESS OF 200 GRAMS OF FISSILE MATERIAL

READINESS ASSESSMENT OF MOVEMENT OR TRANSFER OF WASTE OR RESIDUE DRUMS, WASTE CRATES, OR OTHER WASTE CONTAINERS CONTAINING IN EXCESS OF 200 GRAMS OF FISSILE MATERIAL

Revision 5

Submitted by EG&G Rocky Flats, Inc.
Waste Management

APPROVED: T.G. Hedahl 12-5-94

T. G. Hedahl Date
Director, Waste Management

1. Introduction

This Readiness Assessment of movement or transfer of waste or residue drums, waste crates, or other waste containers containing in excess of 200 grams of fissile materials is submitted to the Department of Energy, Rocky Flats Environmental Technology Site (DOE, Site), as required by the Site Manager's directive [AMOWM:MSM:09160] (Enclosure 1I). The restart of movement of waste or residue containers > 200 grams fissile materials is in support of the Residue Compliance and Residue Elimination Programs.

Movement and transfer of containers with > 200 grams fissile material was suspended (Standing Order #34, Item 6) as a precautionary measure following procedure violations in Building 771 during the transfer of fissile solutions. EG&G Rocky Flats, Inc. intends to restart movement and transfer of all waste/residue containers with > 200 grams fissile material.

This Readiness Assessment addresses the movement of waste/residue within the facilities and includes the transfers of waste/residue containers between buildings. All applicable buildings and the plant support functions are under separate authorization bases in the form of Safety Analysis, Plant Policies and Procedures. All materials proposed for movement under this Plan are coordinated by Program Directorates. These Directorates assure an adequate knowledge base and identification of special conditions or hazards associated with material movement.

The mission of the Residue Compliance Program is to obtain a Resource Conservation Recovery Act (RCRA) permit from the Colorado Department Public Health and Environment (CDPH&E) for storage of mixed residues. EG&G has committed to DOE, Site to meet the permit conditions for compliant storage by December 22, 1994. This task is also driven by Judicial Orders in the Sierra Club and CDPH&E vs. DOE lawsuit (89-B-181). The mission of the Residue Elimination Program is to develop and implement treatment or other means to permanently dispose of residues. To this end, characterization, sampling, and repackaging of residues is required. Both missions require movement of residue containers within buildings and transfer between buildings, and many containers contain in excess of 200 grams fissile materials. The Residue Elimination Program is driven by Settlement Agreement and Compliance Order on consent 93-04-23-01.

This Readiness Assessment documents prerequisites for each Core Requirement, per DOE Order 5480.31 and the satisfaction of each prerequisite. Prerequisites have been established to ensure that the root causes of the 771 incident have been addressed such that the problem will not be repeated in container movement evolutions.

This Readiness Assessment addresses each Root Cause of the Building 771 Unauthorized Draining of Process Lines as reported in the draft Root Cause Analysis CA-94-010, November 23, 1994. The Summary of Causes, Generic Implications, and Associated Recommendations (Enclosure 1K) identifies actions to be completed by EG&G prior to

restart. These immediate actions have been completed for movement of waste or residue containers containing > 200g fissile material as follows:

S.2 Increase senior manager presence during operations.

The Director of Waste Management conducts at least weekly tours of the operational areas of Waste Reduction and Assay (WR&A). The President of EG&G has also toured the work area, specifically observing venting and aspirating of drums. For drum operations under this restart, a member of a team consisting of the following senior managers will observe drum movements for the first four evolutions. Following that, senior managers will observe at their discretion:

T. G. Hedahl
J. A. Geis
R. E. Kell

A.1 Enhance training on nuclear criticality safety.

(First action: Conduct briefings regarding criticality safety as it relates to this event [the 771 incident] for all site personnel).

WR&A has conducted and documented an "all hands" briefing on the 771 incident. The Operations Manager personally participated in a Safety Review Board (SRB) review of the incident and has read the complete Root Cause Analysis. The cognizant Director briefed WR&A managers on the incident. Finally, the Building 776/777 mentor is continuing to conduct small group meetings on the incident.

B.2 Increase independent safety oversight of high risk operations to monitor effectiveness of supervision.

An independent mentor and Conduct of Operations (COOP) Subject Matter Expert has been assigned to WR&A. For the first month of operations under this restart, the mentor or a similarly qualified alternate from another building, will oversee at least half of the evolutions. Beyond the first month, he will oversee operations at his discretion or on special request of the WR&A Operations Manager.

B.4 Consider knowledge of and commitment to COOP as part of the qualification process.

As documented herein, all applicable personnel involved with material handling operations have been interviewed by management. The WR&A Operations Manager, subordinate line managers, and numerous technical supervisors and staff were interviewed by the Waste Management Director. In addition, WR&A interviewed technical supervisors and staff.

Interviews were conducted by the Operations Manager and Unit Managers using the enclosed questionnaire (Enclosure 1A), and documented. The two way process ensures that everyone understands their responsibility. All interviews with

Waste Assay and Storage personnel who will perform the subject container movements have been completed. A list of qualified personnel is attached (Enclosure 1F). The Material Handling procedure governing movement and transfer requires that two qualified people be present for all movement. This minimizes the potential for individual action outside the procedure.

The Joint Company Union Safety Committee (JCUSC) has independently reviewed and verified the Nuclear Safety Awareness Interviewing process. The JCUSC have conducted interviews with facility and operations personnel to review safety awareness and conduct of operations compliance. Interviews were completed on November 2, 1994.

The president of Rocky Flats has also interviewed both salary and hourly employees to assess their level of safety awareness.

C.1 Do not assume COOP is fully implemented in writing work control documents.

Reference Core Requirement 1 for the Material Handling Procedure. This procedure makes no assumptions with regard to COOP, and this statement is supported by two facts. First, the procedure is approved for many buildings in various stages of COOP implementation. Partly for this reason and for completeness, specific elements are included in the procedure, primarily in 5. PREREQUISITE ACTIONS.

C.2 Emphasize the use of physical barriers, supervision, and independent oversight for high risk/priority activities.

Physical barriers are used in that only closed containers are moved. Tamper Indicating Devices (TID) and a two person requirement also prevent uncontrolled activities.

C.3 Re-evaluate adequacy of compensatory measures for Unreviewed Safety Question Determinations (USQDs).

Two USQDs have the potential to affect container movement: An Unreviewed Safety Question on exhaust plenums in Building 371 and Building 771 (USQD-RFP-94.0615-ARS), and an USQD on movement of unvented drums between buildings under Standing Order #36. The first USQD does not affect drum movements within buildings, since drums are sealed or contain filter vent plugs. The only exception is an unvented drum that exhibits signs of pressurization, such as bulging. Such drums are always a special case and cannot be moved under Standing Order #36. The second USQD has determined that an USQ does not exist for movement of unvented drums between buildings. This USQD will be approved and issued prior to movement of Standing Order #36 drums between buildings.

C.4 Assure RCRA compliance is integrated into work controls.

RCRA controls are included in prerequisites, instructions, and post-performance activities of the Material Handling Procedure.

E Assure trained and qualified personnel are assigned to operations.

Reference Core Requirement 2.

G.1 Evaluate and improve, as required, compensatory measures for USQD-RFP-93.1503-GLS.

and

G.2 Discontinue current Lock Out/Tag Out (LO/TO) practice for interrupted activities.

Neither action is applicable to waste and residue container movement. The USQD applies to tanks and piping systems only. No LO/TO is used in the movement of containers.

4.3 Implement protection against knowing and intentional violation of safety requirements until further improvements are implemented.

As noted above, both additional supervision and physical barriers will be used to prevent intentional violations. Physical barriers are always present, and a two person rule will continue to apply once additional supervisory oversight is removed.

II. Facility Definition and Background

Name of Activity Being Started : Movement or transfer of waste or residue drums, waste crates, or other waste containers containing in excess of 200 grams of fissile materials.

Waste or residue containers with > 200 grams fissile materials are currently stored in the following locations:

Current Need to Ship

12 Drums	Relocated from Building 771
10 Drums	Relocated from Building 371
2 Drums	Relocated from Building 776
48 Drums	Relocated from Building 777
1 Drums	Relocated from Building 779

(See Enclosure 1B for more detail)

The Mixed Residue Permit Application (U. S. District Court Order in Sierra Club vs. DOE 89-B-189) proposes storage as follows:

Proposed Storage

37 Drums	To Building 771
3 Drums	To Building 371
8 Drums	To Building 776
25 Drums	To Building 777
68 Drums	To elevate in Building 371
85 Drums	To elevate in Building 771

(See Enclosure 1C for more detail)

Containers must be relocated to this configuration prior to the DOE, Site deadline of December 22, 1994.

In addition, inspections or sampling of waste and residue may occur in the following facilities:

Building 776	Size Reduction Vault
Building 776	Advanced Size Reduction Facility
Building 569	Real Time Radiography Unit/Crate Assay Equipment
Building 371	Nondestructive Assay

Inspection, sampling, and other operations are beyond the scope of this Readiness Assessment. This Readiness Assessment addresses only the movement of containers within these facilities and transfer between them.

The Waste Assay and Storage Manager will supervise the first four container movements. Upon completion the manager will complete a review of the evolution with operating personnel to appraise the lessons learned for future container movements which will be turned over to first line management for continued container movement at the approval of the Operations Manager for Waste Reduction and Assay. The Material Handling Procedure (Enclosure 1D) requires the job supervisor to verify all prerequisites, including a pre-evolution briefing, verify nuclear material quantities do not exceed the NMSL or CSOL, verify proper signatures and chain of custody, sign the transfer document, notify the receiver, and verify proper completion.

III. Process Description

The following activities comprise the movement or transfer process:

Movement of 55 gallon drums, filter coffins, waste crates, 1 gallon containers and 10 gallon cans within the following Buildings: 371, 707, 771, 776, 777, 779, 569, and 664.

Transfer of material through the Transportation Security Officer (TSO) between the listed buildings.

Transfer of material by transfer cart between Buildings 779 and 777 and Buildings 771, 776 and 707.

All activities are covered by Site Procedure 4-C08-A&S-SWH-W0-5220, Revision 0, Material Handling (Enclosure 1D).

Currently, nuclear material safety limits for movement of waste and residues are covered by a 500 gram (moist) or 1,000 gram (dry) limit. Buildings 569, and 664 can only accept containers with less than 200 grams fissile material. There is a request to increase these limits to 1,000 grams in order to transfer containers to Building 569 for Real Time Radiography, and for stacking purposes.

IV. New Process Startup

No new processes will be started for material movement and transfer.

V. Hazard Category

This will be a restart from a precautionary shut down pending review. Based on a hazard potential evaluation, a Medium Hazard Readiness Assessment is appropriate. (Enclosure 1E).

VI. Recent Repairs and Modifications

No Vital Safety Systems have been modified in support of this evolution. Recent modifications in support of the Residue Permit include installation of angle iron to raise drums from the floor in Buildings 371 and 771 and the repair of floor coating in Building 776.

VII. Readiness Assessment Scope

This Readiness Assessment will verify the completion of the prerequisites defined herein, providing the basis to restart normal movement and transfer of waste and residue drums, waste crates, and other waste and residue containers containing in excess of 200 grams of fissile materials. Team members are as follows:

Chris Bernard
Clarence Buchholz
Art Dye
William Franz
Tim Hedahl
Scott Kranker
Enn Titenburg

VIII. Readiness Assessment Prerequisites

This section presents prerequisites as defined in Core requirements in DOE Order 5480.31, Proposed Prerequisites for Restart of Nuclear Activities, October 11, 1994. For each core requirement, the method of satisfying the prerequisites is documented and objective evidence provided as appropriate.

CORE REQUIREMENT 1:

There are adequate and correct procedures and safety limits for operation.

PREREQUISITES:

1. Procedures are approved per Site procedure process.

   Container movement and transfer are performed in accordance with Procedure 4-C08-A&S-SWH-W0-5220, Rev. 0, Material Handling, issued July 5, 1994. This is a rewrite of the previous procedure, C0-5020, rather than a completely new procedure. The procedure was reviewed under 93-DMR-000211 by Criticality Engineering, Hygiene and Safety, Nuclear Material Safeguards, Site Quality Assurance, Traffic, and a Subject Matter Expert. It was approved by the Waste Operations Review Committee (WORC-94-30) and approved for use in Buildings 371, 569, 664, 707, 771, 776, 777, and 779.

2. Procedures incorporate required criticality safety controls in a manner consistent with the method approved at Rocky Flats.

   Procedures utilized for material movement have prerequisites which require the performance of a pre-operational NMSL surveillance in accordance with 4-B19-NSM-03.12 (see Enclosure 1D).

   In addition, as a compensatory measure to concerns about the currency of the Site Master Criticality Safety Manual, an additional check will be performed. A Shift Order was issued requiring verification that posted limits, building manual limits, and Site Master limits agree. Action in the case that they do not is specified in the Material Handling Procedure. Nuclear Criticality Engineering is currently conducting a site wide audit of the site master limits versus the posted limits and building manual limits. Completion of this audit is not a restart condition. Therefore, the temporary shift order is appropriate.

3. Administrative controls are implemented to assure the current approved revision is used.

   The most current revision of this procedure is located in the Document Control Department for all the areas where this procedure is approved for use.

   Supervisory personnel overseeing material handling activities have been briefed on the new Material Handling Procedure 4-C08-A&S-SWH-W0-5220, Rev. 0. All have read it, and all obsolete copies have been removed from the work areas. (Enclosure 1H).

4. Responsible line management and operators understand the process for obtaining the current revision and for identifying and correcting deficiencies.

   All applicable line managers and operators have been interviewed as discussed in Root Cause A (page 3) response to ensure their understanding of this requirement. The Operations Manager for WR&A and the Managers of the performing groups were interviewed by the Director of Waste Management. A sampling of technical supervisors and operators were also interviewed by the Director. All applicable technical supervisors and operators have been interviewed by these Line Managers according to the attached questionnaire. A record of each interview on this form will be maintained in the individual's training file.

CORE REQUIREMENT 2:

Training and qualification programs for management, operations and operations support personnel have been established, documented, and implemented.

PREREQUISITES:

1. Identify the staff that performs activities. A roster of qualified and verified personnel is enclosed (Enclosure 1F).

2. Identified staff and technical supervisors are trained and qualified to perform the required duties and their training/qualification is documented per the methods authorized by the Training Users Manual (TUM).

   Personnel involved with container movements have been trained to the following:

   - Employees who handle waste containers are trained in Nuclear Criticality Safety requirements, Nuclear Material Handling, and Conduct of Operations. Each department also requires operations personnel to complete Qualification Standard Packages that are specific to the performance of their job duties.

- Training has been verified by WR&A management and Performance Assurance for the identified roster of personnel. Additional staff will be similarly verified prior to participating in container movement until the Director of Waste Management is assured in the process of training compliance and records.

3. The Criticality Safety Engineer supporting the activity is qualified per Site prerequisites for job qualification criteria. The training is documented per the methods authorized by the Training Users Manual (TUM) guidance.

   The Criticality Safety Engineer's qualifications were verified with the Nuclear Criticality Safety Engineering Manager. The Engineer has a number of years experience in the field of Nuclear Safety Engineering. He was hired through an incentive program that mandates additional qualifications and certifications in the field of Nuclear Criticality Safety. These qualifications can be verified by contacting the Nuclear Safety Engineering Manager. WR&A is confident in the abilities of the Engineer.

CORE REQUIREMENT 3:

Level of knowledge of operations and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of operating and operations support personnel.

PREREQUISITES:

1. Identified staff and technical supervisors demonstrate in oral interview that they understand their procedures, responsibilities, and accountabilities and authorities relative to compliance, identification and response to deficiencies, and criticality safety.

   As noted above, completion of the interviewing process for all applicable staff and technical supervisors has demonstrated their knowledge in documented interviews per the enclosed questionnaire.

   Key support personnel will also be interviewed prior to restart. Nuclear Materials Control, Radiation Control Technicians, and Transportation Security Officers support these movements under the direction of Waste Reduction and Assay staff. Because they are in support roles, interviews will be conducted in groups rather than individually. Interviews will be documented and will ensure, to the satisfaction of Waste Reduction and Assay management, that the support staff understand their responsibilities for safe operations.

CORE REQUIREMENT 4:

Facility safety documentation is in place that describes the "safety envelope".

PREREQUISITES:

1. Approved CSCLs or NMSLs are established and posted for the activity.

   Procedure 4-C08-A&S-SWH-W0-5220, enclosed requires verification of limits and verification of compliance to limits prior to container movement.

CORE REQUIREMENT 5:

A program is in place to confirm and periodically reconfirm the condition of safety systems.

PREREQUISITES:

1. Surveillances are performed on a regularly scheduled basis to verify safety systems as spelled out in the building OSR and Compliance Guide.

CORE REQUIREMENT 6:

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

PREREQUISITES:

1. Issues related to criticality safety limits that are applicable to the performance of the activity have been dispositioned through an approved process.

   Monthly and annual criticality safety limits assessments confirm the safety of container storage and movement. Annual assessments performed in accordance with 1-NSM-02.01 for Buildings 776/777, 371, and 771 have been reviewed with oversight from the Independent Safety Review Committee.

   In the recent annual assessments for Buildings 371 (94-0336) and 771 (94-0242) deficiencies were noted, but none were assigned to WR&A. In the recent assessment in Buildings 776/777 there were deficiencies noted.

   All deficiencies were examined, corrective actions were implemented. There were no impacts to the operations from these deficiencies.

2. Issues identified during the 1989 Criticality Safety Assessment have been appropriately resolved and remain so.

   Scientech, Inc. Assessment - Team Audit, Page 79, Item 1. The primary issue identified in this assessment was the 289 drums stored in Room 127 basement. This room was emptied of drums on March 26, 1992, and remains empty today.

3. Deficiencies identified in Occurrence Reports and Criticality Safety Infractions that apply to the activity have been resolved.

   Occurrence Reports and Criticality Infractions assigned to WR&A since January 1994, have been reviewed by the Operations Manager.

   In calendar year 1994, WR&A has reported the following incidents attributed to material handling:

   Three crates received into Building 777 in violation of a written Shift Order pertaining to opening an exterior door. The Shift Manager was not cognizant of the Shift Order.

   #94-0053 - Corrective Action:

   The Building Manager initiated a formalized shift relief and turnover process. Shift turnovers reviewed prior to each shift All applicable personnel reviewed the Shift Order. Conduct of Operations (COOP) -013 was reviewed by Shift Managers to ensure compliance with Section 4.5.1.

   In another incident several drums were staged to be moved from a 90 day area to a permitted area when it was discovered that the elevator used to transport containers was out of service.

   The drums were moved into a storage unit that was not permitted fo those containers.

   #94-0054 - Corrective Action:

   Supervision conducted an all hands briefing to discuss:

   Root Cause, Corrective Actions, and Lessons Learned - The Unit Manager re-emphasized the importance of careful preparation and scheduling of container movements. Pre-evolution briefings are now conducted with more detailed scrutiny of the evolution being preformed.

In July of 1994, drums were transferred to Building 664 in violation of the onsite shipping procedure requiring onsite radioactive waste labels.

#94-0065 - Corrective Action:

Supervision conducted personal interviews with personnel involved. The unit manager re-established the drum team in Building 776/777. A review of the onsite transportation requirements outlined in the Transportation Safety Manual was conducted.

All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. These movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

Recently a Low Level Mixed Waste drum was transferred to Building 569 in violation of RCRA permit requirements, and in violation of drum coordination process.

#94-0094 - Corrective Action:

Pending completion of Root Cause Analysis and assignment of corrective actions.

All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. The criteria for these movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

94-09 Fourteen drums of Item Description Code (IDC) 405 exceeded the criticality limit of 1,000 grams.

Fourteen drums of IDC 405 are still infracted and are segregated in Building 776, Room 127, which is locked. These drums are waiting to be repacked. However, the basement located within room 127 still remains empty to this day.

94-10 103 Drums of Item Description Code (IDC) 421 were identified as exceeding the drum limit of 1,000 grams.

Corrective Action:

Safeguard & Measurement upgrades to counters has improved the accuracy of the equipment. With the narrower window of deviation, some backlog drums were found to contain higher gram values than previously estimated. This occurred with the drums containing IDC 421 material. As a result, previously counted drums now showed a gram value that exceeded the Nuclear Criticality limit. Nuclear Criticality Engineering evaluated the assay values for each of the 103 drums. A determination was made by Nuclear Criticality Engineering that 96 of the 103 drums could be deposted and moved. The remaining seven drums were moved to Building 777 Room 483, and are still under infraction posting. This room is locked, with limited key distribution.

See Enclosure 1L.

CORE REQUIREMENT 7:

A systematic review of the facility's conformance to applicable DOE Orders has been performed, any non-conformances have been identified, and schedules for gaining compliance have been justified in writing and formally approved.

PREREQUISITES:

1. Any Compliance Schedule Agreement (CSA) or Short Term Compliance Schedule (STCS) applicable to the activity is implemented as required by the Rocky Flats commitment.

No CSA or STCS apply to material handling.

CORE REQUIREMENT 8:

Management programs are established, sufficient numbers of qualified personnel are provided and adequate facilities and equipment are available to ensure operational support services are adequate for operations.

PREREQUISITES:

All support groups as determined by Facilities Operations Management are funced in appropriate work packages.

CORE REQUIREMENT 9:

A routine and emergency operations drill program, including program records, has been established and implemented. Facilities are required to schedule these drills annually.

PREREQUISITES:

1. Emergency drill operations are scheduled and coordinated by each Facility.

CORE REQUIREMENT 10:

An adequate startup or restart program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of the operators. No special equipment is used in container movement. The only powered equipment items are fork lifts and trucks.

PREREQUISITES:

1. No special equipment is used in container movement. The only powered equipment items are fork lifts and trucks.

CORE REQUIREMENT 11:

Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

PREREQUISITES:

1. Identified staff and technical supervisors demonstrate knowledge of assignment, responsibility, and reporting requirements during an oral interview.

   As discussed previously, all applicable line managers, staff, and technical supervisors involved with container movement have been interviewed and the interview documented per the enclosed questionnaire. (See Root Cause A Response, page 3).

CORE REQUIREMENT 12:

The implementation status of DOE Order 5480.19, COOPs Requirements for DOE Facilities is adequate for operations.

PREREQUISITES:

1. The necessary attributes of the COOPs Manual are applied to support the activity.

   COOPs requires that all operations and support activities are conducted in a manner consistent with Site goals, objectives, and approved procedures. Guidance is provided by DOE Order 5480.19, COOP Requirements for DOE Facilities. All facilities and operations personnel are required to adhere to the requirements of COOP.

   Specific COOP implementation for material movement and transfer includes:

   - Procedural control (Enclosure 1D)
   - Specific instructions for off-normal conditions
   - Inclusion of transfers on building Plan-of-the-Day
   - Pre-evolution briefing
   - Staffing and equipment requirements
   - Documentation
   - Formal closure of evolution

   Note: All radioactive waste/residue container movements are currently being planned, scheduled and implemented through the aid of a centralized container movement meeting held daily in Building 750 cafeteria. These movements has been outlined and distributed to waste generators in the form of a job aid Envirogram. (Envirogram #13, Enclosure 1G).

CORE REQUIREMENT 13:

There are sufficient numbers of qualified personnel to support safe operations.

PREREQUISITES:

1. Staff that will perform the activities to meet requirements established for the personnel categories identified under Core Requirements 2 and 8, and these requirements are consistent with the safety basis and assumptions.

2. Sufficient numbers of qualified personnel defined have been identified by position and name on enclosed roster.

CORE REQUIREMENT 14:

A program is established to promote a sitewide culture in which personnel exhibit an awareness of public and worker safety, health and environmental protection requirements and employees demonstrate a high priority commitment to comply with these requirements.

PREREQUISITES:

1. Implementation of programs such as COOP, Health Safety and Practices (HS&P), OSR, LCO Tracking, Shift Technical Advisor (STA), and Internal Surveillance, have developed a sitewide culture of safety awareness.

   Interviews conducted with personnel involved with container movement reflects the attitude of safety awareness sitewide.

CORE REQUIREMENT 15:

The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures and accident analysis included in the safety basis.

PREREQUISITES:

1. All activities are covered within the Facilities scope.

CORE REQUIREMENT 16:

Modifications incorporated into procedures.

PREREQUISITES:

1. All activities are covered within the Facilities scope.

CORE REQUIREMENT 17:

The technical and management qualifications of contractor personnel, responsible for facility operations are adequate.

PREREQUISITES:

1. Line Management has demonstrated knowledge of container movement and its relation to criticality safety issues.

2. Line Management have met the training qualifications required to perf container movement under the training and qualification guidelines.

Interviews with Line Managers, staff, and technical supervisors involved with the container movement reflect knowledge of the acti

Qualification Standard Packages (QSPs) are required for Solid Wast Processing personnel in the areas of Waste Isolation Pilot Plant (WIPP) sampling operations, supercompactor and repackaging fac operations.

Waste Assay and Storage personnel have eight active QSPs associated with the operation. Those QSP's are relevant to the operations of th assay equipment in all buildings, as well as the actual gamma scann equipment used by Waste Assay and Storage personnel.

First line supervision is required to be qualified to each QSP as wel operating personnel.

ENCLOSURE 7

OPERATIONAL READINESS REVIEW
LIQUID STABILIZATION TANK DRAINING ACTIVITIES
IN BUILDING 771

(TO BE PROVIDED IN FINAL REPORT)

ENCLOSURE 8

RESTART OF ACTIVITIES SUSPENDED BY EG&G STANDING ORDER 34

United States Government

Department of Energy
Rocky Flats Field Office

memorandum

DATE: NOV 30 1994
REPLY TO ATTN OF: SPA:EJW:07799
SUBJECT: Restart of Activities Suspended By EG&G Standing Order 34
TO: Those on Attached List

Attachment 1 defines the process that the Rocky Flats Field Office will utilize to assess the readiness of the subject activities. This process specifically excludes those activities that will be undergoing an Operational Readiness Review in accordance with DOE Order 5480.31. Attachment 2 is EG&G's Root Cause Analysis for the unauthorized draining of a process line in Building 771. The root cause analysis is provided for your information and to assist you in the performance of your readiness assessments.

Please contact Ed Westbrook at extension 7074 if you have any questions regarding this transmittal.

Dero W. Sargent

Dero W. Sargent, Director
Standards, Performance, and Assurance

Attachments (2)

cc w/Att:
B. Smith, DOE-HQ, EM-64
K. Juroff, DOE-HQ, EM-64
P. Hartmann, ONS, RFFO

cc w/o Att:
M. Silverman, OOM, RFFO
K. Klein, OOM, RFFO
M. McCormick, OWM,RFFO
J. Christ, OWM. RFFO
J. Selan, NSEPD, RFFO
P. Harrington, PME, RFFO

Addressees Memorandum Dated NOV 3 0 1994

David Brockman, Acting Assistant Manager for Environment, Safety and Health, RFFO
Jessie Roberson, Acting Assistant Manager for Environmental Restoration, RFFO
Jerry Howell, Acting Assistant Manager for Site Support and Security, RFFO
Leanne Smith, Assistant Manager for Operations and Waste Management, RFFO
Lenora Lewis, Assistant Manager for Administration, RFFO
Michael Karol, Assistant Manager for Project Management and Engineering, RFFO
George Cannode, Director, Training and Development, RFFO
Joe Wienand, Acting Director, Planning and Integration, RFFO
Dana Lindsay, Office of Chief Counsel, RFFO
Roger Butler, Field Chief Financial Officer, RFFO
Beth Brainard-Jordan, Communications and Economic Development, RFFO
Margaret Day, Manager, Total Quality Management, RFFO
Ricky Newton, Manager, Civil Rights and Diversity Management, RFFO

READINESS ASSESSMENT PROCESS FOR RESTARTING ACTIVITIES SUSPENDED BY STANDING ORDER 34.

BACKGROUND

This plans defines the RFFO process for overseeing the restart of activities suspended by EG&G Standing Order 34. This process does not cover those activities that will be undergoing an Operational Readiness Review per DOE Order 5480.31 (e.g. tank drainage operations, Phase II solution stabilization). The restart of these activities will be addressed by separate documents in accordance with DOE Order 5480.31.

Fissile material handling activities were suspended by EG&G as a result of the Building 771 event in which an unauthorized transfer of fissile material was performed and subsequently was attempted to be covered up by the personnel involved.

The Readiness Assessment (RA) process, as defined in DOE Order 5480.31 and DOE-STD-3006-93, provides substantial flexibility in terms of team composition, breadth and scope of review, sequence of events, and the need for a separate DOE RA. The determining factors are the length of the shutdown, the Hazard Classification of the facilities, and the number and complexity of modifications performed during the shutdown.

OBJECTIVE

To provide a formal process for overseeing EG&G in the restart of the cited activities ensuring that adequate corrective actions are in place to allow the safe restart of suspended activities.

GENERAL REQUIREMENTS

SPA will coordinate the RFFO RA activities associated with the restart of activities suspended by EG&G Standing Order 34. SPA shall ensure that all appropriate/cognizant RFFO organizations are aware of their roles and responsibilities relative to the restart of suspended activities, and that expectations and requirements are clearly defined.

The following general requirements apply to all RFFO organizations involved in the oversight of Standing Order 34 restart activities:

- Prepare an oversight plan based upon the specific requirements listed below for each activity to be restarted. The oversight plan should define the criteria to be assessed, the approach and method of review (surveillance, audit, inspection, etc.), organizational procedures governing the selected methods, and how the reviews will be documented. A copy of each plan is to be provided to the Director, SPA.

- Execute the oversight plan. The reviews should focus on actions performed to address/resolve the root causes of the actions that precipitated the shutdown. A technical justification shall be provided for checklist items that are not reviewed. Reviews performed recently by RFFO may be used to justify why a new review has not been performed. However, in these instances changes that have occurred since the past review must be considered, and the results of these changes should be accounted for when reaching readiness conclusions.

- Prepare a formal record of the RA for each activity to be restarted. This shall identify what was done, the results, and a recommendation concerning the restart of suspended operations. The record shall clearly document which criteria have been satisfied and which have not. This record shall be a summary of the reviews performed, not a reiteration of the individual reviews. The record shall be submitted to the Director, SPA, who shall ensure the preparation of final RFFO RA Report.

- Prepare a briefing for the Manager (for each activity to be restarted) when satisfied that the activity can be restarted in a safe manner. The briefing shall address verifications that corrective actions have been completed, that corrective actions are technically adequate, and organizational readiness to oversee resumed activities (as appropriate).

- RFFO organizations involved in this process are authorized to use a graded approach in the planning and execution of the assessments. The level of rigor and depth of review is to be determined by the individual organizations based upon their level of satisfaction with pre-shutdown conditions, the corrective actions taken during the shutdown, and the risk associated with the activity.

- Schedule considerations shall not compromise the adequacy or integrity of the reviews.

SPECIFIC REQUIREMENTS

The following criteria are to be utilized to assess the contractor's readiness to restart activities suspended by EG&G Standing Order 34. Each assigned organization is responsible for reviewing/assessing their specific criteria. These assignments should be reviewed for acceptability and SPA should be promptly notified of any nonconcurrences. These criteria have been developed utilizing DOE Order 5480.31's "Minimum Core Requirements" and tailored to the circumstances of this shutdown. Assignments have been made to minimize overlapping reviews and maximize utilization of organizational expertise. These assignments can be modified if deemed appropriate.

All Assigned Organizations:

- The Root Cause for the Building 771 event is issued and appropriate corrective actions have been identified, completed and verified in preparation for the operation.

- Written work instructions incorporate criticality safety, radiation safety, nuclear safety, administrative controls, and compensatory measures emanating from agreements such as USQDs and CSAs.

- Knowledge of procedures, accountability, criticality safety, radiological controls, occupational hazards, and proper notification procedures for occurrences have been demonstrated by staff, technical supervisors, and line management through oral interviews. The knowledge level should include and understanding of the basis for controls incorporated in work instructions.

Operations and Waste Management:

- The operation will be performed using written work instruction, such as procedures or Task Information Packages, approved per the current RFETS process.

- Provision has been made to provide Management oversight and supervision of activities at the floor level.

- Management and operators understand the scope of the operation and the process for revision and correcting deficiencies prior to deviating from the operation as approved.

- Personnel have demonstrated performance to approved procedures through successful dry runs.

- Staff and technical supervisors demonstrate knowledge of the assignment, their responsibilities and reporting requirements during an oral interview and through trend analysis of performance indicators such as ORPS.

- Staff and supervisors demonstrate acceptance of the Conduct of Operations principles through oral interviews and trend analysis of performance indicators such as ORPS.

- CSOLs or NMSLs for the activity are current, valid, and posted and verified per NSM 3.12 for the activity. Double contingency has been verified by either the 5B.01 procedure or qualitative analysis reviewed and approved by the Manager of EG&G's Nuclear Safety organization.

Environment, Safety & Health:

- CSOLs or NMSLs for the activity are current, valid, and posted and verified per NSM 3.12 for the activity. Double contingency has been verified by either the 5B.01 procedure or qualitative analysis reviewed and approved by the Manager of EG&G's Nuclear Safety organization.

- A process is in place to identify criticality issues, and other safety concerns and resolve deficiencies to the satisfaction of the identifying personnel before work continues.

- All Criticality Safety infractions that affect the operation, or the room(s) involved in the operation have been addressed.

- Drills related to potential criticality safety issues and other abnormal scenarios that pertain to the activity have been successfully performed and plans and procedures are available.

- Staff and technical supervisors demonstrate their commitment to safety through oral interviews and through trend analysis of performance indicators such as ORPS.

Project Management & Engineering:

- Hardware systems are confirmed able to perform their intended function on demand (OSRs) and a system is in place to evaluate changes to equipment operating status.

Training & Development Office:

- Personnel are trained/qualified in accordance with the RFETS process to perform the operation.

Standards, Performance & Assurance

- A process is in place to identify criticality issues, and other safety concerns and resolve deficiencies to the satisfaction of the identifying personnel before work continues.

ENCLOSURE 9

ROCKY FLATS FIELD OFFICE COMMENTS ON EG&G ROOT CAUSE ANALYSIS BUILDING 771

United States Government

Department of Energy

Rocky Flats Field Office

memorandum

DATE: DEC 1 6 1994

REPLY TO ATTN OF: SPA:DWS:12486

SUBJECT: Rocky Flats Field Office Comments on EG&G Root Cause Analysis Building 771

TO: Anson H. Burlingame
President
EG&G Rocky Flats, Inc.

Attached are the Rocky Flats Field Office comments on the Building 771 Root Cause Analysis. These comments can be classified into two major categories, comments on the root cause and comments on the corrective action plan.

After review of EG&G's Root Cause Analysis, RFFO considers that the root cause and corrective actions are adequate to proceed with the review of the restart plans for lifting the suspension to drum movements, thermal stabilization and HSP 31.11. However, should you identify additional corrective actions as a result of review of the attached comments you are expected to review their applicability and incorporate them into Standing Order 34 restart plans.

The only actions with respect to restart plans that RFFO will review are those actions resulting from the Root Cause Analysis, i.e., we do not plan to independently review or verify all the actions EG&G is undertaking to assure the adequacy of procedures and other prerequisites for undertaking work. Nonetheless, RFFO recognizes and commends the fact that EG&G performed readiness type reviews in areas beyond those identified as problem areas in the Root Cause Analysis. Future Standing Order 34 restart plans should clearly differentiate those areas that are related to root cause corrective actions from those that EG&G performed beyond the root cause to help expedite the RFFO reviews.

Mark N. Silverman
Manager

Attachment

1. The Root Cause Analysis does not appear to address or explain why the management environment allowed these types of situations to exist. DOE perceives the environment in 771 was such that management by its actions created an environment that would allow such actions. This perception is based on:
   - Tanks being infracted for more than a year
   - Raschig Ring compensatory measures being not carried out
   - OSR violations remaining unaddressed

2. The Root Cause Analysis or follow-up actions did not address the apparent mistake of the laboratory, including an OSR violation, procedure violation and performing operations without authorization.

3. The root cause indicates that EG&G assumed that Conduct of Operations would not be fully implemented. DOE RFFO does not understand how the site wide infrastructure should be revised to correct this situation.

4. Corrective action A.1 needs to be broadened to include all safety on the site. Even though the B-771 event was primarily a criticality safety issue, the generic implications indicate that all safety, i.e., industrial, electrical, radiological etc. needs to be addressed. The site experienced a rash of electrical safety issues a couple of years ago that was attributed to failure to follow procedures, inadequate training, and lack of management oversight. These are the same generic indicators that the B-771 event has brought out. Therefore, the training needs to be enhanced not only for criticality safety, but needs to also include training for all safety areas to heighten the worker's ability to transfer classroom theory to work place practice.

5. The root cause indicates that EG&G has recognized that management and operating personnel have failed to achieve an acceptable process level for conducting work that incorporated both Conduct of Operations principles and process knowledge. Due to their perception that some work control documents are inadequate some workers continue to rely on process knowledge rather than procedures as the principle basis for their safety. The current site-wide program for preparing procedures is neither streamlined nor responsive to the needs of the user, and appears to represent different levels of rigor. In addition, workers need to understand the purpose of the procedure and procedural compliance principles. EG&G might consider a training class on procedures that includes procedural compliance, what it means for signatures in procedures, etc. (Such a training class was discussed about two years ago, but was never developed.)

6. Interviews by RFFO personnel indicate that the message that EG&G provided to employees and management could be done more effectively. Now that the root cause has been issued, EG&G is afforded an opportunity to re-do these briefings. EG&G should state management's key findings and expectations with respect to procedure development, testing, use and reviews. Procedures that are overly detailed, too hard to change, not walked own, do not reflect process knowledge, etc. will not be effective and welcomed by the workers. Management needs to acknowledge what it will do to facilitate procedure compliance in addition to laying out its expectation for operator compliance.

7. The lack of discipline in and process for establishing and maintaining appropriate authorization bases for hazardous activities increases the probability of safety controls being inadequately specified or being violated during the conduct of these activities. This lack of discipline and process increases the probability of occurrence of incidents such as the Building 771 unauthorized solution draining incident. There is also a perception in the work force reflecting a disrespect for authorization bases that is very similar to the procedure issue. RFFO does not see corrective actions that will resolve this issue.

8. The root cause fails to identify the safety significance of action taken after the operator left the TIP.

9. RFFO is concerned about the reporting of employee concerns. After the Building 991 tunnel event EG&G took action to establish a system to allow employees to report concerns to management. Very few items were reported. RFFO is concerned that there is still a perception with employees that if they report concerns they will be retaliated against. EG&G must take action to ensure that this does not happen and that the concerns of employees are placed on the table so action can be taken to resolve the concerns. RFFO recognizes that EG&G touched on this in the root cause with "no fault" but feels that the corrective actions do not support fixing this area.

10. Past experience with implementing Conduct of Operations on the site has shown that first line management has been resistant to implementing and believing in Conduct of Operations. Management was not supporting the worker in getting the job done, i.e., overly burdensome formal changes rather than pen and ink changes to procedures under appropriate controls, support to stop work if procedures are inadequate, and consequences of going outside the boundaries of a written procedure

11. In review of corrective action by Facility Representatives, some actions are not clear. These actions should be measurable, and capable of being implemented to prevent reoccurrence (for specifics contact Facility Representatives).

ENCLOSURE 10

SUMMARY OF OUTSTANDING ACTIONS FOR FINAL REPORT AND RESPONSIBLE RFETS MANAGER