DEPARTMENT OF ENERGY
ROCKY FLATS FIELD OFFICE

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

FINAL REPORT

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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 final response to the issues and concerns raised in the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, as applicable to the unauthorized operation which resulted in a criticality safety infraction in Building 771 at the Rocky Flats Environmental Technology Site (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 Site. On October 11, 1995, Department of Energy/Rocky Flats Field Office (DOE/RFFO) directed the Contractor to adhere to the requirements of DOE Order 5480.31, Startup and Restart of Nuclear Facilities, when restarting suspended activities. 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 DNFSB Recommendation 94-4 as applicable to the Rocky Flats Building 771 criticality safety infraction. DOE/RFFO and EG&G Rocky Flats had initiated and completed a number of activities at the time this request was made. Many of these activities provide a direct response to the DNFSB's recommendations.

In reviewing the Building 771 incident, it is important to understand that the nature of the occurrence was fundamentally different than the events that transpired at the Oak Ridge Y-12 plant in several significant ways:

1. The event was singular in nature. Although systemic problems were discovered during performance of the root cause analysis, this event was characterized by a discrete failure.
2. The contractor took prompt and effective action following the event to ensure safety of workers and the public.
3. The event transpired out of willful disregard for procedures and policy, rather than a lack of rigor in procedural compliance.
4. Restart of tank draining activities terminated in Building 771 can only be performed following the successful completion of an Operational Readiness Review per DOE Order 5480.31.

Executive Summary

The root cause of this incident was the lack of the Department of Energy/Rocky Flats Field Office (DOE/RFFO) and EG&G Rocky Flats (EG&G) management to institute an adequate

safety culture in Building 771. EG&G initiated immediate action and compensatory measures with direction and concurrence from DOE/RFFO which were adequate and prudent for the situation. EG&G conducted a root cause analysis and initiated a corrective action plan which addresses training, personnel, management, criticality safety and conduct of operations concerns associated with this incident.

DOE/RFFO initiated several measures to fully understand the problems and increase oversight focus to instill safe operations which include: Operational Readiness Reviews to evaluate conduct of operations and safety culture prior to restart, additional Facility Representatives oversight, implementation plan for DOE Order 5480.24, independent root cause analysis, and a campaign to increase criticality safety awareness throughout the Site.

DOE/RFFO recognized the problems in the safety culture at the Site prior to this incident and incorporated those concerns in the Request for Proposal (RFP) from which the new integrating contract was negotiated and written. In addition, DOE/RFFO re-evaluated RFP following this incident to ensure safety culture was included and stressed throughout. The resulting performance goals approved in the contract include:

1. Establish and implement a mature behavior-based ES&H program that supports a culture of continuous improvement resulting in decreasing risk to workers and the public.
2. Ensure that subcontractors meet minimum qualifications for work at the Site and that they have a qualified and verifiable ES&H program.
3. Eliminate criticality safety procedural infractions.

These performance goals have corresponding performance measures which will be used for contractor accountability. Failure of the contractor to meet the specific performance measures will result in the loss of incentive fee. Additionally, DOE/RFFO mandated that the new contract contain provisions that require the contractor to comply with all applicable environmental, safety, and health requirements including DOE Orders and requirements and applicable Federal, State and Local laws. Failure to comply may result in work stoppage without fee reimbursement for the contractor.

The Site interim response to the DNFSB recommendation was forwarded to RADM Guimond on Jan. 20, 1995. The following is the DOE/RFFO's final response to the recommendation. Attachment 1 to this report is EG&G's final response. The EG&G corporate recommendations and conclusions are considered valid and are being implemented. However, the Site has transitioned from EG&G Rocky Flats, Inc. management to Kaiser-Hill Company, L.L.C. (K-H) management. The corrective actions specified are currently under review by K-H. K-H will provide an update to this report by September 1, 1995. This update will include an evaluation of all pertinent data and corrective action plans and will clearly identify changes or improvements to the corrective actions specified. Following review by DOE/RFFO, the update will be forwarded to the DNFSB.

Detailed Response To the DNFSB's Specific Recommendations

Recommendation 94-4 (1)

DOE determine the immediate actions necessary to resolve the nuclear criticality safety deficiencies at the Y-12 Plant (*Building 771, Rocky Flats Environmental Technology Site)*, 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).

Response 94-4 (1)

The immediate actions were the termination of liquid transfer operations in building 771, submission of occurrence notification report RFO-EGGR-771OPS-1994-0062, 771 Operation (Enclosure 1 to Attachment 1) and the issuance of Standing Order 34 (Enclosure 2 to Attachment 1) to suspend movement, transfer, and process operations involving fissile material on the Site. A comprehensive Root Cause Analysis and Generic Implication Study was completed by EG&G on November 23, 1994 (Enclosure 3 to Attachment 1). Additional actions included:

1. An onsite DOE/HQ review was conducted by a representative of the Office of Environmental Management, Deputy Assistant Secretary for Transition and Management (EM-64).
2. The Assistant Manager for Operations and Waste Management - DOE/RFFO conducted a review of the incident.
3. An independent review of the incident was conducted by the DOE Assistant Secretary for Environment, Safety and Health.

In parallel with the root cause analysis, restart plan preparation was initiated by EG&G for each activity suspended by Standing Order 34. Per DOE/RFFO direction, the process for restart used 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. Restart plans were reviewed by a Safety Review Board subcommittee consisting of contractor senior managers not associated with any of the restart programs prior to approval by the President of EG&G, Rocky Flats, Inc. Following the review, approval, and authorization by the DOE/RFFO Manager to restart the first three activities, the requirement for DOE/RFFO Manager approval to restart was revised, limiting this requirement to review of only those plans having an Operational Readiness Review (ORR) as required by DOE Order 5480.31. As of May 1, 1995, the following activities have been restarted:

1. HSP 31.11, Brushing and repackaging Revision 0, 700 Area Only, November 17, 1994 (Enclosure 4 to Attachment 1).
2. Thermal Stabilization in Building 707, Revision 0, November 17, 1994 (Enclosure 5 to Attachment 1).
3. 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 to Attachment 1).
4. Transfer, Re-Packaging, and Offsite Shipment of Enriched Uranium, Revision A, January 16, 1995 (Enclosure 8 to Attachment 1).
5. Movement, Relocation, and Repackaging of SNM Category I, II, III, and IV Material, February 3, 1995 (Enclosure 9 to Attachment 1).

Additional restart plans for other suspended activities are following the same process described above.

Standing Order 34 was cancelled June 29, 1995. All activities covered by the Standing Order have either been restarted or have other administrative controls governing restart.

The root cause identified by EG&G's analysis was a lack of acceptance of Conduct of Operations Principles by some building 771 personnel. The DOE/RFFO was concerned that this analysis was too limited and commissioned the Nuclear Facility Operations Safety Assessment Team (Assessment Team) to conduct an independent verification of the EG&G document "Root-Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO-EGGR-771OPS-1994-0062." The resulting report, Nuclear Facility Operations Safety Assessment Team Report for Rocky Flats Environmental Technology Site, Report Number : SPA-95-0002, dated April 19, 1995 is provided as Attachment 2. The Assessment Team concluded that the root cause of this occurrence was the failure of the DOE/RFFO and EG&G's management to establish an appropriate safety culture in Building 771.

The inadequate safety culture within the building is being addressed in two ways. First, DOE/RFFO and the contractor are expending extensive effort in mentoring and training to change the culture within the building. Specifically, criticality safety training which included presentation of the RFFO criticality safety video has been conducted for all Building 771 personnel as a part of the criticality safety awareness campaign. This training is in progress for the rest of the Site. A safety culture survey was performed in Building 771 in October 1994 and re-performed in May 1995. This document (Attachment 3) indicates significant progress has been made in improving the safety culture in the building. Second, in order to restart liquid stabilization work in the building in the short term, the scope of allowable activity has been narrowed. The planned ORR for Building 771 is restricted to tanks T-83, T-84 and T-85. This approach will ensure material conditions are adequate for the planned operations, and provide for increased supervision and oversight to ensure safe operations for the specific process.

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.

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.

Response 94-4 (2) (a)

Evaluations of compliance with Operational Safety Requirements (OSRs) and Limiting Conditions for Operations (LCOs) were conducted as part of the readiness assessments for all of the activities which have been restarted following shutdown in accordance with Standing Order 34. The evaluations, were completed in accordance with DOE Order 5480.31, Attachment 2, Core requirements 4 and 5.

LCO and OSR compliance are being evaluated for limited tank draining in Building 771 as part of the ORR process. Specifically, the ORR team will verify the existing program which confirms condition and operability of safety systems needed for the tank draining activity, including safety-related process systems and safety-related fire protection and utility systems. All other activities restarted in Building 771 will undergo OSR and LCO reviews as part of the readiness review process in accordance with DOE Order 5480.31.

Additionally, the DOE/RFFO criticality safety group in conjunction with the Facility Representatives, have a program to conduct no notice spot check surveillances on criticality safety related items. This group also conducts periodic assessments of contractor criticality safety programs and reviews contractor criticality safety audits and surveillances.

Before any new operation may begin, a new Criticality Safety Evaluation (CSE) and new Nuclear Material Safety Limits (NMSLs) must be developed by the contractor's Criticality Engineering Group and approved by the contractor's Operating User's Group. These CSEs and corresponding NMSLs are developed in compliance with DOE Order 5480.24 and the DOE standard DOE-STD-3007-93, "Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities." Approval by the operating group is required to provide assurance that the operating group understands the NMSLs. Additionally, the contractor's Criticality Engineering Group concurs on all procedures associated with fissile materials. This process is being followed for all Site solution stabilization activities.

The contractor has also instituted the Criticality Safety Limit Examination Program to address the criticality safety basis for ongoing fissile material operations including those required for resumption of operations that were suspended under Standing Order 34. This program requires review of NMSLs to determine whether the old limits are safe. If the limits are deemed safe, additional documentation is generated by the Criticality Engineering Group to justify this decision. If the limits are not justifiable, a new criticality safety evaluation is developed to establish double contingency.

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 approval, and a root cause analysis of the extensive level of non-compliance found in recent reviews.

Response 94-4 (2) (b)

DOE/RFFO recognized criticality safety program deficiencies existed and has been working with the contractor to correct them. The major areas which were being focused on include: Establishing a training and qualification program for the Criticality Engineering staff, increasing the experience level amongst the Criticality Engineering staff, implementation of DOE Order 5480.24, Nuclear Criticality Safety, and personnel perceptions about criticality safety. The Assessment Team performed an independent review of the nuclear criticality safety program at the Site for DOE/RFFO. This review focused on the implementation of nuclear criticality safety program elements Site-wide. The major nuclear criticality safety program findings of the Assessment Team confirmed the deficiencies which were currently being worked and provided some additional insights relating to the effectiveness of the Site Nuclear Criticality Safety Committee (NCSC) and Safety Review Board (SRB); and personnel perceptions about criticality safety.

The average experience level of contractor criticality safety engineers has been decreasing due to high turnover. The turnover rate can be attributed to frequent reorganizations, severe schedule pressures, staff shortages, insufficient training for assignments, and perceived salary inequities compared with other sites. Much effort has been put forth over the past year to decrease the turnover and to encourage experienced criticality engineers to return to the Criticality Engineering Group. For example, a salary incentive program was established to retrieve and retain criticality engineers in the Criticality Safety Program. Engineers do not receive the full salary incentive unless they remain in the program for a minimum of three years.

Following the Building 771 Tank Draining Incident, the NCSC conducted a review of the Site's nuclear criticality safety program. The resulting report, Cause Evaluation of Recurring Deficiencies in the Nuclear Criticality Safety Program CA-94-012 (Enclosure 10 to Attachment 1), contained several serious findings. The NCSC determined that there is a lack of accountability for criticality safety issues identified in the Plant Action Tracking System (PATS). Their review found that contractor management oversight to either track the committed corrective actions or to drive them to closure, and to resolve root cause management problems have been less than adequate. Additionally, the NCSC concluded that contractor management has not provided adequate criticality safety program elements, delineation of responsibilities and expectations, and working conditions to foster an efficient criticality safety program. EG&G's proposed corrective actions in the report is being reviewed by K-H. DOE/RFFO has provided forceful guidance to K-H concerning the revision to the Implementation Plan (IP) for DOE Order 5480.24, Nuclear Criticality Safety. EG&G' s IP for this order was previously disapproved by DOE. Thorough implementation of this order will improve criticality safety at the Site and will address the concerns of the NCSC. K-H will forward recommendations to DOE/RFFO on whether to continue implementation of these corrective actions or to make changes that are more applicable to the new contract.

A new manager for EG&G Criticality Engineering reported to work in January 1995 (previously, this group had gone without a permanent manager for a year). This

individual has over 20 years experience in the criticality safety field and has worked both as a contractor and a regulator. Since his arrival on Site, a top priority of the Criticality Engineering Manager has been to hire mentors to help him in training the criticality engineers. He has also begun work on a Qualifications Program for the criticality engineers.

The Assessment Team Report also noted that the Site NCSC has been aware of the deficiencies of the criticality safety staff but has been ineffective in raising these problems to management for resolution. EG&G instituted changes aimed at increasing the effectiveness of the NCSC which are briefly outlined in the attached EG&G response to DNFSB Recommendation 94-4. K-H, however, has also expressed great enthusiasm for independent environment, safety and health oversight. The K-H approach emphasizes safety for all activities. An oversight organization, independent of operations and technical support organizations has been established by K-H which allows for an active and effective NCSC as well as a separate Independent Criticality Safety Advisory Committee. This organization will stress safety oversight and compliance assurance.

Criticality safety is perceived by some Site personnel as an obstacle rather than a line of defense. Many people at Rocky Flats do not believe a criticality can occur; therefore, they begrudge money and time spent on criticality safety limits and reviews. In addition to the restart efforts which have incorporated enhanced and job-specific criticality safety training for operators, DOE/RFFO and the contractor have embarked on a campaign to increase criticality safety awareness which has included a series of briefings to contractor management and DOE/RFFO personnel as well as the development of a video entitled, "It Can Happen Here." Further, K-H plans to have trained personnel knowledgeable in criticality safety on the staff for each of the fissile material buildings.

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.

Response 94-4 (2) (c)

The DOE/RFFO response to this subrecommendation is presented in three parts:

1. An evaluation of the Conduct of Operations status of Building 771 at the time of the incident, and all significant changes since that time.
2. A description of the future Conduct of Operations reviews/assessments planned in the facility.
3. A sitewide assessment of Conduct of Operations implementation status to the expectations of DNFSB Recommendation 92-5.

Part 1, Building 771 Conduct of Operations status at the time of the incident:
As of the time of the incident, EG&G had reported that Conduct of Operations was approximately 70% implemented in Building 771, with a full implementation date scheduled as September 1995. DOE/RFFO believes that this number may be correct as far as program implementation is concerned, but that it is inaccurate with respect to floor-level adherence, due to the safety culture in the facility. Additionally, a full compliance date of September 1995 cannot be realistically met. It should be noted, however, that the safety culture surveys (Attachment 3) conducted in the building indicate significant improvement, as previously discussed in the response to subrecommendation (1). Currently, DOE/RFFO is working with K-H to develop an updated Conduct of Operations implementation plan in accordance with DOE Order 5480.19 which more accurately reflects implementation status.

The Assessment Team concluded that Conduct of Operations was not significantly implemented in the building at the time of the incident. Although significant programmatic and administrative work had been completed to bring the building into compliance with DOE Order 5480.19, the Assessment Team concluded that an inadequate safety culture had circumvented this effort. Per the report:

> " [various evaluations]...establish that an unacceptable safety culture exists in B-771. The Assessment Team believes that this culture does not support the high-risk work environment in B-771 and the Site in general, and that contractor and the DOE/RFFO management are responsible for the existence of this culture. The rejection of Conduct of Operations principles is a symptom of the direct cause of the incident, but not the root cause. The Assessment Team believes that the contractor and the DOE/RFFO management's failure to effectively establish an appropriate safety culture is the root cause of this Incident."

DOE/RFFO fully concurs in these conclusions, and believes that the contractor changeover provides an excellent opportunity to effect real change on the Site. The new Performance-Based Contract will provide financial incentive to the contractor to improve Conduct of Operations and the safety culture through established safety performance measures and objectives. As discussed in the response to subrecommendation (1), the safety culture is being addressed in two ways. First, DOE/RFFO and the contractor are expending extensive effort in mentoring and training to change the culture within the building. Second, in order to restart liquid stabilization work in the building in the short term, the scope of allowable activity has been narrowed. The planned ORR for Building 771 is restricted to tanks T-83, T-84 and T-85. This approach will ensure material

conditions are adequate for the planned operations, and provide for increased supervision and oversight to ensure safe operations for the specific process.

DOE/RFFO will also reorganize to more efficiently perform its mission. In the past, a fundamental failure to enforce safety culture adherence had resulted from a blurring of responsibilities between line management and oversight. Under the new organization, line management and oversight responsibilities will be clearly separated and defined. In the interim, DOE/RFFO oversight organizations provide input to DOE/RFFO line management for transmittal to the contractor to minimize the potential for issuing conflicting guidance. Additionally, DOE/RFFO oversight personnel will receive training to clarify their responsibilities.

Under the direction of DOE/RFFO, the following steps were taken by EG&G to ensure safety in the wake of the incident, in addition to those taken by DOE/RFFO and EG&G listed in section 94-4 (1) of this report :

a) A new Operations Manager was hired.
b) An extensive mentoring/training effort was initiated.
c) Conduct of Operations training was performed on a daily basis.
d) The two-man rule was initiated for all work in the Material Access Area (MAA).
e) A Mentor and a training coordinator were hired to improve operations. Additional Mentors are to be hired.
f) An ORR training program was initiated.

DOE/RFFO is satisfied that these immediate actions will ensure safety during the suspended operations period.

Part 2, Future Conduct of Operations Reviews/Assessments:
In order to provide for safe restart of activities in the building, DOE will evaluate the status of Conduct of Operations before allowing reinitiation of any building activities. Currently, EG&G has developed and DOE/RFFO has approved a plan of action to restart tank-draining activities in the facility (Enclosure 8 to Attachment 1). DOE/RFFO has developed an ORR Plan of Action (Attachment 4) for use in reviewing the tank-draining operation.

This method of planning, involving small pieces of work rather than building-wide resumption of activities, is in direct recognition of the safety culture problem. The smaller scope of activity will allow for continuous management supervision and more thorough DOE oversight to ensure no unauthorized or unplanned operations occur. This increased level of vigilance will mitigate the safety culture problem in the short term, and the increased management attention will diminish the problem in the long term. Any further restart of activities in the building will be achieved in accordance with DOE Order 5480.31.

In addition to the ORR review process described above, DOE/RFFO has established a periodic Conduct of Operations Assessment Program. This program mandates that DOE Assessment teams will semi-annually conduct evaluations of all major Site facilities for compliance with DOE Order 5480.19, Conduct of Operations.

Part 3, Site Conduct Of Operations Implementation Status:
Attachment 5 to this report provides a sitewide Conduct of Operations Implementation Status Report prepared in response to DNFSB Recommendation 92-5.

Recommendation 94-4 (2) (d)

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

Response 94-4 (2) (d)

The following is a consolidated listing of completed and proposed corrective actions and corrective action plans generated in response to this incident:

Corrective Action	Responsible DOE Manager Or Contractor	Date Due Or Completed
Subrecommendation (1)		
• Termination of Liquid Transfer Operations In Building 771, pending completion of the DOE ORR.	• Leanne Smith	• Complete 10/94
• Suspension of Movement, Transfer, and Process Operations Involving Fissile Material.	• Leanne Smith	• Complete 10/94
• Commissioning of an Independent Nuclear Facility Operations Safety Assessment Team.	• Dero Sargent	• Complete 10/94
• Building 771 Tank Draining Restart Plan.	• Leanne Smith and Contractor	• Complete 3/95
• Building 771 Tank Draining Operational Readiness Review.	• Dero Sargent	• 8/95
Subrecommendation (2)(a)		
• Evaluation Of OSR And LCO Compliance. Conducted as part of each activity restart Readiness Assessment or Operational Readiness Review.	• Leanne Smith	• Ongoing
• Criticality Safety Assessment and Surveillance Program.	• Dave Brockman	• Ongoing
• Criticality Safety Limit Examination Program.	• Contractor	• Ongoing
Subrecommendation (2)(b)		
• Independent Nuclear Facility Operations Safety Assessment Team Comprehensive Review of the Nuclear Criticality Safety Program.	• Dero Sargent	• Complete 7/95
• Contractor Nuclear Criticality Safety Committee (NCSC) Review of the Site Nuclear Criticality Safety Program and Corrective Action Plan.	• Contractor	• Complete 5/95
• Implementation Plan for DOE Order 5480.24, Nuclear Criticality Safety.	• Dave Brockman & Contractor	• Estimated completion date will be provided in the K-H update

Corrective Action	Responsible DOE Manager Or Contractor	Date Due Or Completed
• Establish an Independent Criticality Safety Advisory Committee.	• Contractor	• Estimated completion date will be provided in the K-H update
• Criticality Awareness Campaign and Training.	• Dave Brockman	• Ongoing
Subrecommendation (2)(c)		
• Conduct of Operations Implementation Plan.	• Contractor	• Estimated completion date will be provided in the K-H update
• DOE/RFFO Reorganization.	• Dave Simonson	• September 1995
• Conduct of Operations Assessment Program.	• Dero Sargent	• Ongoing

Recommendation 94-4 (3) and Recommendation 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).

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.

Response 94-4 (3) and Response 94-4 (4)

The Assessment Team conducted an evaluation of the experience, training and performance of key DOE and contractor management personnel. They noted that a contributing factor to the failure of DOE/RFFO and EG&G management to establish an adequate safety culture was the instability in the upper management for both DOE/RFFO and EG&G. This resulted in "leadership failure at various levels to recognize the symptoms of a poor safety culture and to correct these deficiencies." DOE selected K-H because of their aggressive performance measures in the ES&H area such as their commitment to reducing occurrence of new potential criticality safety procedural violations by 25 percent by FY 95 and 40 percent by FY 96 and reducing the occurrence of unsafe acts by 10 percent by FY 95 and 25 percent by FY 96.

The restart plans 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 EG&G in the EG&G Rocky Flats, Inc. response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4 (Attachment 1).

The lack of experienced criticality engineers at the Site is a deficiency which has long been recognized by both DOE/RFFO and EG&G and has been cited in numerous audits, both internal and external. The current average experience level of the Rocky Flats criticality engineers is less than 3 years. The qualification program for these engineers is not complete. As mentioned above, salary incentive programs have been established to attract and retain engineers in the Criticality Engineering Group. The new Criticality Engineering Manager has made hiring additional mentors for the group a top priority. In July 1994, DOE/RFFO emphasized in the Award Fee program that EG&G hire a permanent manager for the group as well as three mentors. Work has begun on establishing the requirements for a Qualification Program for the engineers. The goal is to have the Qualification Program fully in place by FY 1996.

In addition to the above mentioned items, the ORR for draining of tanks T-83, T-84 and T-85 will include reviews of the following:

1. Level of knowledge of criticality safety personnel is adequate based on reviews of examinations and examination results, selected interviews of criticality safety personnel, and observed operations and drills.

2. Level of knowledge of occupational safety and industrial hygiene personnel is adequate based on reviews of examinations and examination results, selected interviews of occupational safety and industrial hygiene personnel, and observed operations and drills.
3. Level of knowledge of operations personnel is adequate based on reviews of examinations and examination results and selected interviews of operating personnel.
4. A routine and emergency operations drill program, including program records, has been established and implemented.
5. The technical and managerial qualifications are adequate for the DOE/RFFO personnel who interact with the contractor, including Facility Representatives.
6. Training and qualification programs for operations personnel have been established, documented and implemented.
7. The training and qualification programs encompass the range of duties and activities required to be performed.

These reviews will verify Critical Safety Elements (CSE) 12, Training and Qualification Program, and CSE 16, Criticality Safety Program, described in the response to DNFSB Recommendation 93-1 for Building 771 selected tank draining operations.

Corrective Action	Responsible DOE Manager Or Contractor	Date Due or Completed
Subrecommendation (3)		
• Independent Nuclear Facility Operations Safety Assessment Team Comprehensive Evaluation of the Experience, Training and Performance of Key DOE and Contractor Personnel with Recommendations.	• Dero Sargent	• Complete
• Criticality Safety Engineering Training and Qualification Program	• Contractor	• October 1995
• Operational Readiness Review Evaluation of Training, Qualification and Level Of Knowledge of Building 771 Personnel.	• Dero Sargent	• August 1995

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

by

EG&G ROCKY FLATS, INC.

FINAL REPORT

May 1995

We recognize that all restart plans and/or operational readiness reviews for activities suspended as a result of criticality safety limit infraction in Building 771 have not been submitted. However, we believe the process that has been established by DOE, RFFO and EG&G and demonstrated is sufficient to close the concerns raised in the DNFSB Recommendation 94-4.

Should you have any questions, please contact W. S. Glover, Performance Assurance at extension 2510.

A. H. Burlingame
President
EG&G Rocky Flats

LCS:llh

Enclosures:
As Stated

Orig. and 2 cc - D. W. Sargent

EG&G ROCKY FLATS

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May 9, 1995

95-RF-04116

M. N. Silverman
Manager
DOE, RFFO

FINAL RESPONSE TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB) RECOMMENDATION 94-4 - AHB-167-95

Refs: (a) Mark N. Silverman ltr, HR (11566), to A. H. Burlingame, Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, January 4, 1995

(b) A. H. Burlingame ltr, AHB-020-95, to M. N. Silverman, Interim Response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, January 15, 1995

(c) A. H. Burlingame ltr, AHB-087-95, to M. N. Silverman, Request for Extension of Final Response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, February 28, 1995

(d) A. H. Burlingame ltr, AHB-113-95, to M. N. Silverman, Partial Response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, March 16, 1995

(e) A. H. Burlingame ltr, AHB-121-95, to M. N. Silverman, EG&G Plan of Action for Tank Draining Operational Readiness Review, March 27, 1995

The final report is being submitted per your request in the referenced (a) letter. Previous correspondence, including the interim response on this subject, were submitted in references (b), (c), (d), and (e).

At the time of your request, EG&G Rocky Flats and Department of Energy Rocky Flats Field Office (DOE, RFFO) had established a review and restart process. A number of actions have been completed and documented that provide direct response to the specific issues and concerns contained in this Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4.

The final report is an update of the interim report (reference b) to include the previously submitted documentation of the evaluation of the Nuclear Criticality Safety Program (reference d) and the Plan of Action for Tank Draining Operational Readiness Review (reference e). The final report also includes all of the enclosures submitted with the interim response to provide a complete stand-alone response.

Each of the enclosures has been reviewed by members of your staff and your office approved the first four of the enclosed restart plans. On December 15, 1994, a joint briefing between EG&G Rocky Flats and DOE, RFFO titled "Response to Building 771 Occurrence" was held to review the process and three restart plans. Therefore, we believe the request for a briefing in conjunction with this final report has actually been accomplished as the documentation was prepared, reviewed, and approved.

Attachment 1

A. H. Burlingame ltr, AHB-167-95, to M. N. Silverman, Final Response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, May 9, 1995.

TABLE OF CONTENTS

EG&G Rocky Flats, Inc., Response to the Defense Nuclear Facilities Safety Boards (DNFSB) Recommendation 94-4

Introduction

The purpose of this report 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.

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 conducted the activity outside the authorized scope of work and two supervisory employees who not only did not stop the activity, but assisted in completing the unauthorized activity and then concealed it for seven days.

The procedural infraction was reported in occurrence notification report RFO-EGGR-771OPS-1994-0062, 771 Operations. 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 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 completed or planned activities provide a direct response to the DNFSB specific recommendations, within 94-4.

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 Unreviewed Safety Question Determination (USQD) 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 Resource Recovery and Conservation Act (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 report is organized to first list each specific part of Recommendation 94-4 followed by the EG&G Rocky Flats associated response. Each recommendation has been modified, shown in italics, to make it specific to Building 771 and EG&G Rocky Flats. Each related response provides a brief description and references documents enclosed with this report 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).

Response to 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 issuance 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 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 23, 1994. Enclosure 3, W. S. Glover letter, WSG-317-94, to A. H. Burlingame, "Root Cause Analysis and Generic Implications of the Unauthorized Draining of a Process Line in Building 771, November 23, 1994," provides a complete copy of the report. 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. The report was transmitted to DOE, RFFO on November 28, 1994.[1]

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[2] 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 1-H24-ADM-10.01, Startup and Restart of Nuclear Facilities, that implements DOE Order 5480.31 to provide consistent format of the restart plans.

[1] A. H. Burlingame ltr AHB-275-94 to Mark N. Silverman, "Root Cause and Generic Implications of the Unauthorized Draining of a Process Line in Building 771," November 28, 1994

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

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[3] to the entire Safety Review Board (SRB). These managers have significant, broad-based, and relevant experience which is being used to overview the plans and provide a consistent methodology. The SRB, following recommendation by the subcommittee, provides an additional overview of the restart plans, and process. The SRB submits the recommendation to the EG&G Rocky Flats, President who has final approval authority prior to submission to the Manager, DOE, RFFO. All of the restart plans for suspended activities initially required approval by the DOE, RFFO manager. Following the review and approval of the first four restart plans, the DOE, RFFO manager approval was revised[3] only to the plans having an Operational Readiness Review (ORR) and required by DOE Order 5480.31.

The restart plans are based on an Internal Review, Readiness Assessment or Operational Readiness Review as defined in DOE Order 5480.31 and reason for suspension of activity, or previous plans for activities not yet started. As of May 1, 1995, the first four restart plans have been submitted and approved by DOE, RFFO. Two additional restart plans for resumption of suspended activities have also been approved by the President of EG&G per the authorization[3] by the DOE, RFFO manager. These are:

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) Plan of Action Operational Readiness Review Liquid Draining of Tanks T-83, T-84, and T-85 Building 771, Revision 2, March 27, 1995 (Enclosure 7).
5) Restart Plan for the Transfer, Re-Packaging, and Offsite Shipment of Enriched Uranium, Revision A, January 16, 1995 (Enclosure 8).
6) Restart Plan for the Movement, Relocation, and Repackaging of SNM Category I, II, III, and IV Material, February 3, 1995 (Enclosure 9).

The activities in restart plans (Enclosures 4, 5, & 6) were started following approval by DOE, RFFO. The Building 771 restart plan (Enclosure 7) has been approved and preparation for a DOE, RFFO Operational Readiness Review is underway. Restart plans (Enclosures 8 & 9) have just recently been approved by the President, EG&G and restart activities started. Additional restart plans for other suspended activities are following the same process described in this paper.

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.

[3]Mark N. Silverman, memorandum MMD:WSM:09051 to A. H. Burlingame, DOE, RFFO, Approval of Activities Suspended by EG&G Standing Order 5[illegible], April 24, 1995

Editor's Note: A combination of EG&G Rocky Flats, 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.

Response to 94-4 (2)(a)

The reports covering similar reviews at the Los Alamos Plutonium Facility[4] and during the maintenance mode at the Pantex Plant[5] were reviewed to determine applicability to the Building 771 incident. The common issue in each report and the Building 771 incident is less than adequate conduct of operations. As stated in the letter submitting the root cause (Footnote 1) "...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 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, 7, 8 and 9). The infrastructure for conduct of operations was established during resumption preparation for Buildings 559 and 707. The Conduct of Operations Program was established on a Sitewide basis and implemented fully in Buildings 559 and 707. Other facilities are being implemented as activities are planned. 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 Nuclear Criticality Safety training. 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's) 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.

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.

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

[5]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

Response to 94-4 (2)(b)

EG&G Rocky Flats, Inc. has two Sitewide procedures, (4-B19-NSM-03.12) "Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance" and (4-9100-NSP-010) "Monthly Criticality Safety Assessment," which are required controls for all buildings containing Special Nuclear Materials (SNM). Procedure 4-B19-NSM-03.12 is a prerequisite to performing an activity in a glovebox. The Building 771 incident was not a result of inadequate nuclear criticality limits, controls, or approvals, but a violation of limits applied for the activity. Some additional actions were identified in the root cause analysis (Enclosure 3), including additional criticality training. The restart plans, enclosed with this report, address the criticality safety concerns and corrective actions related to the specific activities.

The Nuclear Criticality Safety Committee (NCSC) at the Site had been collecting a number of documents covering assessments, concerns, evaluations, letters, etc., that were related to nuclear criticality safety. The NCSC was in the process of reviewing this information to identify the causal factor themes 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 senior staff from EG&G Rocky Flats, Los Alamos National Laboratory (LANL), and SCIENTECH was assembled to complete the cause evaluation of recurring deficiencies in the criticality safety program. Enclosure 10 is the report from the NCSC that was previously submitted to DOE, RFFO.[6] The report provides the scope, methodology, and results of the evaluation that is summarized in the following paragraphs.

The cause evaluation team reviewed previous evaluations, occurrence reports, and open issues in the Plant Action Tracking System (PATS) and Integrated Work Control Program (IWCP) databases. Interviews were also conducted with key individuals in the criticality safety program.

The review of the action tracking databases supports the conclusion that management issues are the source of most of the open issues related to criticality safety. There is a lack of accountability for criticality safety issues identified in PATS. Actions that cannot be completed by the scheduled date are changed in PATS without recourse as a common practice. Issues are also allowed to remain open for indefinite periods of time. The problem is not the PATS system for tracking criticality safety issues, but how the actions are being described when put into the system and how the system may be being misused to change and complete actions.

The review of previous recommendations found that actions and management oversight to either track the committed corrective actions or to drive them to closure, and to resolve root cause management problems have been less than adequate. In addition, the wording of the corrective action allows the action to be closed and considered complete prior to preventing recurrence.

Based on personnel interviews, the team concluded that management has not provided adequate criticality safety program elements, delineation of responsibilities and expectations, and working conditions to foster an efficient criticality safety program.

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[6]A. H. Burlingame ltr, AHB-113-95, to M. N. Silverman, Partial Response to the Defense Nuclear Facility Safety Board (DNFSB) Recommendation 94-4, March 16, 1995

In summary, management systems that specify, implement and monitor standards, policies, and administrative controls require improvement. This conclusion means that if management expects strict adherence to written standards, policies, controls and procedures, a better job must be done of specifying, writing, and training against such documents.

The NCSC report, including recommendations, was presented to the EG&G SRB on March 27, 1995. The concluding NCSC recommendations from the cause evaluation that were presented to the SRB are as follows:

1) The SRB to create a New Directions task team, accountable to the SRB, to develop defined criticality safety roles, responsibilities, authority, accountability, and performance expectations for each organization; initiate routine SRB review of the Site priorities of open criticality safety issues; and disposition open criticality safety issues.
2) The SRB to review management related corrective actions.
3) Reinforce ongoing improvement programs such as Conduct of Operations, Activity Based Planning, and implementation of Safety Culture Survey Lessons Learned.

The SRB determined that recommendation 1 was a long term project and assigned the manager of Criticality Safety to review the NCSC cause evaluation, prepare a plan, and brief the SRB. The SRB requested that recommendations 2 and 3 be dispositioned as soon as possible.

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.

Response to 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 minimum core requirements in Attachment 2 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 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 high 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 "knowlegeable EG&G Personnel" called 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 management in 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.

Recommendation 94-4 (2)(d)

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

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 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 provide specific criteria, addressing the minimum core requirements in Attachment 2 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.

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).

*(**Editor's Note**: EG&G Rocky Flats believes the reference to be to the Board's 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.

Response to 94-4(3) and 94-4(4)

The restart plans 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 Matrices (TIM) which implement 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 provide an incentive for previously trained and experienced criticality safety personnel to return from other Site positions they currently are assigned.

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 January, 1995.

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 requirements of criticality safety limits.

The actions taken have resulted in a more stable criticality safety program with sufficient resources to correctly monitor the necessary contractor staff, respond to mission requirements, and safety 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. LANL representation was also included 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 identify title, job code, education, and experience of specific positions.

3. A document containing minimum education and experience requirements for technical positions that meet or exceed 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 94-4 (3) and (4).

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 Recommendation 94-4.

- 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 restart plans are approved by the President of EG&G Rocky Flats. The DOE, RFFO Manager approval is required for special activities requiring an Operational Readiness Review and required by DOE Order 5480.31.

  - Root cause analysis and corrective actions as well as core requirements in DOE Order 5480.31 were 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 is included in restart plans. Employee attitude surveys were conducted in several buildings to measure the current acceptance of the conduct of operations principles.

  - 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 has been completed. The recommendations from the report were presented to the EG&G SRB and actions assigned.

ENCLOSURE 1

OCCURENCE REPORT

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

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.

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)966-2504

(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 PR GRAM 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)

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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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) K. Juroff DOE/HQ

12. OTHER NOTIFICATIONS:
10/07/1994 2103 (MTZ) D. Vaughn DOE/RFFO
10/07/1994 2132 (MTZ) E. 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

---

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:

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. Voorheis

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 E. Kramer, 10/7/94
President Date

INFORMATION ONLY

PADC-94-02054

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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 SRB sub-committee.

Approved by: _____ President

12/11/94 Date

INFORMATION ONLY

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

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: 34
Revision: 2
Issue Date: October 20, 1994
Expiration Date: October 20, 1995

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

INTEROFFICE CORRESPONDENCE

DATE: November 23, 1994

TO: A. H. Burlingame, 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

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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.

1. **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.

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

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.

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

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 Raschig 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, USQD 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	11/23/94 Date
Root Cause Analyst	R. S. Bird	11/28/94 Date
Root Cause Analyst	S. M. Lehman	11/23/94 Date
Root Cause Analyst	D. L. Mayfield	11/23/94 Date
Root Cause Analyst	E. R. Swanson	11/28/94 Date
Root Cause Analyst	T. J. Tegeler	11-23-94 Date
Responsible Manager	K. D. Stovall	11/23/94 Date

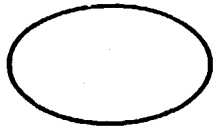
EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

Abbreviations

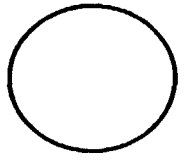
Bldg	-	Building
Crit	-	Criticality
DOE	-	Department of Energy
GB	-	Glovebox
g/l	-	Grams per Liter
Liq Sta	-	Liquid Stabilization
LO/TO	-	Lockout/Tagout
L/U	-	Line-up
PEB	-	Pre-evolution Brief
PF	-	Production Foreman
PM	-	Production Manager
PS	-	Production Specialist
RCRA	-	Resource Conservation and Recovery 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

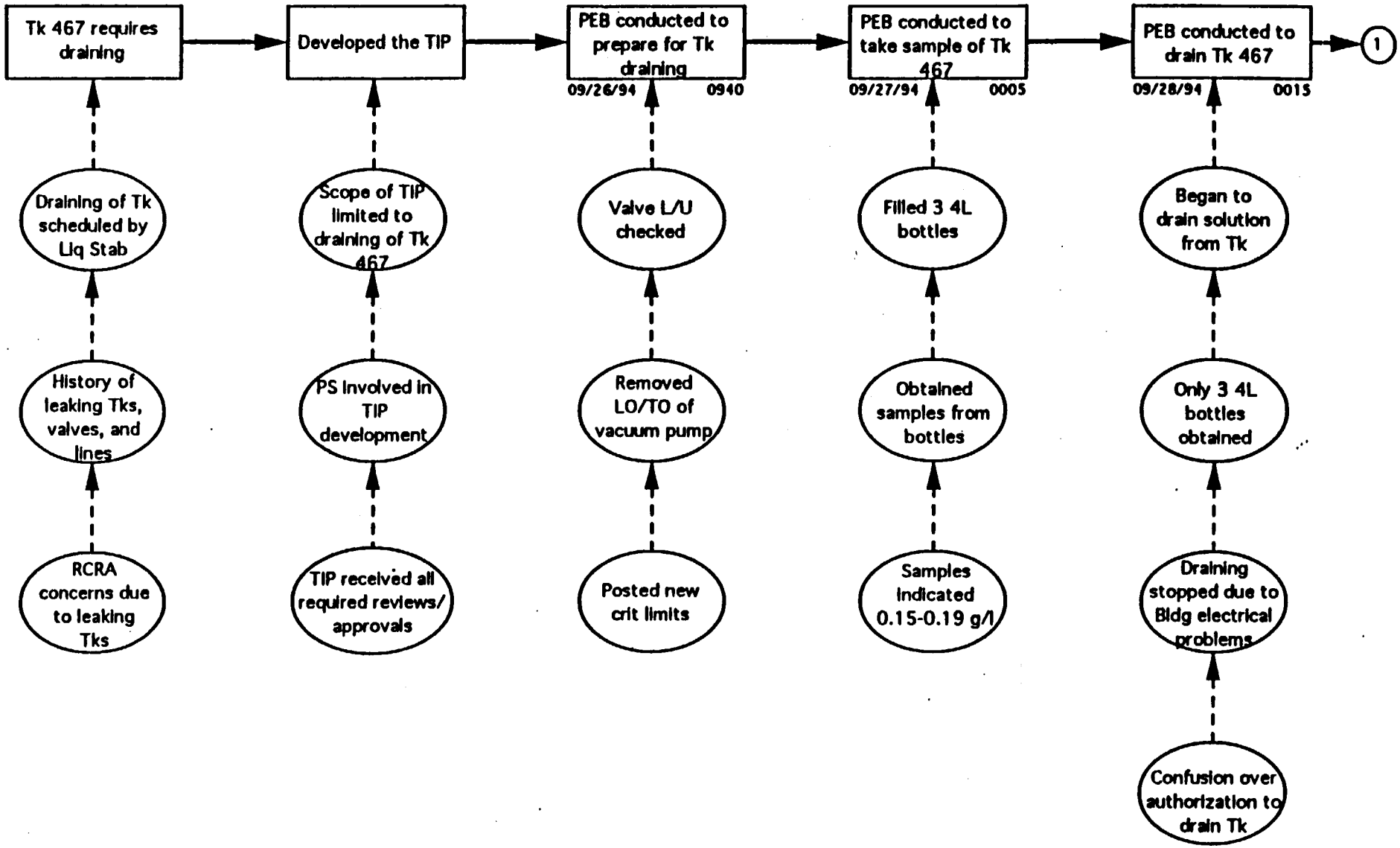
Solid arrows link events

Dashed arrows link causal factors with events

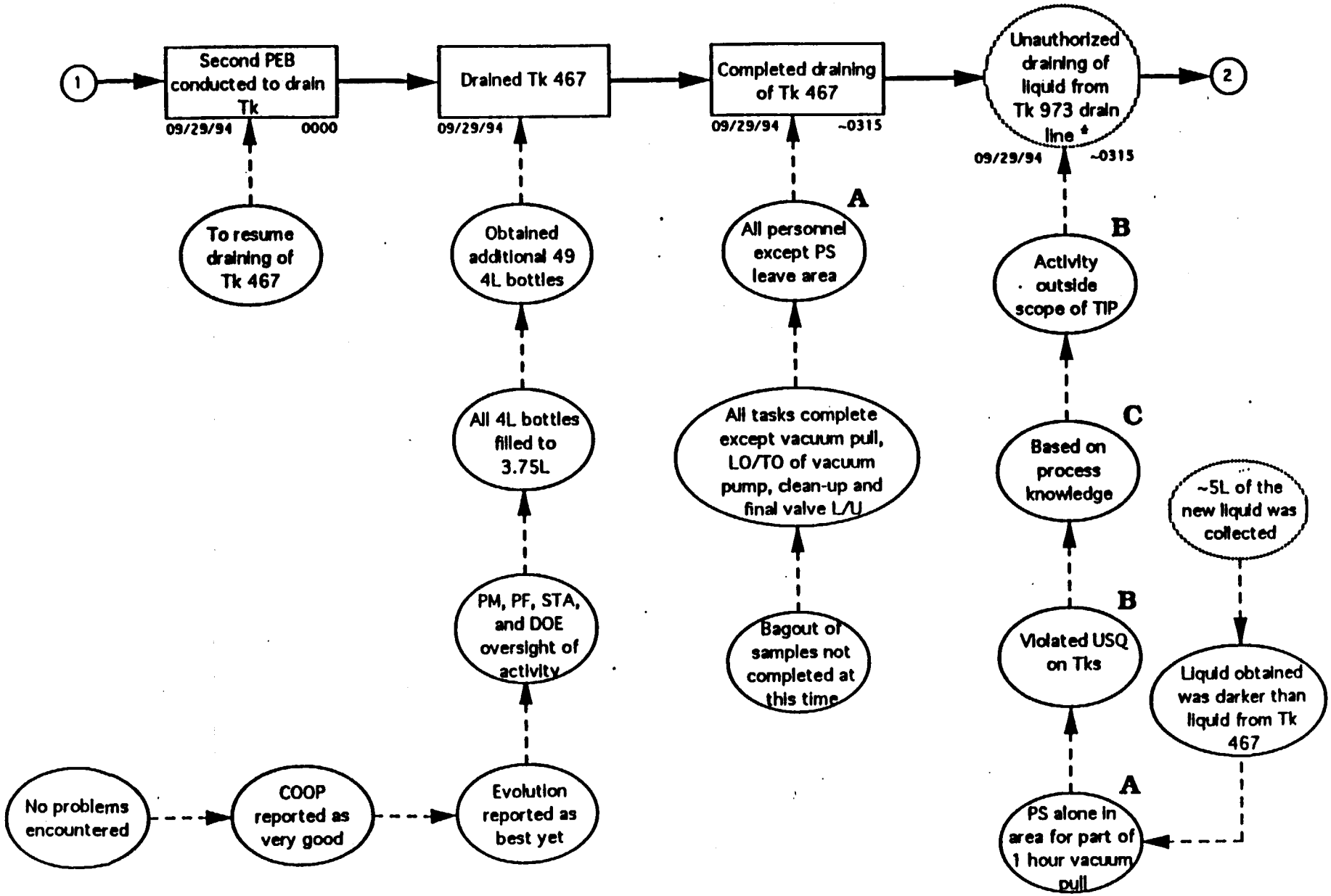
A

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

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

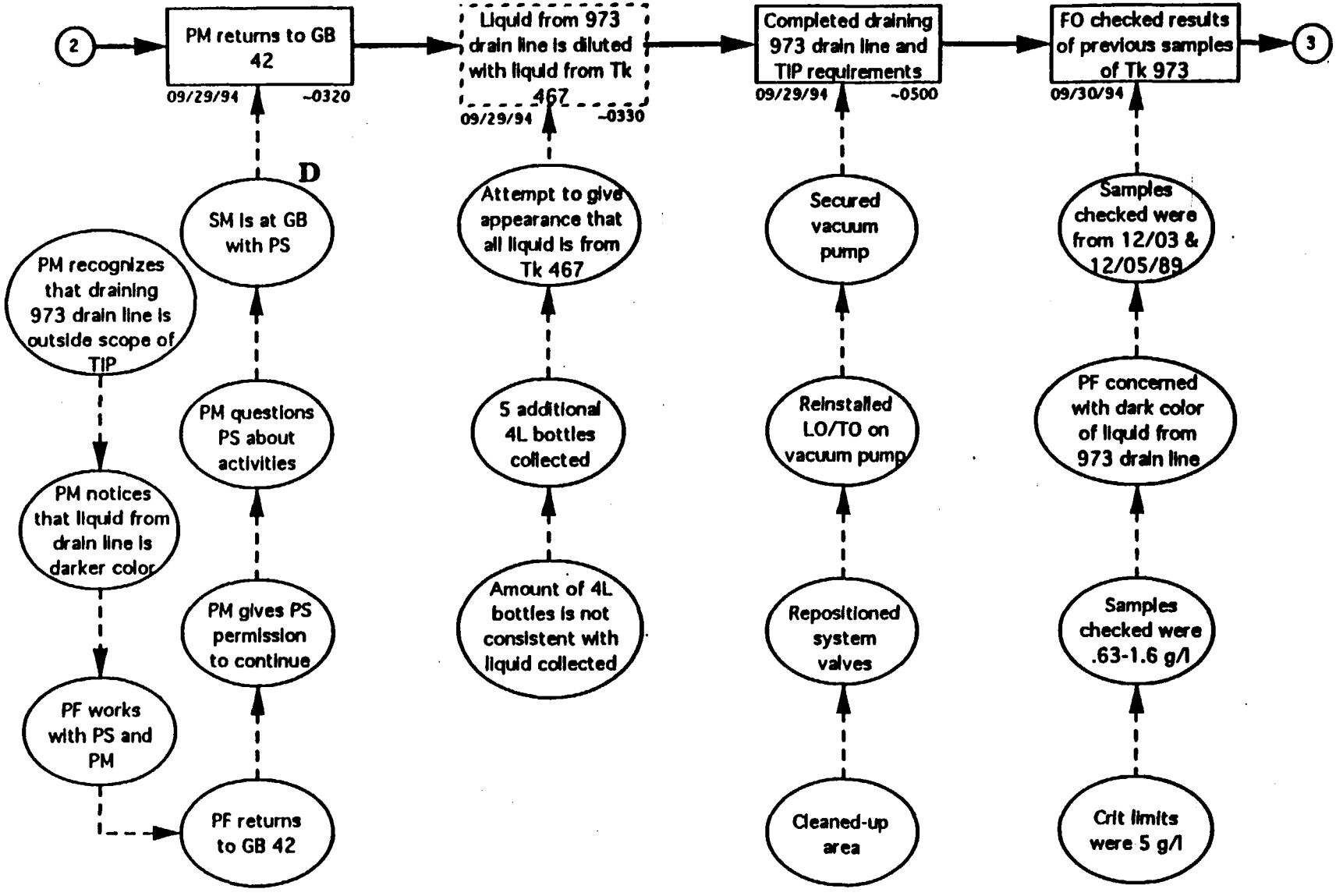


EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94

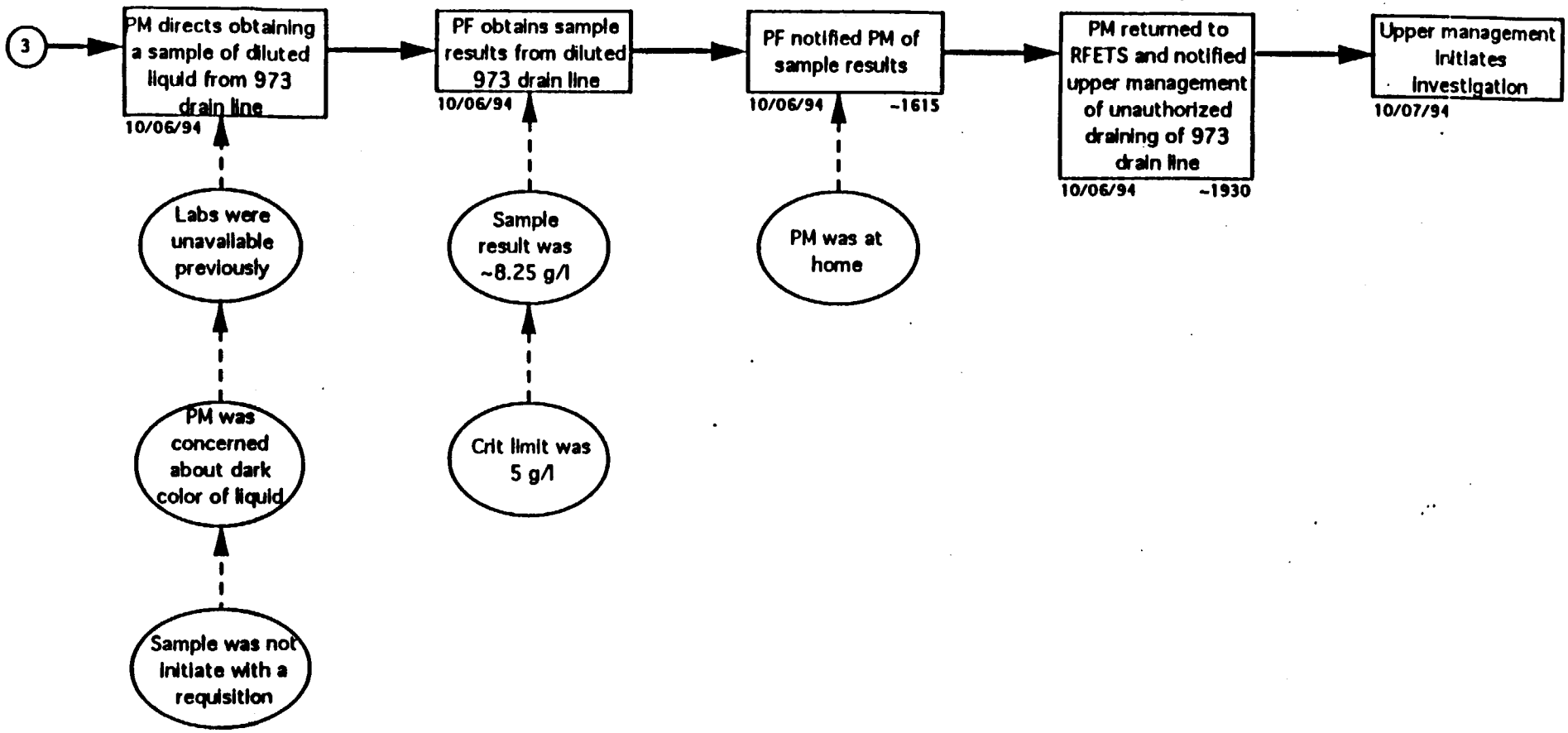


* Additional liquid assumed to be from 973 Tk drain line

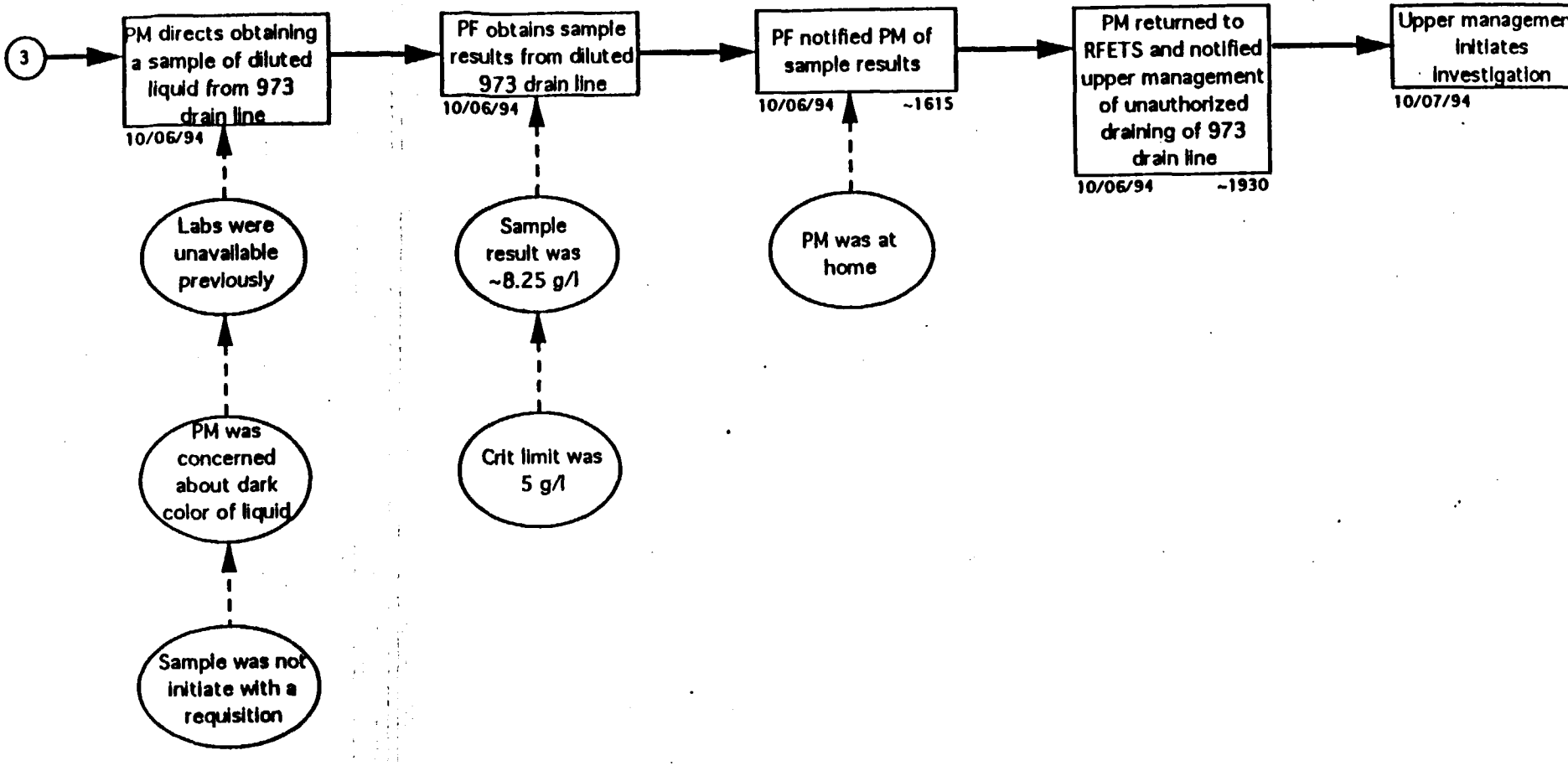
EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT OF 09/29/94



EVENT & CAUSAL FACTOR CHART
BUILDING 771 TANK DRAINING EVENT 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-08669, 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, Independent 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-287-94, 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, Standards, & Procedures Were Violated by Workers?, dated 11/10/94
62. Inside Energy, Grumbly 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-181-94, 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 Procedural Infraction's 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.

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.

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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. 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 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. Voorheis
Director, SNM Management and Storage

Submitted

V. M. Pizzuto
Director, Building Deactivation

BUILDING DEACTIVATION PROGRAM DIVISION
ORGANIZATION CHART

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 & 77
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 (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)			
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

RESTART PLAN FOR THERMAL STABILIZATION IN BUILDING 707

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. 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. 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

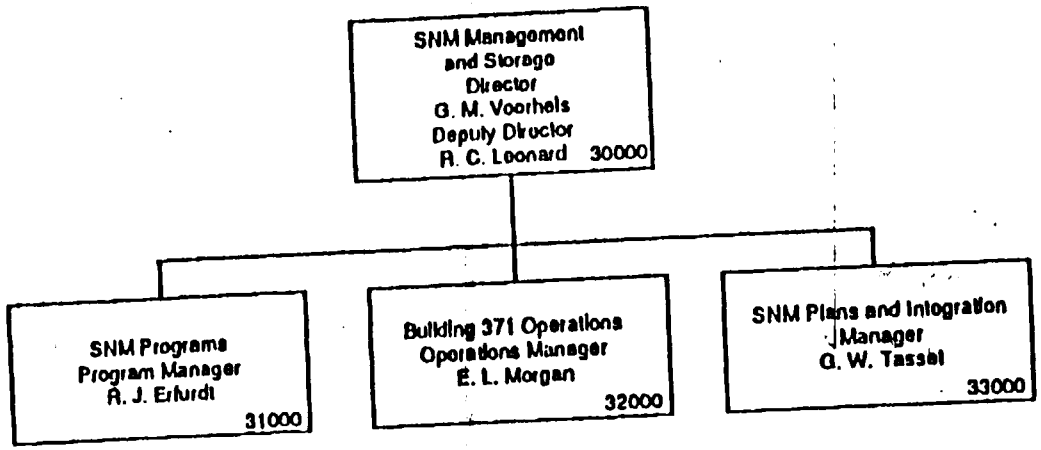
Submitted

G. M. Voorheis
Director, SNM Management and Storage

Submitted

V. M. Pizzuto
Director, Building Deactivation

SNM MANAGEMENT AND STORAGE



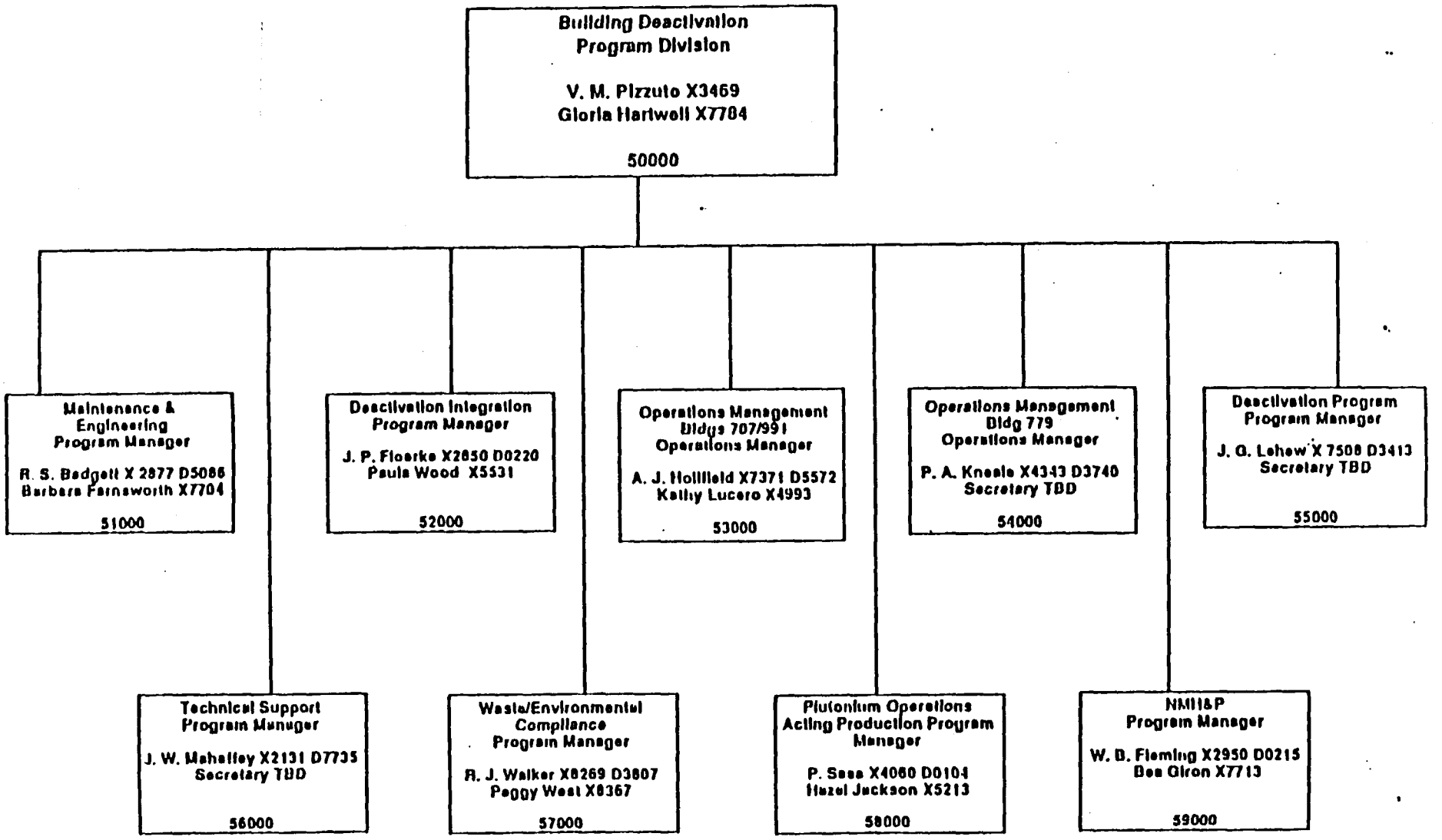
SNM Management and Storage
CHART 30000
September 26, 1994

Company Private

EG&G ROCKY FLATS, INC.
Organization
DE-AC04-90RF62349

BUILDING DEACTIVATION PROGRAM DIVISION ORGANIZATION CHART

50000



Revised 6-22-94

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)			

APPENDIX F

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. Pizzuto 11/12/94

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

I. 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 CSOLs 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 for 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 funded 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 perform 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 activity.

   Qualification Standard Packages (QSPs) are required for Solid Waste Processing personnel in the areas of Waste Isolation Pilot Plant (WIPP) sampling operations, supercompactor and repackaging facility operations.

   Waste Assay and Storage personnel have eight active QSPs associated with the operation. Those QSP's are relevant to the operations of the assay equipment in all buildings, as well as the actual gamma scanning equipment used by Waste Assay and Storage personnel.

   First line supervision is required to be qualified to each QSP as well as operating personnel.

ENCLOSURE 7

PLAN OF ACTION

OPERATIONAL READINESS REVIEW

DRAINING OF TANKS T-83, T-84, AND T-85

BUILDING 771

PLAN OF ACTION

OPERATIONAL READINESS REVIEW
DRAINING OF TANKS T-83, T-84 AND T-85

BUILDING 771

Submitted by EG&G, Waste Stabilization Programs

REVISION 2

March 27, 1995

APPROVED: _____

R. E. Fray
Director, Waste Stabilization

TABLE OF CONTENTS

Plan of Action Review Team Consensus

The individuals listed below are members of the Building 771 Tank Draining Plan of Action Review Team responsible for the review of this document. Signature indicates concurrence with the contents therein.

C. E. Beutler
Organizational Effectiveness

G. E. Francis
Waste Stabilization

R. D. Plappert 3/9/95
Performance Assurance

R. A. Amey 3-9-95
Training and Qualification

K. A. Serafin
Organizational Effectiveness

D. B. Branch
Senior Mentor

T. E. Wright 3-9-95
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Process Evaluation Engineering

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Liquid Stabilization Programs

Note: Changes made subsequent to Review Team approval were reviewed and agreed to by Review Team Members.

I. INTRODUCTION and PROCESS RESTART STRATEGY

Tank draining activities in Building 771 are being restarted after an unplanned shutdown resulting from operations being performed outside the approved safety basis. Accomplishment of the prerequisites defined in this Plan of Action will ensure worker, public and environmental safety during tank draining activities. Submission of this Plan of Action satisfies the requirements of DOE Order 5480.31 Startup and Restart of Nuclear Facilities. The scope of this Plan of Action is the draining of tanks T-83, T-84 and T-85 to four liter bottles in Building 771.

The draining of the tanks to four liter bottles is the first step in achieving the goal of eliminating the liquids in the tanks in Building 771. The elimination of liquids in tanks in Building 771 is one of the Site's priority risk reduction activities due to safety concerns associated with continued storage of plutonium nitrate solutions in process tanks not designed for long term storage. Safety concerns were first raised in 1991 by EG&G and Los Alamos personnel [1]. Concerns were restated in 1993 after further evaluation by Los Alamos personnel [2]. More recently, these concerns have been recognized by the Defense Nuclear Facilities Safety Board [3] and the Department of Energy Plutonium Working Group [4]. All of these references concurred with the conclusion of the 1993 Los Alamos report, that "continued storage of the plutonium solution degrades safety and is not advisable." The primary concern is the continuing degradation of tanks resulting in an increasing rate of hazardous and radiologically contaminated leaks.

The primary focus of the restart strategy is to significantly improve the performance of the core team of employees conducting the tank draining evolution (hereafter referred to as the core team). This improvement will be achieved through the following approach:

- Providing clear definition of the performance expectations of the core team
- Providing focused training of the core team
- Providing opportunity for the core team to practice the evolution and demonstrate understanding of the performance expectations through dry runs

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1 Letter report: "Los Alamos Technology Office (LATO) Safety Assessment of Plutonium in Storage Tanks and Related Issues at the Rocky Flats Plant", February 15, 1991

2 Technical report: LA-UR-93-3282, Plutonium and Uranium Solutions Safety Study, October 14, 1993, Los Alamos Technical Office at Rocky Flats

3 Recommendation 94-1 to the Secretary of Energy, Defense Nuclear Facilities Safety Board, May 26, 1994

4 The Plutonium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Plutonium Storage, Department of Energy, February 1995.

- Providing increased management oversight to evaluate if the desired performance expectations were met

In support of the strategy to significantly improve the performance of the core team, the following changes to the mode of operation will be implemented into draining of tanks T-83, T-84, and T-85 and demonstrated as part of the Operational Readiness Review:

- AUTHORIZATION BASIS

  A Justification for Continued Operations (JCO) will be developed to provide the authorization basis for draining tanks T-83, T-84 and T-85. This will identify the necessary and sufficient OSR sections required to protect the public and collocated worker. This will be utilized to determine if the equipment conditions are adequate to support safe draining of tanks T-83, T-84 and T-85. (implemented through prerequisites 4.1 and 5.1)

- INCREASED MANAGEMENT SUPERVISION AND OVERSIGHT

  Continuous oversight of tank draining activities will be required whenever tank draining to bottle activities are in progress in Building 771. This requirement will be specified in the tank draining procedure. This continuous, on scene, oversight function will be performed by Building 771 Management (e.g., Shift Technical Advisor or Building Mentor). This level of oversight was applied to previous tank draining evolutions, but was not clearly defined or implemented rigorously. (implemented through prerequisites 1.3 and 11.3)

  In addition, senior management oversight requirements (two senior managers and a senior mentor) will be defined in an Operations Order, to provide increased management supervision and oversight. This level of oversight will be focused on ensuring adherence to procedures and appropriate response to conditions encountered. The senior management oversight is a new requirement, imposed specifically for draining of tanks T-83, T-84 and T-85. (implemented through prerequisite 11.4)

- ENHANCED PHYSICAL BARRIERS

  Enhanced physical barriers for criticality safety will be in place for this evolution. For example, the valves identified through physical walkdown and criticality analysis as necessary for criticality safety will be required to be controlled in accordance with the current Lockout/Tagout procedure. The tank draining procedure or Nuclear Material Safety Limit will specify the valves to be controlled. This is a change to the administrative valve controls that were used during previous tank draining evolutions. Other physical controls will be defined in the Nuclear Materials Safety Limit (implemented through prerequisites 4.2 and 12.1).

- ENHANCED PROCEDURES

  Draining of tanks T-83, T-84 and T-85 will be performed through the use of procedures in accordance with Plant Procedures Group (PPG) 1, 3 and 4 rather than Task Information Packages (TIPs). (implemented through prerequisite 1.1)

  Procedural steps credited in the criticality evaluation will be clearly identified in the procedures using a "circle CS" notation. This practice highlights for the procedure users, the criticality controls built into a procedure. This is a new requirement that will be integrated into the site procedures program. (implemented through prerequisites 1.2)

- ENHANCED PROCESS DEFINITION

  A one line schematic that defines the boundaries of the tank draining evolution will be developed and verified. This schematic will be included in the procedure and will be used as a training tool. (implemented through prerequisites 1.5, 3.3 and 11.5)

- ENHANCED TRAINING REQUIREMENTS

  The core team will be trained and qualified in accordance with the Training Users Manual. In addition, an expectation has been established that all core team members will be able to independently draw and demonstrate an understanding of the one line schematic of the tank draining process. This requirement was not imposed on earlier tank draining evolutions. (implemented through prerequisite 3.3)

- ENHANCED ASSESSMENT OF PERSONNEL READINESS

  The Director, Waste Stabilization will conduct interviews with the core team, the Production Manager and the Operations Manager. The purpose of the interviews will be to demonstrate to the Director, Waste Stabilization that the personnel interviewed understand their roles, responsibilities, and expected interfaces. They will also demonstrate that Conduct of Operations concepts are understood and that the expected safety culture is understood. (implemented through prerequisites 11.2)

Tank draining to bottles in Building 771 was shut down on October 7, 1994, by EG&G Management after it was revealed that an unauthorized draining of a process line in Building 771 occurred on September 29, 1994. The incident occurred in conjunction with the authorized draining of tank D-467 to four-liter bottles in Glovebox 42. The unauthorized activity was not reported until the night of October 6, 1994. This type of shutdown is categorized in DOE Order 5480.31 as an unplanned shutdown due to activities outside the approved safety basis.

The investigation of the incident resulting in the shutdown revealed that the fundamental or "Summary" cause of the incident was a failure of personnel to fully accept and implement the concepts of DOE Order 5480.19, "Conduct of Operations." Additional root causes were:

- 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

- Barriers and controls which would have deterred an unauthorized solution transfer were less than adequate

Contributing causes identified were:

- 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 in Building 771, to ensure that individuals meet current training and qualification requirements prior to assignment to work activities was less than adequate.

This Plan of Action has been written to ensure that corrective actions for the root and contributing causes appropriately related to draining of tanks T-83, T-84 and T-85, have been completed as a prerequisite to restart of draining tanks T-83, T-84 and T-85. Appendix A presents a summary of the corrective actions and a cross reference to applicable Core Requirements and Prerequisites in this Plan of Action.

II. FACILITY DEFINITION AND BACKGROUND

Responsible Contractor: The responsibility for this Operational Readiness Review belongs to the Management and Operations Contractor, EG&G Rocky Flats, Inc.

Building 771 is a nuclear material processing building constructed in 1951. Plutonium processing began in May 1953 with Building 771 original mission of processing fissile (actinide) materials and solutions to recover Special Nuclear Materials above their economic discard limits.

When plutonium operations were curtailed at Rocky Flats in December 1989, approximately 9,000 liters of plutonium and uranium solutions were not processed. These materials were left in place in Building 771 to await resumption of plutonium recovery operations. In 1993, Building 771 was declared as a surplus facility scheduled for decontamination and decommissioning. Safety and environmental concerns related to the prolonged storage of solutions in old, non-Resource Conservation and Recovery Act permitted tank systems have been documented by EG&G and Los Alamos National Laboratory personnel and in Defense Nuclear Facilities Safety Board Recommendation 94-1. Removal of these solutions to eliminate these concerns is a high priority. Four tanks (450 liters) were drained to bottles prior to the shut down of tank draining operations. Tank draining into bottles is required in order to remove 1800 liters of the actinide solutions that remain stored in 15 tanks. Other methods will be utilized to drain the remaining 6750 liters from tanks and pipes.

The initial draining of tanks to bottles in Building 771 was authorized after the completion of an internal EG&G Readiness Evaluation conducted in accordance with ADM 10.01 and addressing the Core Requirements of DOE Order 5480.31. On 31 May, 1994, DOE/RFFO granted approval to drain Tank 454 to bottles in Glovebox 42 (DOE/RFFO Memorandum LRT:GWS:05954 dated May 31, 1994). The approval stated that EG&G was considered the approval authority for future tank draining activities, notifying RFFO in writing prior to performing future tank draining. EG&G successfully drained tanks 454, 467, 1001 and 1002 before tank draining activities were shut down as a result of operations outside the approved safety basis.

III. PROCESS DESCRIPTION

Tanks T-83, T-84 and T-85 are located in Room 180K in Building 771. The following table provides the specific data for the three tanks included in the scope of this Operational Readiness Review:

Tank #	Volume	Total grams Actinide[5]
T-83	29 L	18 gm Pu
T-84	49 L	28 gm Pu
T-85	56 L	42 gm Pu

The objective of draining tanks T-83, T-84 and T-85 to bottles is to remove the solutions for characterization and processing to a more stable form for storage or waste disposal. The solutions will be removed from the tanks into bottles in the adjacent glovebox K20, utilizing vacuum transfer. Before the transfer is made, piping systems used for the transfer will be integrity tested. The tank will then be sparged for 30 minutes to ensure adequate mixing. Three bottles will then be filled and sampled from each tank, to confirm actinide concentration. Once laboratory analysis confirms the actinide concentration is within the expected range, the remaining solution in the tank will be removed and placed into four-liter bottles. Vacuum will be drawn on the tank for at least an additional 30 minutes to ensure that as much of the solution has been removed as is possible.

Draining one tank is expected to take two day shifts. The first shift will sparge the tank, draw the three bottles for sampling and return the vacuum system to the locked out configuration. The samples will be analyzed by the Analytical Laboratories to confirm the actinide concentration. The second day shift will complete the draining of the tank. All tank draining activities will be conducted during day shift, Monday through Friday. Draining of tanks T-83, T-84 and T-85 is expected to be completed within 30 days from authorization to proceed.

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5 Per sample data taken before 1990

IV. HAZARD CATEGORY

Integrated Safety Assessments (ISAs) of the proposed tank draining activities were completed in July, 1994. Draining of tanks T-83, T-84 and T-85 were determined to be Hazard Category of 3[6], assuming plutonium content to be as indicated in the table in Section III. The basis for the Hazard Category determination is included in the Integrated Safety Assessment for Transition Activity 8 (TA-08).

Building 771 is categorized as a Hazard Category 2 building. The potential exists for the tanks to contain plutonium concentrations higher than previous sample data indicates. Hence tank draining, per this Plan of Action, is considered a Hazard Category 2 process, in line with the Hazard Category of Building 771.

V. REPAIRS AND MODIFICATIONS

No significant repairs or facility modifications that affect tank draining have been made since the shutdown of tank draining to bottle activity in Building 771.

VI. OPERATIONAL READINESS REVIEW SCOPE

This Operational Readiness Review is intended to verify that the completion of the prerequisites described herein provide an adequate basis to authorize the restart the draining tanks T-83, T-84 and T-85 to bottles in Building 771 under increased management supervision and oversight.

The scope of the Operational Readiness Review is defined by the Core Requirements presented in Attachment 2 of DOE Order 5480.31. The Contractor Operational Readiness Review will address all Core Requirements except 16, 17 and 20. These three Core Requirements are the oversight issues belonging to the DOE/Rocky Flats Field Office. The remaining 17 Core Requirements will be applied using a graded approach, as reflected in the prerequisites.

VII. OPERATIONAL READINESS REVIEW PREREQUISITES

The depth of the Operational Readiness Review is reflected in the prerequisites identified. A graded approach as defined in DOE Order 5480.31, was used to define these prerequisites.

The Operational Readiness Review will be accomplished with particular emphasis on the following:

- Adequacy of the safety basis for the evolution

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6 Hazard Category determined per DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, U. S. Department of Energy, December 1992

- Adequacy of the procedures and Nuclear Materials Safety Limits used to drain the tanks
- Adequacy of the training and knowledge of the core team
- Adequacy of supervision and oversight during the tank draining evolution

The following presentation of prerequisites is organized around the Core Requirements from DOE Order 5480.31.

CORE REQUIREMENT 1
There are adequate and correct procedures and safety limits for operating the process systems and utility systems.

Methods for verifying utility systems meet the requirements defined in the Justification for Continued Operations will be addressed under Core Requirement 5.

Prerequisites:

1.1 The following procedures/IWCP standard work package for transferring liquids from tanks T-83, T-84, and T-85 to four-liter bottles are available and approved in accordance with current site level procedures:

- 4-Q62-TD-006, Draining Tanks T-83, T-84, and T-85, Building 771
- 4-C35-CO-1035, H-4 Nash Vacuum Pump System, Line 5A
- 4-D02-CO-1131, Solution Bottle Handling Building 771
- 4-61000-CO-1036, Glovebox Maintenance Building 771
- SWP-771-94007-00, Troubleshoot and Identify Deficiencies (standard IWCP work package)

1.2 Procedural steps credited by the criticality safety evaluation are identified as such, in a manner consistent with currently approved methods.

1.3 Procedures require oversight of tank draining activities.

1.4 Appropriate Resource Conservation and Recovery Act compliance directions are identified in the procedures.

1.5 Procedures 4-Q62-TD-006 and 4-C35-CO-1035 contain a one line schematic drawing that defines the process and the boundaries.

CORE REQUIREMENT 2

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented (the training and qualification program encompasses the range of duties and activities required to be performed).

The operations and operations support personnel classifications considered essential for safe draining of tanks T-83, T-84 and T-85 to bottles (i.e., the core team as specified in Core Requirement 13) and assurance of adequate response to credible abnormal events are the following:

- Process Specialist, and Process Specialist Technical Supervisor (foremen)
- Shift Technical Advisor
- Shift Manager
- Building Criticality Engineer

Prerequisites:

2.1 Process Specialist and Technical Supervisor training and qualification to perform tank draining is developed from a Job Task Analysis in compliance with the Training User's Manual.

2.2 Shift Technical Advisor and Shift Manager training and qualification is implemented as described in the Qualification Standard Package in accordance with the Training User's Manual.

2.3 The qualification of the Criticality Engineer assigned to support the draining of tanks T-83, T-84 and T-85 has been implemented in accordance with the Training User's Manual.

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:

3.1 The Criticality Engineer and Shift Technical Advisor designated on the core team have a detailed understanding of the Criticality Safety Evaluation on which the Nuclear Materials Safety Limits for the draining of tanks T-83, T-84 and T-85 is based.

3.2 Personnel identified on the core team have completed the training defined in Core Requirement 2 and are current on training required for unescorted access into the Material Access Area.

3.3 Personnel on the core team are knowledgeable of the information in the procedures provided for the draining of tanks T-83, T-84 and T-85. This knowledge will be demonstrated by the ability to draw a one line diagram from memory and to describe the process and equipment utilized for draining tanks T-83, T-84 and T-85.

3.4 Building 771 management has conducted a briefing regarding criticality safety as it relates to the incident of an unauthorized draining of a process line in Building 771. The core team attended this briefing.

3.5 Dry runs of procedures related to draining tanks T-83, T-84 and T-85 have been conducted with the designated core team. Dry runs included a demonstration of responses to abnormal conditions and upsets. Finally, personnel demonstrated a knowledge of and commitment to Conduct of Operations during the dry runs.

3.6 Personnel on the core team understand the assumptions of the criticality safety evaluation, barriers credited by the Nuclear Materials Safety Limit, and credible upset conditions with criticality safety implications during the draining of tanks T-83, T-84 and T-85.

CORE REQUIREMENT 4

Facility safety documentation is in place that describes the "Safety Envelope" of the facility. The Safety documentation should characterize the hazards/risks associated with the facility and should identify mitigating measures (systems, procedures, administrative controls, etc.) that protect the worker and the public from those hazards/risks. Safety systems and systems essential to worker and public safety are defined and a system to maintain control over the design and modification of facilities and safety-related utility systems is established.

Prerequisites:

4.1 An approved Justification for Continued Operations defining the authorization basis for the draining of tanks T-83, T-84 and T-85 is available with supporting documentation.

4.2 Approved Criticality Evaluations for the draining of tanks T-83, T-84 and T-85 are available and applicable Nuclear Material Safety Limits are posted. NMSLs are double contingent with appropriate emphasis on physical controls where applicable.

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 operation or that satisfy Technical Safety Requirements. All systems are currently operable and in a satisfactory condition.

The focus for this Core Requirement will be based on the requirements defined by the Justification for Continued Operations.

Prerequisites:

5.1 The Shift Manager has an effective process for confirming building status with the requirements of the Justification for Continued Operations identified as part of Core Requirement 4.

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.

The Site Commitment Management Program (SCMP) and associated database (Plant Action Tracking System, PATS) provide the Site level process to identify, evaluate and resolve deficiencies identified by oversight groups, review teams and audit groups. This system is implemented in Building 771. Execution of the draining of tanks T-83, T-84 and T-85 does not rely solely on this system to identify deficiencies. Instead, it relies on performance of pre-operational requirements defined in Core Requirements 1, 3, 5 and 8 to identify the existing status of equipment, procedures and personnel just prior to task execution.

6.1 Issues related to the draining of tanks have been dispositioned through the Site Commitment Management Program.

6.2 Deficiencies identified in Occurrence Reports and Criticality Safety Infractions, but not yet identified in the Site Commitment Management Program, have been reviewed for applicability to the draining of tanks T-83, T-84 and T-85 and have been dispositioned appropriately.

CORE REQUIREMENT 7

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

The Order Compliance review system is implemented at the site level. The Standards Organization within Performance Assurance is responsible for coordinating the line management review of DOE Orders, assigning responsibility, determining compliance with Order requirements, preparing Compliance Schedule Approvals and Short Term Compliance Schedules, and advising the DOE of non-compliances and planned compensatory actions. The following list of Orders have specific application to the draining of Building 771 tanks to four-liter bottles and have been reviewed for compliance status. Documentation is on file to show compliance, or compliance documents have been submitted. No prerequisites for this Core Requirement are identified.

4330.4B	Maintenance Management Program
5000.3B	Occurrence Reporting and Processing of Operations Information
5400.1	General Environmental Protection Program
5400.2A	Environmental Compliance Issue Coordination
5400.3	Hazardous and Radioactive Mixed Waste Program
5400.5	Radiation Protection of the Public and the Environment
5440.1E	National Environmental Policy Act Compliance Program
5480.4	Environmental Protection, Safety and Health Protection Standards
5480.5	Safety of Nuclear Facilities

5480.7A	Fire Protection
5480.8A	Contractor Occupational Medical Program
5480.11	Radiation Protection for Occupational Workers
5480.19	Conduct of Operations
5480.1B	Environment, Safety, and Health Program for DOE Operations
5480.20	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities
5480.21	Unreviewed Safety Questions
5480.22	Technical Safety Requirements
5480.23	Nuclear Safety Requirements
5480.24	Nuclear Criticality Safety
5480.31	Startup and Restart of Nuclear Facilities
5481.1B	Safety Analysis and Review
5482.1B	Environment, Safety and Health Appraisal Program
5483.1A	Occupational Safety & Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities
5500.3A	Planning and Preparedness for Operational Emergencies
5700.6C	Quality Assurance
5820.2A	Radioactive Waste Management

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 (e.g., training, maintenance, waste management and environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, criticality safety, and engineering) are adequate for operations;

The Management Programs exist at the Site level and have been validated through previous Operational Readiness Reviews. These Site functions are expected to perform as previously demonstrated. The support functions needed to respond to criticality events and hazardous spills will be tested as part of the drill program (Core Requirement 9).

Due to the specific nature of the tank draining evolution, this Plan of Action will focus on the Criticality Safety Program as implemented to support the draining of tanks T-83, T-84 and T-85, a verification of appropriate Radiation Protection reviews of the procedures and availability of approved Resource Conservation and Recovery Act storage space for bottles resulting from the draining of tanks T-83, T-84 and T-85.

The criticality engineer is identified on the core team (Core Requirement 13). A criticality engineer will be stationed in Building 771 during the draining of tanks T-83, T-84 and T-85. Verification of adequate training and qualifications for the criticality engineer will be accomplished (Core Requirements 2 and 3). Current Nuclear Materials Safety Limits are required (Core Requirement 4).

Verification that core team members are current on required training for Criticality Safety and Radiation Protection is required (Core Requirement 3).

Prerequisites:

8.1 Procedure NSM 3.12 has been used to verify proper Nuclear Material Safety Limits for the draining of tanks T-83, T-84 and T-85 have been posted.

8.2 Procedures for draining tanks T-83, T-84 and T-85 to bottles have been through the ALARA Review process where required.

8.3 Storage space approved for Resource Conservation and Recovery Act regulated bottles is available.

CORE REQUIREMENT 9

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

The drills program review for activities associated with draining T-83, T-84 and T-85 tanks to bottles will be on focused on drills associated with criticality accidents and spills that could result from the draining of the tanks. These are the identified, credible, postulated accidents.

Prerequisites:

9.1 Building 771 Operations has satisfactorily completed criticality and spill drills.

CORE REQUIREMENT 10

An adequate startup or restart test 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 operators.

A dry run of the evolution (Core Requirement 3) will provide assurance of readiness of the personnel and procedures. Pipe integrity tests are included in the procedures as appropriate to provide a confidence in the piping just prior to the planned draining.

Prerequisites:

10.1 Pipe integrity tests are included in the procedure for the draining of tanks T-83, T-84 and T-85.

CORE REQUIREMENT 11

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

This requirement will be met through senior management interviews of personnel, and observations of the dry runs (Core Requirement 3). In addition, verification that personnel understand responsibilities during off-normal conditions through the drill program will be accomplished (Core Requirement 9).

Prerequisites:

11.1 Core team members for the draining of tanks T-83, T-84 and T-85 have been briefed on the organization structure and informed of the reporting expectations that might occur during the process.

11.2 The Director, Waste Stabilization has interviewed the core team, the Production Manager and the Operations Manager. The Director, Waste Stabilization has a high level of confidence that the personnel interviewed understand their roles, responsibilities, and expected interfaces. He also has confidence that Conduct of Operations concepts (Core Requirement 12) and the expected safety culture (Core Requirement14) are understood.

11.3 The Director, Waste Stabilization, has established requirements for the minimum level of supervision of tank draining operations. Implementation of these requirements are observed during the draining of tanks T-83, T-84 and T-85 and are incorporated into the procedure.

11.4 An Operations Order has been established to define the requirements, roles, responsibilities and required knowledge and experience of the senior management oversight team.

11.5 The senior management oversight team, the Operations Manager, and the Production Manager can demonstrate sufficient understanding of the tank draining evolution, including drawing a one line schematic of the evolution.

CORE REQUIREMENT 12

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

Improvements in performance of the core team as it impacts the draining of tanks T-83, T-84 and T-85 will be a major focus of this Plan of Action. These increased performance expectations embrace the Conduct of Operations concepts. These improvements will be achieved through the following approach, implemented under other Core Requirements:

- Providing clear definition of the performance expectations of the core team. (Core Requirement 3)

- Providing focused training of the core team. (Core Requirements 2 and 3)

- Providing opportunity for the core team to practice the evolution and demonstrate understanding of the performance expectations through dry runs. (Core Requirement 3)

- Providing increased management oversight to evaluate if the desired performance expectations were met. (Core Requirement 11)

The following specific elements of the Conduct of Operations Manual as they relate to the draining of tanks T-83, T-84 and T-85, are required before restarting the draining of tanks T-83, T-84 and T-85 to bottles. Those identified under a different Core Requirement will not be addressed under this Core Requirement.

Procedures (Core Requirement 1)
Qualification Program (Core Requirement 2)
Drills (Core Requirement 9)
Lockout/Tagout
Status Board
Component Labeling
Logs
Operator Aids
Pre-evolution Briefs
Plan of the Day
Shift/Standing/Operations Orders

Prerequisites:

12.1 Lockout/Tagout: The valves necessary for criticality control are being controlled in accordance with the current Lockout/Tagout procedure.

12.2 Status Board: It has been demonstrated during dry runs that the status board will be utilized appropriately to indicate status of tank draining activities and the equipment needed to comply with the Justification for Continued Operations for the draining of tanks T-83, T-84 and T-85.

12.3 Component Labeling: Tank draining hardware defined in the procedures identified under Core Requirement 1, is labeled in accordance with site standards.

12.4 Logs: It has been demonstrated during dry runs that logs associated with the draining of tanks T-83, T-84 and T-85 are defined and implemented consistent with the governing procedures.

12.5 Operator Aids: The use of Operator Aids for the draining of tanks T-83, T-84 and T-85 are consistent with the COOP procedure.

12.6 Pre-evolution Briefs: It has been demonstrated during dry runs that pre-evolution

briefs are conducted for the draining of tanks T-83, T-84 and T-85 and are consistent with the governing procedures.

12.7 Plan-of-the-Day: It has been demonstrated during dry runs that Building 771 Operations uses the established Plan-of-the-Day procedures. Tank draining activities will be identified and approved on the Plan-of-the-Day by the Operations Manager or his designee.

12.8 Shift/Standing/Operations Orders: Shift/Standing/Operations Orders are on file and controlled for activities that support the draining of T-83, T-84 and T-85 tanks to bottles.

12.9 A survey of Building 771 personnel has been completed to determine the extent and nature of differences of opinion, practices, attitudes and behavior regarding Conduct of Operations. The survey has been evaluated, and actions relating to human factors that have the potential to impact the draining of tanks T-83, T-84 and T-85 have been implemented in Building 771.

12.10 A process is established to define the steps involved in getting approval for, and manipulation of valves associated with tank systems that potentially contain fissile liquids.

CORE REQUIREMENT 13

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

Prerequisites:

13.1 Numbers of personnel that need to be assigned to the core team have been established for the personnel categories identified under Core Requirement 2.

13.2 Qualified personnel for the core team have been identified by position and name.

CORE REQUIREMENT 14

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

The lack of a "Safety First Culture" within Building 771 Production Operations contributed to the incident resulting in the shutdown of tank draining to bottle activities. The Director, Waste Stabilization will conduct oral interviews with all personnel on the core team and the Operations Manager to verify and assure upper management that the expected culture is understood and accepted (Core Requirement 11). The practice of this expected culture will be demonstrated through dry runs of the draining of tanks T-83, T-84 and T-85 and drills (Core Requirements 3 and 9). Increased senior management oversight will be present during the

execution of the draining of tanks T-83, T-84 and T-85 to reinforce the expected performance. (Core Requirements 11.3 and 11.4) No further prerequisites have been identified for this Core Requirement.

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.

The safety basis for draining tanks T-83, T-84, and T-85 to bottles will be fully described in the Justification for Continued Operations (JCO) and supporting safety analyses (Core Requirement 4). The facility condition required by the JCO will be verified as a pre-operational activity (Core Requirement 5). No further prerequisites have been identified for this Core Requirement.

CORE REQUIREMENT 18

Modifications to the facility have been reviewed for potential impacts on procedures and training and qualification. Procedures have been revised to reflect these modifications and training has been performed to these revised procedures.

The procedures developed for the draining of tanks T-83, T-84 and T-85 to bottles will be verified to be consistent with the existing process equipment configuration as part of the procedure development process (Core Requirement 1). It will be verified again during the dry runs of the evolution (Core Requirement 3). Training will be developed based on these verified procedures. No modifications to process equipment will be allowed prior to execution of the tank draining evolution. No further prerequisites are defined for this Core Requirement.

CORE REQUIREMENT 19

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

The personnel positions responsible for facility operations are the positions identified in the core team and their line management, up to and including the Operations Manager as depicted on the organizational chart. The core team undergo a formal qualification process (Core Requirements 2 and 3) which will be further demonstrated through dry runs of the draining of tanks T-83, T-84 and T-85 and drills (Core Requirements 3, 9 and 11).

The Director Waste Stabilization is responsible for conducting oral interviews with the Production Manager and Operations Manager to verify and assure upper management that they are qualified to perform their assigned functions.

Prerequisites:

19.1 The Production Manager and Operations Manager have been qualified through an interview process.

VIII. OPERATIONAL READINESS REVIEW PLAN AND AUTHORITIES

Contractor Operational Readiness Review

The contractor Operational Readiness Review is expected to start in early April and last 3 days. The proposed Operational Readiness Review team leader is William S. Glover, Director Performance Assurance.

The Director, Waste Stabilization is responsible for determining when readiness has been achieved to initiate the EG&G Operational Readiness Review.

The President, EG&G Rocky Flats Inc. is responsible for determining when readiness has been achieved to request the DOE Operational Readiness Review or approval to restart. This determination will be documented in a Readiness to Proceed Memorandum to the DOE/Rocky Flats Field Office.

Startup Authority

The Department of Energy, Rocky Flats Field Office Manager is responsible for issuing the final approval to restart the operations defined in the scope of this document.

Appendix A

Summary of Causes, Implications and Corrective Actions Resulting from the Unauthorized Draining of a Process Line in Building 771

Core Requirement/Prerequisite Cross Reference Matrix

Root Cause Analysis Causes & Implications	Corrective Action	Priority	Core Rqmt Number	Prereq Number
Summary Root Cause: Conduct of Operations (COOP) was less than adequate.	S.1 Team Building with workers, experts, & managers.	Short Term	2 3	1 5
	S.2 Increase senior manager presence during operations.	Immediate	11	4
	S.3 Survey opinions, practices, attitudes & behavior regarding COOP & implement recommendations.	Short Term	12	9
Root Cause A: Performance of task was less than adequate	A.1 Enhance training on nuclear criticality safety.	Immediate & Short Term	3	4
	A.2 Increase effectiveness of COOP implementation and procedures.	Long Term	12 1	All 1
Root Cause B: Supervision of work was less than adequate.	B.1 Develop & implement guidance for minimum levels of supervision.	Short Term	11	3
	B.2 Increase independent safety oversight of high risk operations to monitor effectiveness of supervision.	Immediate	11	4
	B.3 Improve senior managers training of lower level managers.	Long Term	19	1

Root Cause B: (continued)	B.4 Consider knowledge of & commitment to COOP as part of the qualification process.	Immediate	11	2
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	11	2
	C.2 Emphasize use of physical barriers, supervision and independent oversight for high risk/priority activities.	Immediate	11	3 & 4
	C.3 Re-evaluate adequacy of compensatory measures for USQDs.	Immediate	4	1
	C.4 Assure RCRA compliance integrated into work controls.	Immediate	1	4
Contributing Cause D: Ineffective corrective action for previously identified weaknesses.	D.1 Complete actions already underway to modify corrective action program & train people in revised program.	Short Term	6	1
	D.2 Develop performance indicators for managers to evaluate their performance in driving high priority issues to closure.	Short Term	6	1
Contributing Cause E: Participants had expired qualifications.	E. Assure trained and qualified personnel assigned to operations.	Immediate	3	All
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	11	2

Potential Problem F: (continued)	F.2 Assure understanding of accountability for adherence to requirements, including no fault reporting of safety information.	Short Term	11	2
Potential Problem G: Removal of Lockout/Tagout (LO/TO) was not in compliance with the compensatory measures for USQD.	G.1 Evaluate & improve, as required, compensatory measures for USQD-RFP-93.1503-GLS.	Immediate	4	1
	G.2 Discontinue current LO/TO practice for interrupted activities.	Immediate	12 1	1 1
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	3 9	5 1
	1.2 Institute situational ethics training.	Long Term	3	4
Generic Implication 2: Ineffective implementation of corrective action.	2.1 Redefine, strengthen & monitor safety oversight functions of SRB, NCSC & ESC.	Short Term	SRB role in tank draining reviews defined under Section 1	No specific prerequiste identified
	2.2 Institute monthly line management review of corrective action implementation.	Short Term	6	1
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	4
	3.2 Apply lessons learned from S.1, S.3, & 1.1 to other types of hazards.	Long Term	3	5

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	Activity based planning has been used for tank draining as reflected in the strategy for this Plan of Action descibed in Section 1	No specific prerequiste identified
	4.2 Improve processes for maintaining building status in compliance with approved authorization bases.	Short Term	5	1
	4.3 Implement protection against knowing and intentional violation of safety requirements until other improvements are implemented.	Immediate	11	4

ENCLOSURE 8

RESTART PLAN FOR THE

TRANSFER, RE-PACKAGING AND OFFSITE

SHIPMENT OF ENRICHED URANIUM

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RESTART PLAN FOR THE TRANSFER, RE-PACKAGING AND OFF SITE SHIPMENT OF ENRICHED URANIUM

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

Reviewed for Classification
by: T. H. Briggs
Date: 2-6-95 (J)

January 16, 1995
Revision A

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RESTART PLAN FOR UNCONTAMINATED ENRICHED URANIUM REPACKAGING

Introduction

This Restart Plan is to reaffirm the safety culture and readiness for continuation of the transfer, re-packaging and off site shipment of enriched uranium (eU) and 4.5% eU Oxide in excess of 200 grams.

This activity, suspended under Standing Order 34 since October 7, 1994, has been in successful operation in Building 707 and Building 777 since June 1994 and has safely re-packaged 34 approved and certified containers of enriched uranium for off-site shipment to Y-12 and LANL. The suspension of this activity was taken as a precautionary measure in response to the Building 771 incident.

The Criticality Experimental Parts and Enriched Uranium hemishells are re-packaged into certified DT-22 shipping containers in Building 707, room 184 and Building 777, room 462 "A" vault. The Criticality Experiment Parts will be transferred in approved on site 2030-1 shipping containers to Building 777 from Buildings 371, 771, 779, and 991 for re-packaging and off site shipment. Additionally, 4.5% enriched uranium oxide will transported from Building 991 to Building 777, room 462 "A" vault for re-packaging into UNC-2901 shipping containers.

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. Documentation of the completion of each deliverable will be presented after implementation of the plan.

This activity involves the movement of approved sealed containers from several buildings to a central location for re-packaging. Experienced and well-trained work crews, who are being further re-examined on their knowledge of COOP, have demonstrated high performance over the previous year, prior to the suspension of activities. Consequently, assessment of compliance with core requirements that apply to specific building functions is limited to only those buildings where re-packaging occurs.

This restart plan follows the restart plan for HSP 31.11 and Thermal Stabilization, and builds on the activities completed for those restart plans. Many of the personnel, procedures and systems required for HSP 31.11 and Thermal Stabilization are utilized in the SNM Shipping activities. These include the same material transfer procedures, NMH&P procedures and many of the same building support systems. The oral interviews, management seminars, and individual awareness interviews conducted for HSP 31.11 and Thermal Stabilization will be repeated for the SNM Shipping activities only when new personnel, procedures and systems are involved.

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

This plan addresses the Root Causes, Contributing Causes and Generic Implications of the Building 771 Unauthorized Draining of Process Lines as reported in the final Root Cause Analysis WSG-317-94, November 23, 1994, 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.

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.

The Root Cause Analysis requires that some corrective actions be implemented prior to initiating activities. The "immediate" Corrective Actions listed in attachment 3 of WSG-317-94, have been addressed in this plan. They are 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.

CORE REQUIREMENTS identified with an asterisk (**) specifically address corrective actions from the Root Cause of the Building 771 Unauthorized Draining of Process Lines.

1. Subject Area:

This Readiness Assessment is for the continuation of the transfer, re-packaging and off site shipment of enriched uranium (eU) and 4.5% eU oxide in excess of 200 grams. The Criticality Experimental Parts and Enriched Uranium hemishells are re-packaged into certified DT-22 shipping containers in Building 707, room 184 and Building 777, room 462 "A" vault. The Criticality Experiment Parts will be transferred in approved on site 2030-1 shipping containers to Building 777 from Buildings 371, 771, 779, and 991 for re-packaging and off site shipment. Additionally, 4.5% enriched uranium oxide will transported from Building 991 to Building 777, room 462 "A" vault for re-packaging into UNC-2901 shipping containers.

2. Purpose:

To confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise enriched uranium re-packaging activities demonstrate a commitment to formality of operations 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 suspension as a precautionary measure, pending management review. Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope:

This assessment will ensure that re-packaging activities of enriched uranium are accomplished safely, and organizational infrastructures are verified to be in place. This will be accomplished by confirming the following infrastructure supports requirements for re-packaging enriched uranium:

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility Safety
5. Activity Supporting Hardware Systems
6. Criticality Safety Deficiencies
7. CSAs/STCSs
8. Criticality Safety Training
9. Criticality Safety Drills
10. Functional Test Startup
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 371, 771, 779, and 991 have material stored in them that must be transferred to Building 707 or 777 for re-packaging. The assessments for these Buildings will include reviews of procedures, CSOLs/NMSLs, training and qualifications. No re-packaging activities will be performed in any areas other than those stated in the subject area.

5. Schedule

The execution of this revised restart plan is projected to be complete by February 10, 1995.

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, Startup and Restart of Nuclear Facilities. For each core requirement, the criteria, methodology, and deliverable is 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, available and that adequate safety controls are incorporated.
Actionee: W. B. Fleming
M. J. Landrus

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, including: NMH&P Process Support Specialist, NDA hands-on personnel who transfer material, and Process Specialists who leak check re-packaged materials (see Appendix B).**

Methodology: Records review per 1-10000-TUM, Training Users Manual.

Deliverable: Documented verification that adequate training and qualification has been completed for applicable personnel (with dates for next training due).
Actionee: D. M. Shaw
Actionee: S. E. Gawart

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 B).
Management seminars (see Appendix C).
Individual interviews (see Appendix B).
Feedback sessions (selected from Appendix B).

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: 1) Verify NSM 3.12 compliance; 2) verify NMSL/CSOLs are written/reviewed for each individual move during the SES/USQD process for CAT I & II materials; additionally, CAT III & IV moves will be reviewed by Criticality Safety on a case by case basis.**

Methodology: Review of pre-evolution briefing records, a review of SES/USQD process for each CAT I & II move, a review of applicable NMSL/CSOLs identified to support the movement of all materials.

Deliverable: Documented verification of NSM 3.12 inclusion in pre-evolution briefings. Documented verification that each evolution involving fissile material is reviewed by Criticality Safety and all CAT I & II moves has undergone the SES/USQD process.
Actionee: R. S. Brown
Actionee: Bob Wilson

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 systems 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. The focus of this requirement will be on systems specifically supporting SNM Shipping activities.

Criteria: Verify OSR compliance and surveillance requirements are met for Buildings 707, 777.

Methodology: Record reviews of applicable VSS/LCO surveillances.

Deliverable: Documented verification of LCO Surveillance Compliance.
Actionee: A. J. Holifield
W. A. Franz

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 through Plant Action Tracking System (PATS).

Methodology: Records Review.

Deliverable: Documented verification of Criticality Safety deficiencies have been dispositioned. Additionally, those deficiencies that apply to the systems identified in the Engineering Assessment 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: Verification through Compliance Management Records.

Methodology: Records Review.

Deliverable: Documented verification that non-conformances applicable to the project have been dispositioned.
Actionee: S. Williams

CORE REQUIREMENT 8:

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

Criteria: Verify that the POD and pre-evolution briefings ensure that facilities, equipment and personnel are adequate to authorize activity in Bldg. 707, 777.**

Methodology: Records review.

Deliverable: Documented verification that requirements established in the criteria have been met and are being maintained.
Actionee: D. M. Shaw

CORE REQUIREMENT 9:

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

Not Applicable
Refer to Introduction

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: The nature of the operation does not require a graded start up. However, crews were trained on packaging and leak testing certified shipping containers prior to commencement of each of the projects. Since then, in excess of 100 certified shipping containers have been packaged and leak tested for off site shipment.

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

Methodology: All-hands briefings (see Appendix B).
Management seminars (see Appendix C).
Individual interviews (see Appendix B).
Feedback sessions (selected from Appendix B).

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

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 COOP Manual are applied to support the activity. These attributes include:**
- Pre-evolution Briefing
- Plan of the Day (POD)
- LCO Compliance
- Use of Procedures
- Training/Qualification of Staff

Methodology: Document review.

Deliverable: Documented verification that the attributes of COOP described above are in place and satisfactorily implemented for the activity, including specifically that the safety basis documentation that supports the activity has been confirmed to be fully implemented.
Actionee: D. M. Shaw

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 site-wide 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 a safety basis is established for the operation in each building associated with the project.**

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
W. A. Franz

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 2 and 3.

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 Managers.

10. Restart Plan approval

Submitted

G. M. Voorheis
Director, SNM Management & Storage

Submitted

V. M. Pizzuto
Director, Building Deactivation Program Division

APPENDIX A
REQUIRED PROCEDURE LIST

Plant-wide:

1-63200-NMT-001,	Transfer of Nuclear Material Between Material Access Areas. (Categories I & II).
1-63200-NMT-002,	Transfer of Category III and IV Special Nuclear Material.
WSI 3-5540,	Transfer of Special Nuclear Material.
4-T67-Traffic-TSO-002,	Transfer of Category III and IV Special Nuclear Material.
9-94700-TSO-001,	Transfer of Category I and II SNM.
1-31000-COOP-011	Pre-Evolutionary Briefings.
4-B19-NSM-03.12	Nuclear material safety limits & criticality safety limit surveillance.
1-F09-NMS-04.02	Nuclear material drum & transfer reports.
1-F08-NMS-04.04	Material Balance Area (MBA) Nuclear Material Transfers.
1-F10-NMS-04.03	Material Access Area (MAA) Nuclear Material Transfers.

Transportation Plan.
Rocky Flats Transportation Safety Manuals.
Nuclear Materials Safeguards Manual.

Building 371:

4-22320-NDA-0018,	Movement of Material In Buildings 371/771.
4-22320-NDA-0028,	Receiving Material In Building 371.
4-22320-NDA-0078,	Transfer of Material from Building 371.
4-30000-FO-0001,	Decontamination.

Building 707:

4-84300-FO-0018,	Material Transfer and Storage Buildings 707, 776/777 & 779.
4-30000-FO-0001,	Decontamination.
4-84300-FO-0078,	Transfer of Material from Buildings 707/777.
M-70098	Packaging Uranium Components in the Model DT-22 Container for Offsite Shipment.
M-70097	DT-22 Assembly Verification Leak Testing.
4-30000-FO-0103,	Balances Buildings 707, 776/777.

Building 776/777:

4-84300-FO-0018,	Material Transfer and Storage Buildings 707, 776/777 & 779.
4-84300-FO-0028,	Receiving and Storing Material Buildings 707/777.
4-84300-FO-0078,	Transfer of Material from Buildings 707/777.
4-30000-FO-0001,	Decontamination.
4-30000-FO-0103,	Balances Buildings 707, 776/777.
4-J29-2901PAC,	Packaging Uranium Oxide Material Into UNC2901 Shipping Container.
M-70083	Packing the RF-Model 2030-2(DOT 6-M) for Offsite Shipment.
M-70098	Packaging Uranium Components in the Model DT-22 Container for Offsite Shipment.
M-70097	DT-22 Assembly Verification Leak Testing.

January 16, 1995
Revision A

APPENDIX A
REQUIRED PROCEDURE LIST

Building 771:

4-22320-NDA-0018, Movement of Material In Buildings 371/771.
4-22320-NDA-0038, Receiving Material In Building 771.
4-22320-NDA-0088, Transfer of Material from Building 771.
4-30000-FO-0001, Decontamination.

Building 779:

4-84300-FO-0018, Material Transfer and Storage Buildings 707, 776/777 & 779.
4-30000-FO-0001, Decontamination.

Building 991:

4-23000-NMHP-004, Movement of SNM in Building 991.
4-84269-FO-0108, Receiving Material in Building 991.
4-84260-FO-0114, Shipping and Transfer of Material in Building 991.
4-23000-NMHP-003, Safe Secure Trailer.
4-30000-FO-0001, Decontamination.
4-T70-Traffic-TSO-005, SST Procedure.

APPENDIX B
TRAINED and QUALIFIED EMPLOYEES

The Building Deactivation Program Division provides leak testing services for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Nuclear Material Handling & Packaging group provides movement of materials, packaging of materials and loading of SST's for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Assay & Storage groups provides movement of materials for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Traffic Department provides movement of the materials via TSO trucking and arranges for Off-site shipments. They keep a minimum staff trained and qualified to do these types of activity. Contact S. E. Gawart, Building T112A, phone 3314, pager 4085.

A current list of employees will be provided in the documentation manuals for this project. It will be used for verification processes.

APPENDIX C
MANAGEMENT SEMINARS

NAME:

G. L. Aguero

B. E, Woolsey

W. B. Fleming Jr.

W. A. Franz

A. J. Holifield Jr.

D. R. Jackson

K. F. Lenarcic

P. Sasa

R. D. Slaybaugh

January 16, 1995
Revision A

ENCLOSURE 9

RESTART PLAN FOR THE MOVEMENT, RELOCATION,

AND REPACKAGING OF SNM CAT I, II, III AND IV MATERIAL

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RESTART PLAN FOR THE MOVEMENT, RELOCATION AND REPACKAGING OF SNM CAT I, II, III AND IV MATERIAL

SNM PROGRAMS

ROCKY FLATS
ENVIRONMENTAL TECHNOLOGY SITE

February 3, 1995

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RESTART PLAN FOR THE MOVEMENT, RELOCATION AND REPACKAGING OF SNM CAT. I, II, III, IV MATERIAL.

INTRODUCTION

This Restart Plan is to reaffirm the safety culture and readiness for the relocation of Special Nuclear Material (SNM) into Building 371, the International Atomic Energy Agency (IAEA) material transfers, the movement of Categories I, II, III and IV SNM in Buildings 371, 771, 779, 707, 776/777 and 991 and the repackaging of the above materials for off-site shipment.

These activities, suspended under Standing Order 34 since October 7, 1994, have been in successful operation since early 1994, examples:

- 917 items of CAT I SNM were relocated to Building 371.
- 42 drums of Scrub Alloy Cat II SNM were relocated and repackaged.
- 40 SREP Pits were relocated, repackaged and shipped off site to LANL.
- 34 drums of CAT I eU were relocated, repackaged and made ready to ship off-site.

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. Documentation of the completion of each deliverable will be presented after implementation of the plan.

These activities involve the movement/relocation of approved sealed containers from several buildings to Building 371 for consolidation of SNM or to a central location for repackaging prior to storage or off-site shipment. Experienced and well-trained work crews, who are being further re-examined on their knowledge of COOP, have demonstrated high performance over the previous year, prior to the suspension of activities. Consequently, assessment of compliance with core requirements that apply to specific building functions is limited to only those buildings where consolidation or repackaging occurs.

Many of the personnel, procedures and systems required for HSP 31.11, Thermal Stabilization, Consolidation and Uncontaminated Enriched Uranium Repackaging are utilized for the movement of Categories I, II, III and IV SNM in Buildings 371, 771, 779, 707, 776/777 and 991 and the repackaging of the above materials for off-site shipment. The oral interviews, management seminars, and individual awareness interviews conducted for the above similar operations will be repeated for these activities only when new personnel, procedures and systems are involved.

This plan addresses the final root cause analysis through formal briefings and interviews. Contributing causes have also been addressed through formal interviews and briefings as well as specific verification of training and qualification status. The generic implications are broader but they have also been addressed, where appropriate, in management seminars, briefings and interviews. Additionally, specific checks were performed for any corrective actions that remain outstanding and any other facility hazards that could impact those activities.

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

The Plan addresses the Root Causes, Contributing Causes and Generic Implications of the Building 771 Unauthorized Draining of Process Lines as reported in the final Root Cause Analysis WSG-317-94, November 23, 1994, 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.

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.

The Root Cause Analysis requires that some corrective actions be implemented prior to initiating activities. These "immediate" Corrective Actions listed in attachment 3 of WSG-317-94, have been addressed in this plan. They are 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.

CORE REQUIREMENTS identified with an asterisk (**) specifically address corrective actions from the Root Cause of the Building 771 Unauthorized Draining of Process Lines.

1. Subject Area:

This Restart Plan is to reaffirm the safety culture and readiness for the relocation of Special Nuclear Material (SNM) into Building 371, the International Atomic Energy Agency (IAEA) material transfers, the movement of Categories I, II, III and IV SNM in Buildings 371, 771, 779, 707, 776/777 and 991 and the repackaging of the above materials for off-site shipment.

2. Purpose:

To confirm that the organizational infrastructure is in place, procedural compliance requirements are understood, and employees who accomplish or supervise enriched uranium re-packaging activities demonstrate a commitment to formality of operations 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 suspension as a precautionary measure, pending management review. Based on a hazard potential evaluation, a Low Hazard Readiness Assessment is appropriate.

4. Scope:

This assessment will ensure that movement, relocation and repackaging of SNM CAT. I, II, III and IV materials are accomplished safely, and organizational infrastructures are verified to be in place. This will be accomplished by confirming the following infrastructure supports requirements for movement, relocation and repackaging of SNM CAT. I, II, III and IV materials:

1. Procedures
2. Training/Qualifications
3. Level of Knowledge
4. Facility Safety
5. Activity Supporting Hardware Systems
6. Criticality Safety Deficiencies
7. CSAs/STCSs
8. Criticality Safety Training
9. Criticality Safety Drills
10. Functional Test Startup
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

This plan addresses current and future SNM projects that consist of 5 types of projects; 1) Packaging, 2) Movement inside buildings, 3) Transfer between

buildings on site, 4) Shipment off site, and 5) Storage activities. The projects will involve Categories I, II, III and IV SNM in Buildings 371, 771, 779, 707, 776/777 and 991. No handling activities will be performed in any areas other than those stated in the subject area. Buildings 371, 771, 779 and 991 have material stored in them that must be transfered to Building 707 or 777 for re-packaging. The assessments for these buildings will include reviews of procedures, CSOL/NMSLs, training and qualifications. Specifically excluded are processes that require operations to be performed inside of gloveboxes. Projects currently planned are SNM Consolidation, SNM Shipping, transfer of HSP 31.11 material from Building 371, and the International Atomic Energy Agency (IAEA) project.

5. Schedule

The execution of this restart plan began on January 19, 1995, with a projected completion date of on or before February 16, 1995.

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, Startup and Restart of Nuclear Facilities. For each core requirement, the criteria, methodology, and deliverable is 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, available and that adequate safety controls are incorporated.
Actionee: W. B. Fleming
M. J. Landrus

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, including: NMH&P Process Support Specialist, NDA hands-on personnel who transfer material, and Process Specialists who leak check re-packaged materials (see Appendix B).**

Methodology: Records review per 1-10000-TUM, Training Users Manual.

Deliverable: Documented verification that adequate training and qualification has been completed for applicable personnel (with dates for next training due).
Actionee: D. M. Shaw
Actionee: S. E. Gawart

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 B).
Management seminars (see Appendix C).
Individual interviews (see Appendix B).
Feedback sessions (selected from Appendix B).

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: 1) Verify NSM 3.12 compliance; 2) verify NMSL/CSOLs are written/reviewed for each individual move during the SES/USQD process for CAT I & II materials; additionally, CAT III & IV moves will be reviewed by Criticality Safety on a case by case basis.**

Methodology: Review of pre-evolution briefing records, a review of SES/USQD process for each CAT I & II move, a review of applicable NMSL/CSOLs identified to support the movement of all materials.

Deliverable: Documented verification of NSM 3.12 inclusion in pre-evolution briefings. Documented verification that each evolution involving fissile material is reviewed by Criticality Safety and all CAT I & II moves has undergone the SES/USQD process.

Actionee: R. S. Brown
Actionee: E. L. Morgan
Actionee: Bob Wilson

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 systems and other instrumentation which monitor Limiting Conditions of Operations (LCO) or that satisfy Technical Safety Requirements (Operational Safety Requirements). All required systems for the activity are currently operable and in a satisfactory condition.

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
Actionee: W. A. Franz
Actionee: E. L. Morgan
Actionee: J. D. Weaver

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 through Plant Action Tracking System (PATS).

Methodology: Records Review.

Deliverable: Documented verification of Criticality Safety deficiencies have been dispositioned. Additionally, a verifiable process has been established to address those deficiencies that apply to the systems required for the activity.
Actionee: R. S. Brown
Actionee: E. L. Morgan

April 17, 1995 Revision A to this page.

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: Verification through Compliance Management Records.

Methodology: Records Review.

Deliverable: Documented verification that non-conformances applicable to the project have been dispositioned.
Actionee: A. J. Holifield
Actionee: E. L. Morgan

CORE REQUIREMENT 8:

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

Criteria: Verify that the POO and pre-evolution briefings ensure that facilities, equipment and personnel are adequate to authorize activity in Bldg. 707, 777, 371.**

Methodology: Records review.

Deliverable: Documented verification that requirements established in the criteria have been met and are being maintained.
Actionee: D. M. Shaw

CORE REQUIREMENT 9:

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

Not Applicable
Refer to Introduction

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: The nature of the operations does not require a graded start up. However, crews were trained on transfer, packaging and leak testing procedures prior to commencement of each of the projects. Successful accomplishments of the crews include:
- 917 items of CAT I SNM were relocated to Building 371.
- 42 drums of Scrub Alloy Cat II SNM were relocated and

repackaged.
- 40 SREP Pits were relocated, repackaged and shipped off site to LANL.
- 34 drums of CAT I eU were relocated, repackaged and made ready to ship off-site.

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

Methodology: All-hands briefings (see Appendix B).
Management seminars (see Appendix C).
Individual interviews (see Appendix B).
Feedback sessions (selected from Appendix B).

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

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 COOP Manual are applied to support the activity. These attributes include:**
- Pre-evolution Briefing
- Plan of the Day (POD)
- LCO Compliance
- Use of Procedures
- Training/Qualification of Staff

Methodology: Document review.

Deliverable: Documented verification that the attributes of COOP described above are in place and satisfactorily implemented for the activity, including specifically that the safety basis documentation that supports the activity has been confirmed to be fully implemented.
Actionee: D. M. Shaw
Actionee: M. J. Landrus

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 site-wide 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 a safety basis is established for the operation in each building associated with the project.**

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
Actionee: E. L. Morgan

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 2 and 3.

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 Managers.

10. Restart Plan approval

Submitted

G. M. Voorheis
Director, SNM Management & Storage

Submitted

V. M. Pizzuto
Director, Building Deactivation Program Division

Submitted

T. G. Hedahl
Director, Waste Management

APPENDIX A
REQUIRED PROCEDURE LIST

Plant-wide:

1-63200-NMT-001,	Transfer of Nuclear Material Between Material Access Areas. (Categories I & II).
1-63200-NMT-002,	Transfer of Category III and IV Special Nuclear Material.
WSI 3-5540,	Transfer of Special Nuclear Material.
4-T67-Traffic-TSO-002,	Transfer of Category III and IV Special Nuclear Material.
9-94700-TSO-001,	Transfer of Category I and II SNM.
1-31000-COOP-011	Pre-Evolutionary Briefings.
4-B19-NSM-03.12	Nuclear material safety limits & criticality safety limit surveillance.
1-F09-NMS-04.02	Nuclear material drum & transfer reports.
1-F08-NMS-04.04	Material Balance Area (MBA) Nuclear Material Transfers.
1-F10-NMS-04.03	Material Access Area (MAA) Nuclear Material Transfers.

Transportation Plan.
Rocky Flats Transportation Safety Manuals.
Nuclear Materials Safeguards Manual.

Building 371:

4-22320-NDA-0018,	Movement of Material In Buildings 371/771.
4-22320-NDA-0028,	Receiving Material In Building 371.
4-22320-NDA-0078,	Transfer of Material from Building 371.
4-30000-FO-0001,	Decontamination.

Building 707:

4-84300-FO-0018,	Material Transfer and Storage Buildings 707, 776/777 & 779.
4-30000-FO-0001,	Decontamination.
4-84300-FO-0078,	Transfer of Material from Buildings 707/777.
4-30000-FO-0103,	Balances Buildings 707, 776/777.

Building 776/777:

4-84300-FO-0018,	Material Transfer and Storage Buildings 707, 776/777 & 779.
4-84300-FO-0028,	Receiving and Storing Material Buildings 707/777.
4-84300-FO-0078,	Transfer of Material from Buildings 707/777.
4-30000-FO-0001,	Decontamination.
4-30000-FO-0103,	Balances Buildings 707, 776/777.

APPENDIX A
REQUIRED PROCEDURE LIST

Building 771:

4-22320-NDA-0018, Movement of Material In Buildings 371/771.
4-22320-NDA-0038, Receiving Material In Building 771.
4-22320-NDA-0088, Transfer of Material from Building 771.
4-30000-FO-0001, Decontamination.

Building 779:

4-84300-FO-0018, Material Transfer and Storage Buildings 707, 776/777 & 779.
4-30000-FO-0001, Decontamination.

Building 991:

4-23000-NMHP-004, Movement of SNM in Building 991.
4-84269-FO-0108, Receiving Material in Building 991.
4-84260-FO-0114, Shipping and Transfer of Material in Building 991.
4-23000-NMHP-003, Safe Secure Trailer.
4-30000-FO-0001, Decontamination.
4-T70-Traffic-TSO-005, SST Procedure.

APPENDIX B
TRAINED and QUALIFIED EMPLOYEES

The Building Deactivation Program Division provides leak testing services for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Nuclear Material Handling & Packaging group provides movement of materials, packaging of materials and loading of SST's for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Assay & Storage groups provides movement of materials for these activities. They keep a minimum staff trained and qualified to do these types of activity. Contact D. M. Shaw, Building 707, phone 2196, pager 3247

The Traffic Department provides movement of the materials via TSO trucking and arranges for Off-site shipments. They keep a minimum staff trained and qualified to do these types of activity. Contact S. E. Gawart, Building T112A, phone 3314, pager 4085.

A current list of employees will be provided in the documentation manuals for this project. It will be used for verification processes.

APPENDIX C
MANAGEMENT SEMINARS

NAME:

G. L. Aguero

B. E, Woolsey

W. B. Fleming Jr.

W. A. Franz

A. J. Holifield Jr.

D. R. Jackson

K. F. Lenarcic

P. Sasa

R. D. Slaybaugh

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: April 13, 1995

TO: D. J. Sandstrom, Safety Review Board, Building 111, Extension 6266

FROM: G. M. Voorheis, SNM Management & Storage, Building 111

SUBJECT: RESTART PLAN FOR SNM CONSOLIDATION - GVM-046-95

We request approval to restart SNM consolidation and off site shipping activities. These activities involve varying degrees of transferring, packaging, leak testing, storing, and shipping category I, II, III, and IV SNM. The activities will take place in Buildings 371, 707, 776/777, 991, 771 and 779. This plan includes no activities in Building 886. The activities referenced above have been suspended under Standing Order 34, Rev.1, Suspension of Fissile Material Movements, October 11, 1994.

Our request is supported by the attached Restart Plan for the Movement, Relocation and Repackaging of SNM Cat I, II, III and IV Material. Documentation of its implementation is located in Room 106 of Building 441, and has been reviewed by both EG&G and DOE oversite personnel. Approval of the plan will authorize a process to conduct both current and future activities to transfer, store, package and ship SNM.

This restart plan addresses the final root cause analysis of the Building 771 incident. Implementation of the plan incorporated the same actions addressed in the Restart Plan for Shipment of Enriched Uranium. These included personal interviews, all hands briefings, management seminars, feedback sessions, and assessments of the readiness of the buildings' physical and administrative systems to support this level of activity. Key in the implementation was the development of a review process to insure all nuclear safety limits applicable to the activity are double contingent. This process has been presented to RFFO, and will be followed prior to initiating each new SNM activity.

A large number of these types of evolutions were successfully completed in FY94. They included the transfer of SNM from the Building 991 tunnel to Building 371, packaging and off site shipment of several shipments of SREP pits, and the packaging of enriched uranium hemishells into off site shipping containers. The experienced operators and the improved processes and procedures used in these evolutions will support their continued safe accomplishment. We request Safety Review Board approval to resume these activities.

RLH:jcb

Attachment:
As Stated

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: April 17, 1995

TO: J. G. Davis, Safety Review Board Chairman, Bldg. 111, X2809
D. J. Sandstrom, Safety Review Board Chairman, Bldg. 111, X6266

FROM: W. S. Glover, Performance Assurance, Bldg. 111, X2510

SUBJECT: IMPLEMENTATION REVIEW OF THE *RESTART PLAN FOR THE MOVEMENT, RELOCATION, AND REPACKAGING OF SNM CAT I, II, III, AND IV NOT RELATED TO WASTE OR RESIDUES* - WSG-165-95

I have directed members of my staff to perform a review of the subject restart plan to provide independent assurance that key aspects of the plan have been adequately implemented. Several areas of the plan were chosen for review:

- Training and qualification programs for operations and operations support personnel have been established, documented, and implemented (Core Requirement [CR] 2).
- Level of knowledge of operations and operations support personnel is adequate (CR 3).
- 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 (CR 6).

Based on a review of the required courses, a sampling of training records, and a review of the interview documentation, CRs 2 and 3 have been satisfied.

Based on a review of the CR 6 Readiness Assessment Appraisal Forms from Buildings 371, 707, 771, 776/777, 779, and 991, a process to identify, evaluate, and resolve deficiencies and recommendations has been established, thus satisfying CR 6. While CR 6 has been satisfied, the CR 6 Deliverable has not been precisely met in all of the buildings addressed in the restart plan. The Deliverable suggests that the Criticality Safety Deficiencies with the potential for affecting the subject activity be evaluated and dispositioned. With the exception of Building 771, the existing Criticality Safety Deficiencies have been reviewed and evaluated for applicability to this restart plan. With respect to Building 771, a similar review must be performed prior to beginning any activity permitted by this restart plan. With this condition in place and understood, there are no other outstanding issues identified by Performance Assurance that would prevent the restart of activities addressed in this plan.

Please direct any questions concerning this issue to me or B. L. White, Assessments Program, at extension 8888.

GE:kq

cc:
A. H. Burlingame
L. E. Burton, III
J. A. Geis
V. M. Pizzuto
R. D. Plappert
G. M. Voorheis
B. L. White

ENCLOSURE 10

CAUSE EVALUATION OF RECURRING DEFICIENCIES IN THE NUCLEAR CRITICALITY SAFETY PROGRAM

CA-94-012

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CAUSE EVALUATION OF RECURRING DEFICIENCIES IN THE NUCLEAR CRITICALITY SAFETY PROGRAM

CA-94-012

March 16, 1995
Revision 0

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Table of Contents

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CAUSE EVALUATION OF RECURRING DEFICIENCIES IN THE NUCLEAR CRITICALITY SAFETY PROGRAM

1. PURPOSE

The purpose of this evaluation is to identify causal factor themes leading to recurring deficiencies in nuclear criticality safety at Rocky Flats Environmental Technology Site (Site). Included in this evaluation is a review of the inability to correct nuclear criticality safety program problems that have been known and open for an extended period of time. The goal of this evaluation is to provide recommendations to the Safety Review Board (SRB) to correct identified recurring deficiencies in criticality safety.

This evaluation is in response to the recommendation made by Performance Assurance for a causal factors evaluation. It is also one element of the Rocky Flats response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4 to perform a comprehensive review of the nuclear criticality safety program.

2. BACKGROUND

The Nuclear Criticality Safety Program at Rocky Flats is an important element in maintaining the overall safety of the Site. In April 1994, Standards, Audits, and Assurance staff authored a report titled, "Significance Evaluation Report of Nuclear Criticality Safety Program Key Deficiencies." The report noted recurring deficiencies within the program and recommended that an analysis be performed to "identify causal factors leading to the inability to correct safety problems that have been known and open for an extended period of time." The Nuclear Criticality Safety Committee (NCSC) was directed to evaluate causal factors leading to weaknesses in criticality safety at Rocky Flats and provide recommendations.

The April 1994, report is one in a series of evaluations that address the Nuclear Criticality Safety Program at the Site. An external assessment of the program was performed in 1989 by SCIENTECH, Inc. An internal assessment was subsequently performed in 1992 by Performance Assurance personnel. In May 1994, Issues Management prepared a collective significance evaluation of criticality safety procedural infractions since 1990 at the Site. Annual appraisals of the Nuclear Criticality Safety Program were conducted by the NCSC and Performance Assurance throughout this period.

The April 1994, report concluded that "EG&G Rocky Flats Nuclear Criticality Safety Program fails to satisfy many key requirements contained in Department of Energy (DOE) Orders and other governing standards (... 80% of the administrative and 67% of the technical requirements are not satisfied)." [Note: Attachment A of the above referenced report identifies ANSI/ANS-8.1, ANS-8.19 and DOE Order 5480.5 as the principal requirements of interest.] Causes of the problem (called deficiencies in the April 1994, report) were determined to be in the following areas: (1) responsibilities are not clearly defined; (2) nuclear criticality safety procedures and documents are deficient; and (3) accountability for correcting identified deficiencies and preventing recurrence is lacking.

Recent events at the Y-12 Plant prompted the DNFSB to write Recommendation 94-4 to request that DOE undertake a comprehensive review of the nuclear criticality safety program at that facility. This recommendation was accepted by DOE and extended to other sites. This report is one element in the Rocky Flats Site response to the DNFSB recommendation.

This cause evaluation was initiated in September 1994. Work was suspended in October 1994, because NCSC members were needed to support the root cause analysis of the Building 771 unauthorized tank draining incident. Work resumed January 17, 1995, with a reconfigured team of personnel that included individuals from Los Alamos National Laboratory and SCIENTECH, Inc.

The following sections of this report discuss the evaluation methodology, deficiencies, causal factor themes, recommendations and conclusions. Attachments list the documents reviewed and detailed results of this evaluation.

3. EXECUTIVE SUMMARY

This section provides a brief description of the methodology, conclusions and recommendations of the evaluation.

A cause evaluation was performed in accordance with Procedure 1-11000-ADM-16.03, Cause Analysis. A team reviewed previous evaluations, occurrence reports, and open issues in the Plant Action Tracking System (PATS) and Integrated Work Control Program (IWCP) databases. The root cause checklist in the procedure was used to determine causal factor themes from the available information. Interviews were conducted with key individuals in the criticality safety program. The time frame covered by this cause evaluation is 1990 to the present.

Many issues within the body of this report support the causal factors themes and associated recommendations.

The review of recent criticality safety related Occurrence Reports shows that 15 of the 44 reports exceeded the 45-day final reporting requirement.

The review of the action tracking databases supports the conclusion that management issues are the source of most of the open issues related to criticality safety. There is a lack of accountability for criticality safety issues identified in PATS. Actions that cannot be completed by the scheduled date are changed in PATS without recourse as a common practice. Issues are also allowed to remain open for indefinite periods of time.

The review of previous recommendations found that actions and management oversight to either track the committed corrective actions or to drive them to closure, and to resolve root cause management problems have been less than adequate. In addition, the wording of the corrective action allows the action to be closed and considered complete prior to preventing recurrence.

Based on personnel interviews, the team concludes that management has not provided adequate criticality safety program elements, delineation of responsibilities and expectations, and working conditions to foster an efficient criticality safety program.

The team identified five primary causal factor themes, as follows:

1) Standards, Policies or Administrative Controls (SPAC) Less Than Adequate (LTA);

2) SPAC Not Used;

3) Understanding of Training LTA;

4) Corrective Actions LTA; and

5) Procedures Followed Incorrectly.

Three actions are recommended, as follows:

1) Create a New Directions task team by April 15, 1995. The task team, reporting to the SRB, is to accomplish a defined set of short term corrective actions by July 15, 1995. Paramount among those actions is to assist operations managers to define criticality safety roles, responsibilities, authority, accountability and performance expectations for each management and staff position that has a relationship to criticality safety.

2) Initiate, within one month, routine SRB review of the reasonableness and effectiveness of management corrective actions identified by root cause and generic implications assessments at Rocky Flats.

3) Initiate, within one month, a routine program to track and monitor the three already approved reform programs affecting conduct of operations, activity-based planning and implementation of lessons learned from the recent safety culture survey.

Recommendation 1 addresses all of the primary causal factor themes. Recommendation 2 addresses primary causal factor theme Number 4. Recommendation 3 addresses primary causal factor themes 1, 2, 3, and 5.

Equipment issues that are identified in this report were not pursued to determine specific types or the nature of the deficiency. In addition, while physical controls are recommended rather than administrative controls where cost effective and practical, the team decided to make no broad recommendation on this issue. A responsibility of the task team will be to look at these issues and assist in determining the priority level by which they will be addressed.

Detailed information related to causal factors and recommendations is contained in Section 5, Conclusions, and Section 6, Recommendations, of this report.

4. CONDUCT OF THE CAUSE EVALUATION

This section describes the evaluation. Documents reviewed are listed in Attachment 1.

4.1 Methodology

A cause evaluation was performed to determine the effectiveness of the management systems associated with the observations of recurring deficiencies in the nuclear criticality safety program. Normally, cause evaluations are less rigorous than root cause analyses and collective significance evaluations, and may not identify the specific root cause of events. However, the Root Cause Checklist (shown in Attachment 2) in Procedure 1-11000-ADM-16.03, Cause Analysis, was used in this particular cause evaluation because noncompliance with requirements of DOE safety-related orders has been previously identified.

As part of the causal factor evaluation, the team reviewed information contained in previously completed reports and identified as deficiencies, findings, causes and potential problems. The information contained in these reports was assumed to be factual. A causal factor theme that best represented each issue was determined from the information within each of the reports. Utilization of the root cause checklist enabled the team to be consistent in the identification of the issues represented in this evaluation. Causal factor themes identified in reviewing previous reports then were compared to the currently open criticality safety issues in PATS and IWCP, again aided by the root cause check list. From this comparison and knowledge of the Site, conclusions and recommendations were developed.

The documents reviewed were all dated after 1990, with the exception of some open issues in PATS which date back to 1989. In addition to a review of IWCP and PATS, we selected several types of documents which include: (1) an assessment of nuclear criticality safety activities; (2) a significance evaluation in response to concerns discovered through oversight activities; (3) a summary of noted deficiencies during assessments; (4) a current root cause analysis of a significant event; and (5) occurrence reports containing information about specific events.

Personnel interviewed included several current and former criticality safety engineers, operations managers, and senior operations staff. These people were selected to provide a range of views on criticality safety strengths and weaknesses, and because of their hands-on experience with efforts to improve criticality safety since 1990.

4.2 Review Of Previous Evaluations

The issues from five previous reports were examined as described in the methodology section of this report. The five reports evaluated by three members of the Cause Evaluation Team were as follows:

- Assessment of Nuclear Criticality Safety, WSG-094-92, December 15, 1992;
- Significance Evaluation Report of Nuclear Criticality Safety Program Key Deficiencies, April 20, 1994;

- Summary of Fiscal Year 1994 Nuclear Criticality Safety Assessments, BLW-239-94, October 13, 1994;

- Root Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO--EGGR-771OPS-1994-0062, November 23, 1994; and

- Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990 at The Rocky Flats Plant, WSB-072-94, May 16, 1994.

A matrix was developed to show the recurring causal factor themes. The title of the report containing the issues evaluated precedes the listing of the issues in the matrix. Assigned weighting factors were identified for each type of issue in the matrix. The matrix is included as Attachment 3 to this report. Ten separate causal factor themes were identified through this evaluation process. The five most prevalent themes in their order of weighted importance are:

1) SPAC LTA

2) SPAC Not Used

3) Understanding of Training LTA

4) Corrective Actions LTA

5) Procedures Followed Incorrectly

Causal factor theme three relates specifically to continuing training in the form of pre-job briefings, on-the-job training, seminars, professional development, etc.

The team also reviewed Occurrence Reports related to criticality safety that were not included in the "Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990 at the Rocky Flats Plant." A key word search identified that, as of January 27, 1995, 44 Occurrence Reports listed in Attachment 4 related to criticality safety had been issued since May 1994. The methodology used to evaluate the five evaluation reports was also used to evaluate issues within these 44 Occurrence Reports. The Occurrence Reports were in various stages of completion. Fifteen of the 44 occurrences had exceeded the 45-day final reporting requirement; all but one of these originated in Building 771. Five reports were over five months delinquent. The content of each report was the basis upon which the causal factor determination was made by two of the team members.

A separate causal factor matrix is included in Attachment 5 to show the causal factor themes identified through review of the Occurrence Reports. Causal factor themes for three (7%) of the Occurrence Reports were unable to be determined due to insufficient information in those reports. The four most prevalent themes are:

1) Procedures Followed Incorrectly

2) SPAC LTA

3) SPAC Not Used

4) Equipment design

4.3 Review Of Action Tracking Databases

The PATS and IWCP action tracking databases were reviewed for issues relating to criticality safety. This review was performed to identify causal factor themes associated with current open actions.

An electronic sort of the PATS database using key words, plus a review by one of the team members produced a list of 116 open criticality safety issues (out of about 2000 open issues plant wide) as of January 31, 1995. Of the 116 open issues, 14 were identified in PATS as high priority. A January 11, 1995, copy of the Performance Indicators for criticality safety corrective actions in PATS, developed by Performance Measurements and Analysis, is included as Figure 1 in this section.

The entries in PATS for each of these issues, plus some background reading on several of the issues that had very short descriptions in PATS, produced the following information relative to the cause categories defined in the root cause checklist:

A) 89 issues (77%) related to management deficiencies, such as:
   1) SPAC LTA, (57 issues)
   2) SPAC Not Used, (31 issues)
   3) and Corrective Action LTA, (1 issue);

B) 19 issues (16%) related to equipment deficiencies, such as:
   1) Defective Equipment, (11 issues)
   2) Maintenance LTA, (6 issues)
   3) and Design Deficiencies, (2 issues);

C) 4 issues (3%) related to training deficiencies;

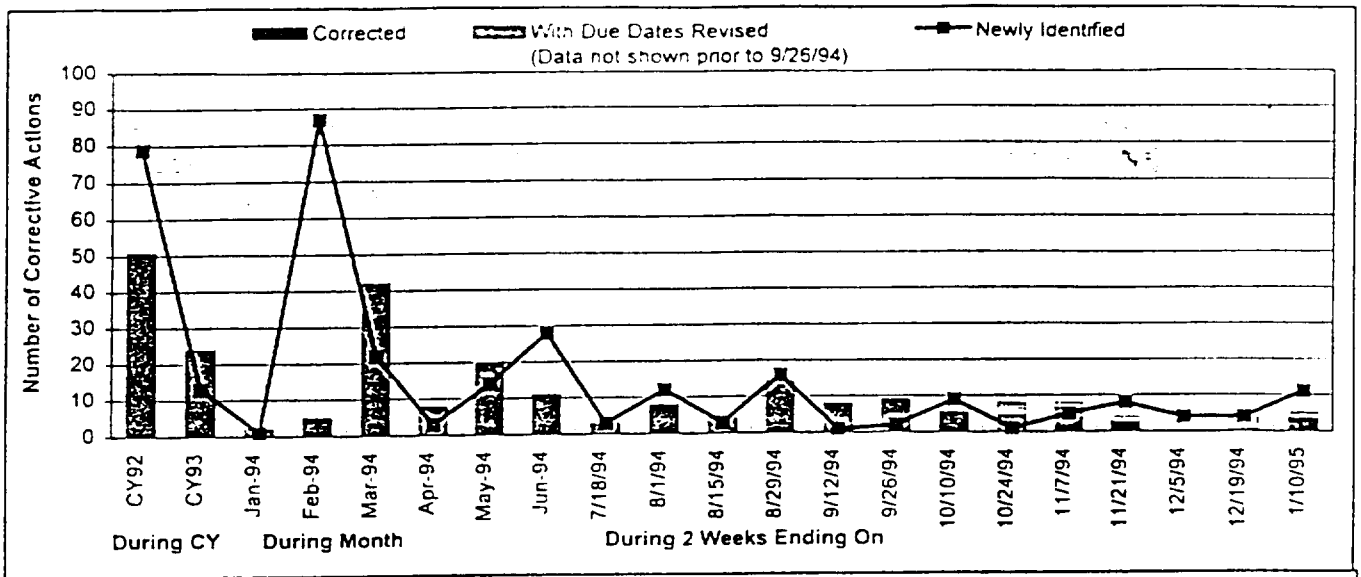
D) 2 issues (1.5%) related to personnel deficiencies; and

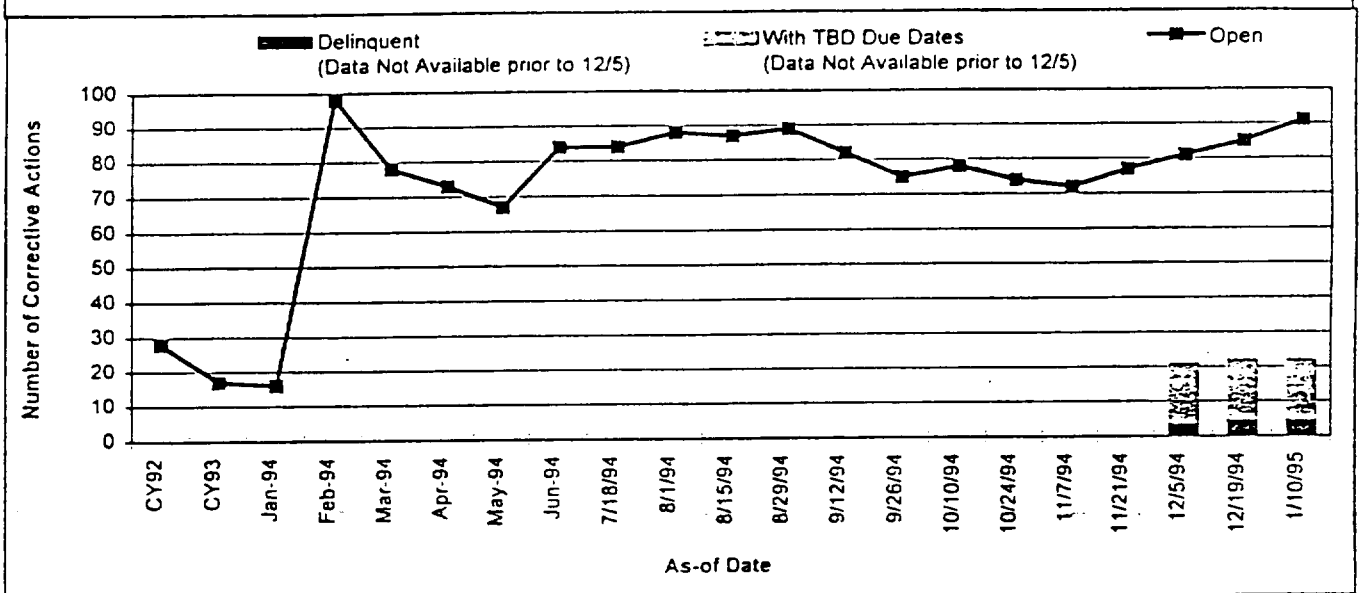
E) 2 issues (1.5%) related to procedure deficiencies.

These data confirm some of the observations made by the team's review of the previous evaluation reports cited above. Namely, management issues, especially those associated with identification of standards, policies or administrative controls, and Conduct of Operations in following those controls, are the source of most of the open issues related to criticality safety.

These data also indicate that there is a lack of accountability for criticality safety issues identified in PATS. Review of a January 31, 1995, PATS printout showed that managers assigned to 28 of the criticality safety issues, including two of the 14 high priority issues, have not had that responsibility for several months. Also, the actions derived from the root cause and generic implications evaluations of the September 1994, unauthorized draining of plutonium nitrate in Building 771 had not been entered into PATS. Those actions were adopted by plant management on November 23, 1994, some 60 days earlier than the

Criticality Safety Corrective Actions in PATS





Status on January 10, 1995

Responsible Organization	Org. Code	# Identified	# Corrected	# Open	# with Due Date TBD	# Delinquent	# Delinquent > 30 Days	During Last 2 Weeks Due	Delinquent	Revised
Burlingame	10000	1		1						
Glover	10300	6	6							
McDonald	10600	7	5	2						
Stiger	11000									
Fray	13000	46	29	17		2	2			
Hedahl	20000	30	20	10				1		1
Voorheis	30000	43	24	19		2	2	1		
Golan	40000	4	3	1	1					
Pizzuto	50000	72	63	9				1		
Kell	60000	77	47	30	16	1				
Marx	70000	1	1	0						
Geis	80000	28	27	1						
Ferrera	90000	11	10	1						
Total		326	235	91	17	5	4	3	0	1

printout that was examined. However, Action Plans addressing the Building 771 Root Cause Analysis Recommendations are however, being reviewed by an SRB subcommittee.

Improvement in timely closure of criticality safety issues is needed. The PATS database indicates that 24 (21%) of the 116 open criticality safety issues on January 31, 1995, were more than one year old, and seven issues (6%) were more than five years old. Of the 14 open high priority criticality safety issues in PATS, ten issues (71%) were first identified in 1993 or earlier. This high proportion of long-standing, high-priority, criticality safety issues indicates that the high priority issues are resolved in a less timely fashion than the medium and low priority issues, although the high priority issues are only about 10% of the total population of issues. This situation also indicates that either resources are not dedicated to the highest priority issues, or high priority is poorly defined.

The team observed in the PATS review that the schedule for closure of an issue is not treated rigorously. For example, there were many issues in PATS, including five of the 14 high priority issues, whose schedules were "to be determined." Other issues had schedules for completion estimated well into the future, including one high priority issue that is scheduled for completion in March 1996, more than four years after it was identified. A common practice is that when an item cannot be completed by the time it is scheduled, the identified manager can change the schedule in PATS to a future date often without recourse to higher authority. Thus, routine reports to top management show the program for issue resolution to be generally on schedule, which is far from a complete picture. The team did not inquire into why so many high priority issues have not been addressed. Rather, the action was deferred to the New Directions Task Team, which is the subject of one of the team's recommendations.

The IWCP database from 1991 to present was reviewed because the team noted that a significant number of Occurrence Report corrective actions were deemed complete upon submission of a Work Control Form, thereby "handing off" the actual performance of corrective actions to the IWCP. To track the performance of these corrective actions, the database was searched for all open Work Control Forms that were indicated to have originated from Occurrence Reports.

Priority levels are assigned to each of the Work Control Forms, indicating the degree of urgency in completing the corrective actions. Priority Level 1 constitutes an "emergency" which "requires immediate action to prevent serious personal injury, harm to the environment, including hazardous waste spills, a breach to security, or a serious loss of property." Priority Level 2 is designated as "urgent" and "requires rapid action to ensure safety to personnel or the environment, to correct problems deemed critical to sustain the current mission of a facility, or to correct deficiencies in Special Nuclear Materials (SNM) security alarm systems or environmental regulatory compliance facilities, systems, or hardware as defined in this procedure" (1-E31-IWCP-Glossary).

The search of the IWCP database on January 5, 1995, identified 230 open Work Control Forms that originated from Occurrence Reports; 18 were related to criticality safety. Twenty-seven of the open items were Priority Level 1 "emergency" open Work Control Forms dating from November 4, 1991, to November 10, 1994: five were related to criticality safety. Two criticality safety related issues originated in 1992 and the remaining three are from 1994. However, when copies of the above-referenced Work Control Forms were reviewed on February 27, 1995, four of the five forms indicated that the issue had been closed. Up to 27 months was necessary to close the Work Control Forms.

Additionally, there were 191 Priority Level 2 "urgent" open Work Control Forms, 13 of which are related to criticality safety. The open issues originated in the following years:

1991	1992	1993	1994	1995
2	4	1	5	1

Again, a subsequent review of the Work Control Forms for these Level 2 items revealed that six of the thirteen forms were closed. Up to 34 months was necessary to close the Work Control Forms; one of the remaining issues has been open 41 months.

The Engineering and Safety Services Department was contacted to obtain information on the open emergency and urgent work control forms. As shown in the table below, one emergency and six urgent work control forms have been put on hold by Operations request. One urgent work control form has been canceled by Operations request.

OPEN WCFs ORIGINATED BY ORs

Priority Level 1		**Origination Date**	**Status (3-15-95)**
TX000258	Repair LS/DW System, Bldg. 774	4/5/94	on hold
Priority Level 2A			
TB049381	TS&R Crit panel for Bldg. 776/777 Located in Bldg. 750	6/2/92	on hold
TI079585	Install LS/DW Speakers in Stairwells, Bldg. 374	11/5/94	canceled
TP033527	Install Conduit and Re-Run Wire for Bldg. 991 Crit System	10/30/91	on hold
TF056192	Install Crit Alarm System Identification on Conduit	9/25/92	on hold
Priority Level 2B			
TP044581	Install Crit Beacon at 777 MAA Access	3/27/92	on hold
TP028329	Replace Crit Beacons with Strobe type Beacons (707, 776, 777, 778)	9/7/91	on hold
Priority Level 2C			
TB077046	Angle Iron Berm Around Tank T-3 Needs to be Cut Down to 2 inches	6/1/94	on hold

The above information was generated from Work Control Forms explicitly indicating that they were initiated by an Occurrence Report. However, a Planning & Integration Technical Administrator who aided in the generation of this information indicated his experience showed that many Work Control Form originators were less than diligent in recording that a Work Control Form had been initiated by an Occurrence Report. Therefore, this list is likely to be a subset of the actual number of Work Control Forms initiated by Occurrence Reports. The Administrator also stated that a number of Work Control Forms were closed due to cancellation rather than actually completing the proposed work.

This review indicates that high priority issues can remain open for significant periods of time. Possible scenarios related to "open" issues in PATS and IWCP are:

1) The open issue has physically been corrected, closure documents have been submitted, but the database has not been updated;

2) The open issue has physically been corrected, but the closure documents have not been submitted; or

3) The physical work necessary to complete the issue is not done.

The length of time that issues remain open also indicates that the priority categorization may have been inappropriate. In addition, some issues categorized as high may not have been completed because they are extremely expensive and/or not cost effective. In any case, the tracking system needs to be updated to reflect management's intentions for all pending actions, perhaps leading to the elimination of some actions. This is one type of effort intended for the New Directions Task Team recommended below.

4.4 Review Of Previous Recommendations

The team conducted a review of previous recommendations for corrective actions. The team spot checked previous recommendations to identify trends and concerns regarding corrective actions and closure. The review included the following documents:

- Significance Evaluation Report of Nuclear Criticality Safety Program Key Deficiencies, April 1994;
- Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990 at the Rocky Flats Plant, May 1994;
- Assessment of Nuclear Criticality Safety, December 1992;
- Root Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO--EGGR-771OPS-1994-0062, November 1994;
- Evaluation of Generic Implications of Building 771 Incident, November 1994;
- Summary of Fiscal Year 1994 Nuclear Criticality Safety Assessments, October 1994; and
- Forty-four Occurrence Reports since May 1994.

Tracking and trending of previous corrective actions is difficult in order to evaluate the effectiveness of those actions towards preventing recurrence in today's activities. Tracking previous corrective actions to determine the current status requires following complicated document trails through Assessments, Occurrence Reports, PATS history files, departmental tracking systems, plans assigned to personnel that may no longer work at EG&G, Document Modification Requests, and multiple procedure revisions over the past few years. Evaluation of whether or not implementation of a particular recommendation was effective would also require identification of any repeat or similar deficiencies that have occurred since each corrective action was implemented. Records are not readily available to perform this type of review. For example, annual criticality safety assessments review the findings and associated corrective actions from the most recent annual assessment. Findings where corrective actions are determined to have been less than adequate are reopened in the new assessment report. However, since there is no overall compilation of previous criticality safety corrective actions from all sources of problem identification, the annual assessments do not capture all previous corrective actions (especially those more than one year old which may or may not still be in use). Also, Occurrence Reports list previous or similar occurrence reports and generally do not address the previous corrective actions and why those actions did not prevent recurrence. The team concluded that there is not a specific program element that reviews continuity of previously implemented corrective actions with focus on recurrence control.

Many previous recommendations concerning criticality safety have been very general in nature and are not easily resolved by specific corrective actions. Such general recommendations are usually programmatic and cultural in nature. Follow-up tasks to evaluate improvements made by corrective actions are not generally included in the action plans. Such tasks would include definition of expected future performance criteria, performance indicators and periodic follow-up to evaluate future performance and program improvement. This approach could be accomplished through the Self-Evaluation Program if action plans fed the corrective actions and expected improvements into appropriate self-evaluations. No such links to the Self-Evaluation Program were apparent from the corrective actions records reviewed. The New Directions Task Team recommended below should look into the possibility of making such linkage during the assistance the team provides to the operations organizations.

Three specific Findings (F-PA-92-39/01, F-PA-92-39/15, and F-PA-92-39/16) from the December 1992, Assessment of Nuclear Criticality Safety were followed to completion as an example. After the Assessment, the findings were evaluated through the Issues Management Evaluation process in April 1993. The above three findings were combined as "Personnel and Management Inattention to Criticality Safety" under Issues Management Program tracking number IMP 93-0046 with the combined finding stated as "Personnel/management inattention remains the major causal factor for criticality safety procedural infractions. The infraction rate remains relatively high despite curtailment." The evaluation goes on to state, "This concern was evaluated as a category II issue due to non-compliance with DOE order 5480.5 paragraph 8(g), which deals with remedial action and reporting of occurrences. Remedial actions have apparently been less than adequate because the inattention to criticality safety still exists despite an almost identical concern shown in the referenced 1989 Scientech report. The less-than-adequate remedial action constitutes a non-compliance with DOE orders."

IMP 93-0046 was completed through PATS Commitment Number 93-001633 by Facility Management and Operations in September 1993, under Plan Number IMP-93-0046A, with reference to letter WAK-0259-93. The team concluded that the corrective actions implemented to resolve "Personnel and Management Inattention to Criticality Safety" have still been less than adequate, since, as discussed in other sections of this report, inattention to criticality safety is still a recurring deficiency. See Attachment 6 which details actions identified in WAK-0259-93 related to personnel and management inattention to criticality safety.

Forty-four Occurrence Reports, consisting of two Notification Reports, 27 10-Day Reports, five 10-Day Update Reports, and ten Final Reports were reviewed. Notification Reports contain information in the first 18 fields. Corrective Actions are the responsibility of the facility manager and are contained in Section 25 of future updates to the Notification Reports which show management's response to the occurrences. For the other report types, five of the 10-Day Reports listed corrective actions, one of the 10-Day Update Reports listed corrective actions, and nine of the Final Reports listed corrective actions.

Fifty corrective actions were identified from the 44 Occurrence Reports reviewed. The Occurrence Reports state that 39 of the corrective actions are "complete." Review of some specific cases demonstrated that the term "Complete" in an Occurrence Report can be misleading. Due to the way corrective actions are often worded, "Complete" on the Occurrence Report does not necessarily mean that corrective actions to prevent recurrence were taken. "Complete" may mean that the specific worded action was taken even though the specific action is just to request some other action or response. "Complete" may also mean that tracking of the action was passed to another tracking method, such as an individual department, another Occurrence Report or PATS. Under the current commitments management system where only a sample of complete items is verified and only a sample of verified items is closed, "Complete" may not mean the action is actually done due to errors in documentation or communication. The following examples were observed in the 44 Occurrence Reports reviewed:

- Request new limits (with no commitment to implement)
- Schedule training (with no commitment to implement)
- Show action complete by transferral of tracking responsibility to another specific organization (i.e., Criticality Safety to track, Commitments Tracking to track)
- Show action complete by reference to other open corrective actions in another Occurrence Report
- Provide written guidance or plans for correction of infractions (with no commitment to implement)
- Show review complete by providing copy of final report prior to final report date (in two of the reports reviewed, the 10-Day Reports show completion of action to provide copy of Final Report).

A criticality safety infraction identified on January 5, 1994, as Occurrence Number 94-0014 was reviewed as an example. This infraction was reported as Final Report RFO--EGGR-771OPS-1994-0002 dated May 31, 1994. Several corrective actions were undertaken (See Attachment 7). The root cause for this infraction was stated in the Occurrence Report as a management problem that policy was not adequately defined, disseminated, or enforced. The corrective actions addressed the specific deficiency of inadequate limits, but did not address the management problem in order to prevent recurrence. The Occurrence Report indicates that all corrective actions have been implemented. Contrary to the report, this team's review has determined that not all actions have been done. The team concluded that actions and management oversight to either track the committed corrective actions or to drive this infraction to closure, and to resolve the root cause management problem, have been less than adequate. The basis for this conclusion are stated in Attachment 7.

The following points summarize this review of previous recommendations:

1) There appears to be little or no documented follow-up of completed corrective actions to evaluate their continued utilization and effectiveness after initial implementation. There was no apparent link between corrective actions and the Self-Evaluation Program in order to monitor effectiveness of corrective actions.

2) Most corrective actions are directed at correction of the immediate problem. There is often little or no emphasis in the corrective actions documented in action plans toward prevention of recurrence through correction of the root cause management problems. The team's review disclosed that management-related root causes are vaguely identified and seldom associated with specific corrective actions.

3) Examples were given which show less than adequate management attention and oversight to assure "completed" items are actually satisfactorily completed and implemented. This review did not include sufficient breadth and depth to draw any conclusions regarding whether or not this problem is limited or widespread. A detailed assessment of a statistically representative population of completed items would be required for such determination. However, we have no reason to expect that the problem is not widespread.

4) Based on discussions with personnel in management, operations, program, and support roles, the problem with tracking corrective actions and driving issues to closure is strongly tied to the sheer number of issues management must track and prioritize, the rate at which new issues emerge, and frequent reorganizations that require changes in the assignment of task managers.

4.5 Insights From Personnel Interviews

The initial EG&G team in early fall of 1994 develcped questions and conducted interviews with three sets of employees: current criticality engineers; former criticality engineers; and operations managers and their staffs. The questions were developed to confirm or deny results of the Performance Assurance Significance Evaluation Report of Nuclear Criticality Program Key Deficiencies, April 1994. Topics covered by the questions pertained to nuclear criticality safety program responsibilities, deficiencies, training, technical

support, and performance monitoring. Although individual responses to a number of the questions were instructive, four major points stand out:

1) A clear understanding of the various responsibilities for criticality safety has not been effectively communicated. Criticality safety engineers indicate that they do not have job descriptions. Responsibilities for funding and addressing Site issues are not clear.

2) Criticality safety engineer's training and experience levels are less than adequate. Sufficient mentoring and advanced training has not been available. There was a certification program in place at the Site that consisted of a written and verbal test which is not in place today.

3) Criticality engineers believe that they are not treated as professionals with opportunities for professional development. They point out that there is very limited training and development for improvement of their analytical skills and their knowledge of operations at Rocky Flats.

4) Operations organizations believe that there is inadequate criticality safety engineering support, a lack of experience among criticality safety engineers, a failure to walkdown packages, and a lack of understanding of building operations by nuclear analysts.

The team noted that the people interviewed did not say that the number of criticality safety engineers or overwork of the criticality safety engineers was a source of problems.

Operations organizations require criticality safety limits on a schedule to meet project requirements. This situation establishes tension between the two organizations. Operations personnel feel that six to eight weeks to generate a modified limit is not acceptable. Their perception is that the generation of documentation from criticality safety takes too long, is too expensive, is onerous, and lacks professionalism.

Using the same root cause analysis tool employed in the rest of this report causal factor themes were determined for the four major points identified above:

1) SPAC LTA - is the causal factor theme for points one and three;

2) Understanding of Training LTA - is the causal factor theme for points two and four.

These causal factor themes are similar to the themes identified in the preceding sections. These conditions make it difficult for the current staff of criticality safety engineers to be as

Based on the interviews, the team concludes that management has not provided adequate criticality safety program elements, delineation of responsibilities and expectations, and working conditions to foster an efficient criticality safety program.

4.6 Other Contributing Factors

The team considered two other factors which may contribute to the recurring criticality safety issues. The first of the two is over-reliance on administrative controls. The root cause analysis of the Building 771 unauthorized tank draining incident concluded that the

administrative barriers and controls established for Task Information Package (TIP) 771-OPS-94-005 were not adequate to prevent the occurrence of the incident. Administrative controls are most effective during continuous operations or when Conduct of Operations is fully accepted and implemented. 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 ready to ensure procedural compliance, and inadequate independent oversight of operations within EG&G. The memo also provided a list of six specific recommendations that have not been fully addressed by EG&G. The broad concerns were addressed in the corrective actions identified for the Building 771 unauthorized draining incident. 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. However, risk and cost must be balanced, because overuse of physical controls may make operations prohibitively difficult or expensive.

The other factor considered by the team was stress. Preliminary results of a recent safety culture survey conducted in four fissile materials process buildings indicate that, of the areas surveyed, stress was the area to be of most significance. Personnel experiencing high levels of stress due to the uncertainties faced at the Site have difficulty remaining focused and are more likely to be involved in accidents. The announced staffing reduction is having an impact on the stress levels of employees at the Site. The staffing level reduction involves both hourly and salary personnel. The stress factor, the level of implementation of Conduct of Operations, and the decline in the numbers of personnel with process knowledge in specific positions, enforces the need to deal more effectively with criticality safety in the near term.

5. CONCLUSIONS

A typical cause evaluation is performed on a single incident for which a sequence of events and causes can be developed. This team's evaluation is a review of multiple evaluations and events for which numerous causal factor themes have been developed. A continuous process improvement framework lends itself to discussion of the facts associated with numerous events as illustrated in Figure 2.

Figure 2 illustrates elements of an idealized process for controlling criticality safety. A description of that process follows. Requirements are defined through promulgation of standards, policies, and administrative controls. This element produces criticality safety program elements, procedures, and Criticality Safety Operating Limits. The element of [illegible] requirements then follows, including initial and follow-up [illegible] personnel then perform work, implementing the standards, policies, and administrative controls in accordance with procedures while doing that work. Performance is measured to detect and trend problem areas in order to identify opportunities for improvement. The method of performing the work is modified to improve performance. New methodology is incorporated into the requirements to prevent recurrence of identified weaknesses.

In this context and based on the information developed during this review, the team has developed the following conclusions regarding the primary causal factor themes of recurring deficiencies in criticality safety at the Site.

Figure 2

Ideal Process Elements
and Identified Causal Factors (In Italics)
SPAC Not Used and Procedures Followed Incorrectly
Implement
Measure Performance
SPAC LTA
Continued Training LTA
Train
Continuous Improvement
Trend Performance and Identify Weaknesses
SPAC LTA
SPAC LTA
Specify Programs, Procedures, Limits
Fix Weaknesses
Corrective Action

1) Standards, Policies, or Administrative Controls Less Than Adequate
- SPAC Confusing or Incomplete
- Responsibility Not Defined
- SPAC LTA
- MORT Cause Codes 2, 4, 6, or 7

2) Standards, Policies, or Administrative Controls Not Used
- Inadequate Conduct of Operations
- Accountability LTA
- SPAC Not Used
- MORT Cause Code 3

3) Understanding Training Less Than Adequate
- Continued Training LTA
- Understanding LTA
- MORT Cause Code 23

4) Corrective Actions Less Than Adequate
- Corrective Action LTA
- Corrective Action Not Yet Implemented
- MORT Cause Code 14

5) Procedures Followed Incorrectly
- Inattention to Detail
- MORT Cause Code 21

These causal factor themes are shown in italics in Figure 2 in conjunction with the process elements that they affect.

Equipment issues that are identified in this report were not pursued to determine specific types or the nature of the deficiency. In addition, while physical controls are recommended rather than administrative controls where cost effective and practical, the team decided to make no broad recommendation on this issue. The New Directions task team recommended below will be responsible to review these issues and assist in determining the priority level by which they will be addressed.

6. RECOMMENDATIONS

[redacted] of these discussions was to identify the most important themes that ran through the main causal factors identified in the Conclusions. The goal of the recommendations that follow is to have the greatest impact in reducing the criticality safety weaknesses attributed to the primary causal factor themes listed in the conclusions.

From the deliberations, three actions are recommended for the SRB:

1) Create a New Directions task team by April 15, 1995. The task team is to be accountable to the SRB and funded by affected Divisions in shares determined by the SRB. The task team of about 10 persons is to devote full time to accomplish a defined set of short term corrective actions by July 15, 1995. To create the task team, the SRB should require the SRB Secretary to provide a draft charter, proposed members, and a list of prioritized actions by April 1, 1995, for review and approval by the SRB. The SRB should oversee the activities of the task team. The NCSC should review criticality safety program changes recommended by the task team, and serve as an ombudsman to negotiate disagreements between operations and support organizations. Program Managers will retain final approval authority for changes to their programs. The SRB should initiate routine, long term tracking and monitoring of operating organization implementation of program improvements arising from the activities of the task team. A criticality Process Improvement Team (PIT) is already in place with the primary mission of revising and streamlining the procedures used to generate CSOLs. The task team will also need to coordinate its activities with this PIT team. A preliminary list of actions to be completed by the task team, listed approximately in priority order, is as follows:

(a) develop, in conjunction with the affected organizations, defined criticality safety roles, responsibilities, authority, accountability, and performance expectations for each management and staff position in those organizations;

(b) confirm that the priorities assigned to open issues tracked in PATS and IWCP, as examples, or take steps to have them adjusted;

(c) develop, in conjunction with the affected managers, performance expectations for each of those positions identified in (a), above. The written performance expectations will address, in measurable terms, such areas as the sufficient time allocation for generation of NMSLs for planned operational activities; removing inadequacies while ensuring necessary and sufficient standards and requirements remain in SPAC and procedures in a timely, risk-based order; supporting the resolution of generic criticality safety issues; completing assigned corrective actions in a timely, risk-based order; managing the response to criticality safety infractions within reasonable time limits; completing operational occurrence reports on schedule; etc.;

(d) disposition the criticality safety issues in PATS to eliminate those that are so low [illegible] to not deserve attention and identifying better methods to resolve higher [illegible]

[illegible] identified by operating events;

(f) take specific actions, by streamlined procedures to bring SPAC and procedures affecting criticality safety for ongoing operations up to date;

(g) assure that proper NMSLs are in place for high risk activities;

(h) define professional and site familiarization training of Criticality Safety Engineers and continuing training for Operations personnel dealing with Criticality Safety;

(i) eliminate unnecessary requirements such as NMSLs on unused tanks;

(j) define training for all program improvements identified by the New Directions Task Team; and

(k) assist operating organizations in tying corrective actions monitoring to routine self assessment efforts.

The expectation is that the charter for the task team will refine this list based on further input from the SRB and prospective members of the task team.

2) Initiate, within one month, routine SRB review of the reasonableness and effectiveness of management corrective actions identified by root cause and generic implications assessments at Rocky Flats. This action will require review by at least a subcommittee of the SRB of occurrence reports, collective significance reports, cause evaluations, root cause assessments, generic implications evaluations, etc. that identify management deficiencies as a root cause or other causal factor. The SRB should concur in the planned corrective actions, track the development and implementation of the corrective actions, and track and trend the effectiveness of completed corrective actions as they apply to management.

3) Initiate, within one month, a program to routinely track and monitor the three already approved reform programs. These reforms are already underway and should have a significant positive effect in improving criticality safety. These ongoing reforms are the programs to improve Conduct of Operations and Activity Based Planning, and to implement lessons learned from the Safety Culture Survey. The initiation of the survey was a result of the Building 771 Unauthorized Tank Draining Root Clause Analysis. The Safety Culture Survey is for 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. These are very important programs and should be pursued with all the priority and commitment that management can muster.

The actions of the New Directions task team (Recommendation one) should focus (give highest priority) to projects that address the primary causal factor themes identified in this cause evaluation. In the short term, the New Directions task team should accomplish changes that address all five of those themes, as illustrated by the preliminary list of actions identified in Recommendation one, above. In the longer term, Recommendation 2 will help to assure that

conducted with inadequate understanding of training), and theme 5 (because Conduct Of Operations improvements and responses to the Safety Culture Survey will reduce instances of procedures being followed incorrectly).

These recommendations are offered to the SRB for their endorsement and implementation.

7. ATTACHMENTS

Attachment 1: List of Reviewed Documents

Attachment 2: Root Cause Checklist

Attachment 3: Causal Factor Matrix Previous Evaluation Review

Attachment 4: Criticality Infraction Occurrence Reports

Attachment 5: Causal Factor Matrix Recent Occurrence Reports

Attachment 6: Actions Addressing Personnel and Management Inattention to Criticality Safety

Attachment 7: Corrective Actions from Occurrence Report RFFO--EGGR-771OPS-1994-0002

Lead Cause Analyst NCSC Member	J. A. McLaughlin, Sr.	Date 3/16/95
Cause Analyst NCSC Member/LANL	R. A. Haarman	Date 3/16/95
Cause Analyst LANL	D. R. Liles	Date 3/16/95
Cause Analyst NCSC Member	D. L. Mayfield	Date
Cause Analyst		Date
Responsible Manager NCSC Chair	D. W. Croucher	Date

LIST OF REVIEWED DOCUMENTS

1. Assessment of Nuclear Criticality Safety - WSG-094-92, December 15, 1992

2. Significance Evaluation Report of Nuclear Criticality Safety Program Key Deficiencies, April 20, 1994

3. Summary of Fiscal Year 1994 Nuclear Criticality Safety Assessments - BLW-239-94, October 13, 1994

4. Root Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO--EGGR-771OPS-1994-0062, November 23, 1994

5. Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990 at The Rocky Flats Plant - WSB-072-94, May 16, 1994

6. Evaluation of Generic Implications of Building 771 Incident, November 23, 1994.

7. J. N. McKamy memo, to D. G. Satterwhite, My Personal "Gut Feel" Criticality Concerns at EG&G, March 8, 1993.

ROOT CAUSE CHECKLIST

Identify Causal Factor Here

- ☐ Personnel Interaction Difficulty → See Guide to Basic Categories Below
- ☐ Equipment Reliability LTA → See Basic Cause Category "Equipment Reliability LTA" Page 3
- ☐ Natural Phenomenon/ Sabotage → See Basic Cause Category "Natural Phenomenon/ Sabotage" Page 3

GUIDE TO BASIC CAUSE CATEGORIES

START

Directions: Answer all questions and then refer to the Basic Cause Categories on pages 2 and 3 to investigate the indicated potential cause of the incident.

Individual Performance

Basic Cause Categories to investigate

- Indication of excessive fatigue, impairment, personal problems, or inattentiveness? If Yes → ☐ HUMAN ENGINEERING; ☐ IMMEDIATE SUPERVISION
- Did available information guide person to procedure? If No → ☐ HUMAN ENGINEERING; ☐ PROCEDURES
- Was procedure used correctively? If No → ☐ PROCEDURES
- Were displays/alarms/ controls/equipment [illegible] to perform task? If No → ☐ HUMAN ENGINEERING
- [illegible] If Yes → ☐ TRAINING
- [illegible] If Yes → ☐ PROCEDURES
- Was knowledge of task performance or equipment response missing? If Yes → ☐ TRAINING
- Was work performed in adverse environment (hot, humid, dark, cramped or hazardous)? If Yes → ☐ HUMAN ENGINEERING

Team Performance

Basic Cause Categories to investigate

- Was coordination required between team members or did shifts change? If Yes → ☐ COMMUNICATIONS
- Was there agreement about the who/what/why/when of task performance? If Yes → ☐ TRAINING; ☐ COMMUNICATIONS; ☐ IMMEDIATE SUPERVISION

Management

- Was communication across organizational [illegible] facilities required? If Yes → ☐ COMMUNICATIONS
- Was task performed [illegible] or shortcuts Yes → ☐ MANAGEMENT SYSTEM; ☐ IMMEDIATE SUPERVISION
- Were administrative controls or policies to prevent/identify/ mitigate the error not used or missing? If Yes → ☐ MANAGEMENT SYSTEM
- Should a QC check have caught the problem? If Yes → ☐ QUALITY CONTROL

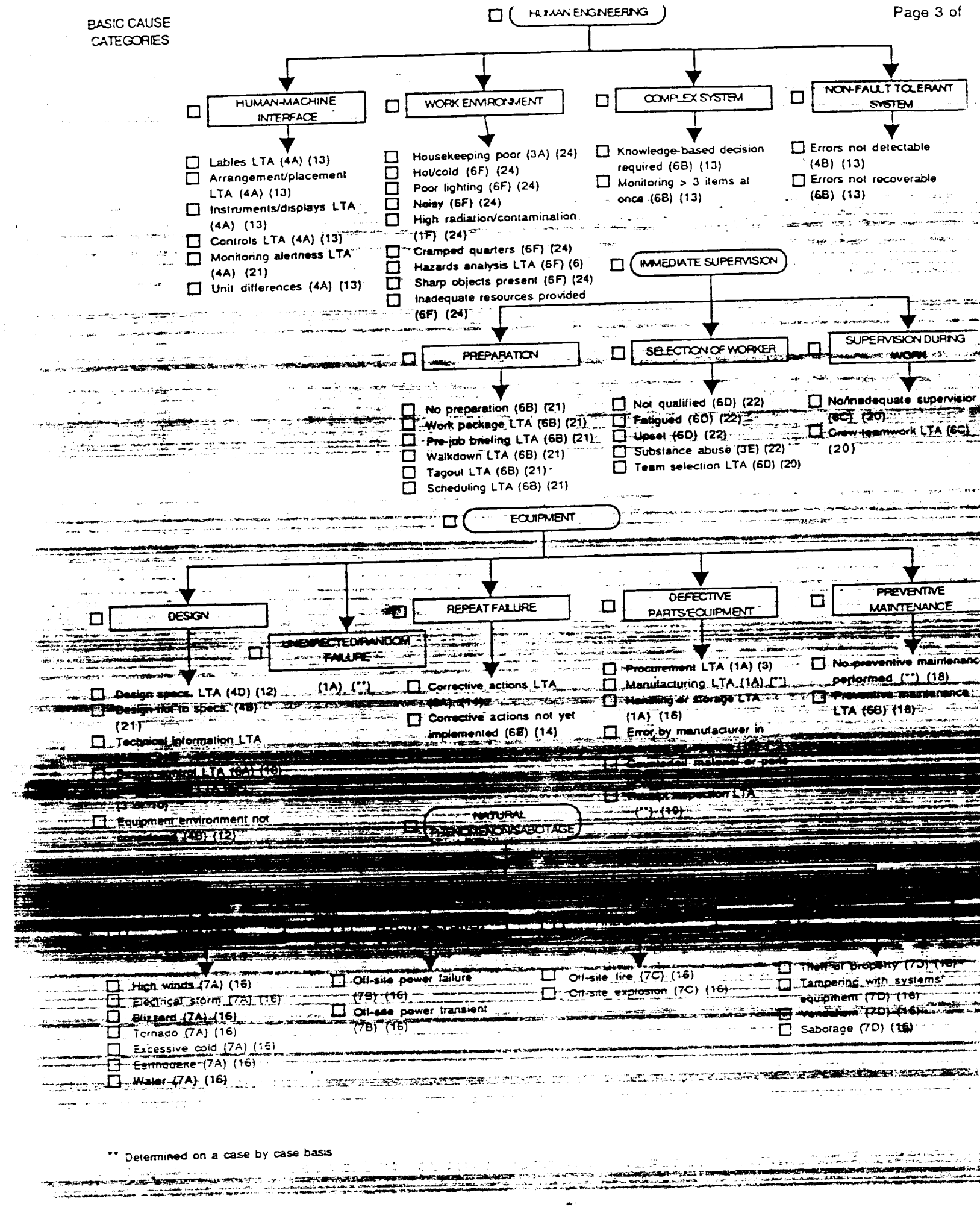
Go to pages 2 and 3 for the Basic Cause Categories

BASIC CAUSE CATEGORIES

- ☐ PROCEDURES
  - ☐ NOT USED
    - ☐ No Procedure (2B) (10) *
    - ☐ Not available or inconvenient for use (2B) (10)
    - ☐ Difficult to use (2A) (10)
    - ☐ Use not required but should be (2B) (10)
  - ☐ FOLLOWED INCORRECTLY
    - ☐ Format confusing (2A) (10)
    - ☐ > 1 action/step (2A) (10)
    - ☐ Excess references (2A) (10)
    - ☐ Limits LTA (2A) (10)
    - ☐ Details LTA (2A) (10)
    - ☐ Data wrong/incomplete (2A) (10)
    - ☐ Graphics LTA (2A) (10)
    - ☐ No check-off (2A) (10)
    - ☐ Check-off misued (3C) (21)
    - ☐ Misused second check (3C) (21)
    - ☐ Ambiguous instructions (2A) (10)
    - ☐ Equipment identification LTA (2A) (10)
    - ☐ Inattention to detail (3B) (21)
  - ☐ WRONG
    - ☐ Typo (2A) (10)
    - ☐ Sequence wrong (2A) (10)
    - ☐ Situation not covered (2A) (10)
    - ☐ Facts wrong (2A) (10)
    - ☐ Wrong revision used (3C) (21)
    - ☐ Second check needed (2A) (10)
    - ☐ Defective/inadequatee (2A) (10)
- ☐ COMMUNICATIONS
  - ☐ MISUNDERSTOOD
    - ☐ Standard teminology not used (6A) (26)
    - ☐ Repeat back not used (3D) (26)
    - ☐ Long message (3D) (26)
    - ☐ Noisy environment (3A) (24)
    - ☐ Ambiguous message (6A) (26)
  - ☐ NO COMMUNICATIONS/ NOT TIMELY
    - ☐ No formal process (6A) (3)
    - ☐ Late communication (6B) (26)
  - ☐ TURNOVER LTA
    - ☐ No formal process (6A)
- ☐ TRAINING
  - ☐ NO TRAINING
    - ☐ Task not analyzed (5A) (23)
    - ☐ Decided not to train (5A) (23)
    - ☐ No learning objective (5A) (23)
  - ☐ UNDERSTANDING LTA
    - ☐ Learning objectives LTA (5C) (23)
    - ☐ Lesson plan LTA (5C) (23)
    - ☐ Instruction LTA (5B) (23)
    - ☐ Practice/repetition LTA (5B) (23)
    - ☐ Testing LTA (5B) (23)
    - ☐ Continuing training LTA (5D)
- ☐ QUALITY CONTROL
  - ☐ NO INSPECTION
    - ☐ Inspection not required (6A) (14)
    - ☐ No hold point (6A) (14)
    - ☐ Hold point not performed (3C) (21)
  - ☐ QC LTA
    - ☐ Inspection instructions LTA (2A) (10)
    - ☐ Inspection technique LTA (3B) (21)
    - ☐ Foreign material exclusion during work LTA (3B) (21)
- ☐ MANAGEMENT SYSTEM
  - ☐ No SPAC (6A) (2, 4, 6, or 7)
  - ☐ Not strict enough (6E) (2)
  - ☐ Confusing or incomplete (6E) (2)
  - ☐ Technical error (6A) (2)
  - ☐ Drawings prints LTA (4D) (5)
  - ☐ Communication of SPAC LTA (6E) (3)
  - ☐ Recently changed (6A) (3)
  - ☐ Enforcement LTA (6E) (3)
  - ☐ No way to implement (6F) (3)
  - ☐ Accountability LTA (6B) (3)
  - ☐ Inadequate audits and evaluations (A & E) (6F) (8)
  - ☐ A & E lacks depth (6F) (8)
  - ☐ A & E not dependent (6F) (8)
  - ☐ Employee communications LTA (6E) (26)
  - ☐ No employee feedback (6F) (3)
  - ☐ Corrective action LTA (5A) (14)
  - ☐ Corrective action not yet implemented (6B) (14)

* The first designator in parentheses is the ORPS cause code. The second designator in parentheses is the MORT cause code.

BASIC CAUSE CATEGORIES



** Determined on a case by case basis

Cause Identification and Corrective Action Recommendations

Cause (s)

Corrective Action (s)

[redacted]

Analyst/Date

Responsible Manager/Date

CAUSAL FACTOR MATRIX TO COMPILE AND SORT RESULTS OF PREVIOUS EVALUATIONS

WEIGHTING FACTORS

1 = POTENTIAL PROBLEMS

2 = CONTRIBUTING CAUSES

3 = CAT 3 FINDINGS & ROOT CAUSES

4 = CAT 2 FINDINGS, DEFICIENCIES, & SUMMARY ROOT CAUSE

	IDENTIFICATION NUMBER	Stds, Policies or Admin. Controls (SPAC) LTA	SPAC Not Used	Oversight	Corrective Action (CA)	Procedures - Followed Incorrectly	Training - No Training	Training - Understanding LTA	No Communication - Not Timely	Human-Machine Interface	Supervision During Work
Assessment of Nuclear Criticality Safety, WSG-094-92, December 15, 1992											
F-PA-92-39/01 - CAT 3: Personnel & Mgmt. trng. needs to instill a concern for Crit. Safety	1						X 3				
F-PA-92-39/02 - CAT 3: There is insufficient confidence that criticality safety evaluations are conservative	1	X 3									
F-PA-92-39/03 - CAT 3: Raschig ring procedures lack conservatism.	1	X 3									
F-PA-92-39/04 - CAT 3: Criticality Safety Engineer training and qualification is inadequate	1						X 3				
F-PA-92-39/05 - CAT 3: The RFP procedures do not address interaction between nearby process stations	1	X 3									
F-PA-92-39/06 - CAT 3: Criticality Alarm facilities procedures	1			X 3							
F-PA-92-39/07 - CAT 3: OSOL-94014, Evaluation JW-248.3, Section 7, contains a conclusion that is not conservative	1	X 3									
F-PA-92-39/08 - CAT 3: Records storage of [illegible]	1										
F-PA-92-39/17 - CAT 4: Management and personnel inattention to detail in criticality safety is seen in ORs	1					X 3					
F-PA-92-39/18 - CAT 3: Raschig ring filled tank gamma scans, calibrations, inspections, and laboratory analysis have not been done	1		X 4								
F-PA-92-39/19 - CAT 3: The control and assessment of criticality safety in the facilities is deficient	1	X 3									

CAUSAL FACTOR MATRIX TO COMPILE AND SORT RESULTS OF PREVIOUS EVALUATION

WEIGHTING FACTORS

1 = POTENTIAL PROBLEMS

2 = CONTRIBUTING CAUSES

3 = CAT 3 FINDINGS & ROOT CAUSES

4 = CAT 2 FINDINGS, DEFICIENCIES, & SUMMARY ROOT CAUSE

Significance Evaluation Report of Nuclear Criticality Safety Program Key Deficiencies - April 20, 1994	IDENTIFICATION NUMBER	Stds. Policies or Admin. Controls (SPAC) LTA	SPAC Not Used	Oversight	Corrective Action (CA)	Procedures - Followed Incorrectly	Training - No Training	Training - Understanding LTA	No Communication - Not Timely	Human Machine Interface	Supervision During Work
DEFICIENCY 1: Responsibilities are not clearly defined	2	X 4									
DEFICIENCY 2: Nuclear Criticality Safety Procedures are Deficient	2		X 4								
DEFICIENCY 3: Accountability for correcting identified deficiencies and preventing recurrence is lacking	2				X 4						
DEFICIENCY 4: Nuclear Criticality Safety procedures, documents, and evaluations are not being properly maintained	3				X 4						
DEFICIENCY 5: The admin. requirements which ensure compliance with crit. safety physical controls are not always followed	3		X 4								
SUMMARY CAUSE: Personnel failed to fully accept and implement the concepts of Conduct of Operations	4							X 4			
ROOT CAUSE A: Performance of task was less than adequate	4					X 3					
ROOT CAUSE B: Supervision of work was less than adequate	4										X 3

CAUSAL FACTOR MATRIX TO COMPILE AND SORT RESULTS OF PREVIOUS EVALUATIONS

WEIGHTING FACTORS

1 = POTENTIAL PROBLEMS

2 = CONTRIBUTING CAUSES

3 = CAT 3 FINDINGS & ROOT CAUSES

4 = CAT 2 FINDINGS, DEFICIENCIES, & SUMMARY ROOT CAUSE

	IDENTIFICATION NUMBER	Stds, Policies or Admin Controls not Adequate	SPAC Not Used	Oversight	Corrective Action (CA) Inadequate	Procedures - Followed Incorrectly	Training - No Training	Training - Understanding LTA	No Communication - Not Timely	Human-Machine Interface	Supervision During Work
Root Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO--EGGR-771OPS-1994-0062 November 23, 1994 (Cont.)											
ROOT CAUSE C: Inadequate barriers and controls were established in work control document (TIP 5)	4								X 3		
CONTRIBUTING CAUSE D: Ineffective corrective action for previously identified weaknesses	4				X 2						
CONTRIBUTING CAUSE E: Participants had expired qualifications	4						X 2				
POTENTIAL PROBLEM F: Perception of inconsistent discipline may hinder reporting of safety information	4		X								
POTENTIAL PROBLEM G: Lockout/Tagout (LOTO) violated compensatory measure for USQD	4		X								
Collective Significance Evaluation of Criticality Safety Procedural Infractions Since 1990 at the Rocky Flats Plant WSB-072-94 - May 16, 1994											
ROOT CAUSE - Standards, Policies, and/or Administrative Controls are not adequately implemented or enforced	3										
CAUSE - Ineffective corrective actions were developed to prevent recurrence of problems in previous SAA reports					2						
CAUSE - The LL section of ORs was not used in buildings to prevent recurrence of incidents that took place in other buildings	5								X 2		
CAUSE - Ambiguous instructions, incorrect limits, and other incorrect facts contributed to 17.5% of infractions	5	X 2									
TOTALS		7	7	1	5	3	1	5	1	1	1
WEIGHTED TOTALS		21	20	3	16	8	3	17	2	3	3

Criticality Infraction Oc[illegible] All Applicable [illegible] Collective Significance Evaluation, May 1994 to January 27, 1995

Area	Report #	[illegible]	Title - Notes	Report Status
371 OPS	1993-0079	[illegible]	Drum >NMSL needs to be recounted w/Seg. Gamma scan. No action planned.	Final
	1994-0029	[illegible]	Drum 3 grams > NMSL of 1000g/drum. Temporary NMSL.	Final
	1994-0077	[illegible]	Gamma scan on Tank D-293B exceeded NMSL.	Final
	1995-0006	[illegible]	NMSL [illegible] M2 for loading drums. M2 limit no longer exists.	Notification
771 OPS	1993-0093	[illegible]	Improper storage of Pu source.	10 day,>45 days
	1993-0090	[illegible]	Material movement without proper procedures.	10 day,>45 days
	1994-0002	[illegible]	Pu oxide [illegible] with grease stored under dry Pu.	Final
	1994-0031	[illegible]	[illegible] gamma scan not performed per NMSL.	10 day,>45 days
	1994-0062	[illegible]	Solution stabilization line drained without procedure. Concentration of [illegible]. NMSL requires [illegible]	10 day,>45 days
	1994-0066	[illegible]	USQ identified on plutonium holdup in ventilation system.	10 day,>45 days
	1994-0077	[illegible]	[illegible] containment wrap on 2 valves poses potential liquid accumulation area in violation of NMSL.	10 day,>45 days
	1994-0080	[illegible]	Potential criticality infraction identified in glovebox D-2 in B-771	10 day,>45 days
	1994-0089	[illegible]	NMSL in glovebox [illegible], room 182, requires no fissile material. Bottles of oil identified in [illegible] containing undetermined fissile material.	10 day,>45 days
	1994-0090	[illegible]	Criticality engineer identified B boxes E50 and E51 that violate the NMSL due to lack of a criticality drain. Boxes unused & taped over for many years.	10 day,>45 days
	1994-0092	[illegible]	Monthly verification of system lineup not verified for July & October. This is an NMSL requirement to address lack of double contingency on taschig ring tanks.	10 day,>45 days
	1994-100	[illegible]	Drum found with total gram weight exceeding NMSL.	10 day,>45 days
	1995-0012	[illegible]	Water chiller unit shroud identified as non raschig ring filled container >[illegible] liters.	Notification
774 OPS	1994-0007	[illegible]	Gamma scans not performed for U235 per NMSL. 10 day update.	10 day,>45 days
	1994-0016	[illegible]	Tanks 201 [illegible] found to have high gamma scans.	10 day,>45 days
Non Pu OPS	1994-0010	[illegible]	Tanks in room 103 of B886 not seismically qualified, USQ.	10 day,>45 days
Analytops	1993-0163	[illegible]	Plastic house [illegible] inverted, not in compliance.	Final
	1994-0092	[illegible]	Criticality drain higher than 2 inches on soft sided containment. Prelim.	Final

Reports after 11/29/94 [illegible] >45 days Without Final Highlighted

Criticality Infraction Occurrence Reports After Publication of the Collective Significance Evaluation, May 1994 to January 27, 1995

Area	Report #	Discovery Date	Title - Notes	Report Status
Pu Fab	1993-0160	9/27/93	Duct holdup > 400g due to 1.5 factor.	Final
	1994-0007	1/18/94	Plenum holdup surveillance not performed.	Final
	1994-0096	5/12/94	Can on wrong position on cart.	10 day, >45 days
	1994-0165	8/17/94	Dry Pu moved based on wet Pu CSOL.	Final
	1994-0216	10/20/94	Two packages put in drum without proper paperwork, no gram limit data on traveler for packages.	Final
	1994-0233	11/7/94	CSOL infraction, can discovered tilted in storage tray. Prefinal.	Final
SOLIDWST	1993-0050	10/5/93	Equipment configuration not per NMSL.	Final
776/777	1993-0056	10/19/93	Drums double stacked.	Final
	1994-0024	3/14/94	Supercompactor filters not changed per limit.	Final
	1994-0026	3/30/94	117 drums > 1000g, IDC 405,421.	Final
	1994-0033	5/2/94	6 inch berm on T-3 .	Final
	1994-0046	6/14/94	NCSA report, 8 areas with potential infractions.	Final
	1994-0050	6/20/94	Shop vacuum infraction.	Final
	1994-0057	7/ /94	Raschig ring filled pit in floor, new discovery.	Cancelled
	1994-0063	7/11/94	New NMSL posted before area was changed from old limit.	Final
SOLIDWST	1994-0081	8/26/94	Configuration of carts does not meet NMSL.	Final
776/777	1994-0094	10/13/94	14 waste drums, IDC 292, identified with free standing liquid based on radiography, improper packaging & potential criticality infraction. Prefinal.	Final
	1994-0104	11/13/94	Carpenters crate stacked on top of a LLW crate in Rm 134, B776. Inter Plant shipping manual allows only single stacking. Prefinal.	Final
	1994-0123	12/ /94	Drum found in size reduction area. Undetermined if drum is empty. Prefinal.	Final
	1994-0124	12/ /94	Incorrect NMSL used during ventilation and aspiration of drums. 10 day update.	10 day
	1995-0003	1/ /95	Five empty 110 gallon over-pack drums being stored in room 134, B778. possible criticality infraction.	10 day
	1995-0005	1/18/95	One gallon machine bit discovered in glovebox 642, Rm 131, B777.	10 day

Reports after 11/29/94 and Reports >45 days Without Final Highlighted

Attachment 4

CAUSAL FACTOR MATRIX TO COMPILE CAUSAL FACTOR THEMES FROM RECENT OCCURRENCE REPORTS

	IDENTIFICATION NUMBER	Stds. Policies or Admin. Controls (SPAC) LTA	SPAC Not Used	Oversight	Corrective Action (CA)	Procedures - Followed Incorrectly	Training - No Training	Training - Understanding LTA	Equipment - Design
Current ORs evaluated utilizing root cause checklist - number of reports with same causal factors	6	9	9	2	1	12	2	1	5
TOTALS		9	9	2	1	12	2	1	5
WEIGHTED TOTALS									

ACTIONS FROM LETTER WAK-0259-93 ADDRESSING PERSONNEL AND MANAGEMENT INATTENTION TO CRITICALITY SAFETY

FINDING

Personnel and Management Inattention to Criticality Safety (IMP 93-0046, combined Nuclear Criticality Safety Assessment concerns F-PA-92-39/01, F-PA-92-39/15, F-PA-92-39/16). "Personnel/management inattention remains the major causal factor for criticality safety procedural infractions. the infraction rate remains relatively high despite curtailment."

Action(s) taken by Facility Management and Operations:

Criticality safety information is disseminated to personnel through continuing training activities. these activities include all-hands meetings, per-shift briefings, al required reading program, tool box meetings, safety meetings, and pre-evolution briefings. This is in addition to required (core) training. Also, all personnel assigned to a building in which fissile material is handled, stored, or transported receive comprehensive On-the-Job Training (OJT), during which hazards specific to the job are discussed.

All buildings in which fissile material is stored or handled are performing monthly facility self-assessments in accordance with 4-91000-NSP-0.10, Monthly Criticality Safety Assessments.

RFP has implemented a Pre-Operational/Pre-Posting Criticality Safety Operating Limits (CSOL)/Nuclear Materials Safety Limits (NMSL) Surveillance procedure, to be used each time personnel access a glovebox, hood, or area where fissile materials may be stored, handled, or transferred.

Note:

The escalation in the reporting of criticality safety procedural infractions can be directly attributable to heightened personnel and management awareness and attention as result of the implementation of criticality safety assessment procedures as described above.

CORRECTIVE ACTIONS FROM OCCURRENCE REPORT RFO--EGGR-771OPS-1994-0002

A review of the Occurrence Report, the Occurrence Report backup file, PATS, and the Interim Nuclear Materials Safety Manual for Building 771 was conducted to obtain information in this attachment. In addition, discussions were held with affected personnel. Where background information was available in the occurrence report files to support that the actions were complete, the team made no attempt to independently verify that information.

1. "Change the room number designation of Room 146C in Building 771 in order to comply with the NMSL, or change the NMSL to correct the room number listed therein from 146B to 146C."

   Observations: Shown complete per RFO--EGGR-771OPS-1994-0002 and PATS Commitment Number 94-003328 on March 20, 1994.

2. "Move Vollrath 8802 container, ID #07161819, from Vault 188 to Room 146C, Building 771, in accordance with letter from CSBS [*Criticality Safety Building Support*] Engineering."

   Observations: Completion date not given in RFO--EGGR-771OPS-1994-0002 as of January 27, 1995. Shown complete per PATS Commitment Number 94-003328 on March 2, 1994. Occurrence Report updated February 20, 1995, to add completion date of March 2, 1994.

3. "Move three containers, ID numbers 07020900, 07020899, and MT7288, from Vault Room 184 to the Staging Door Area in Room 114, Building 771, or other approved storage area as established by CSBS Engineering."

   Observations: Completion date not given in RFO--EGGR-771OPS-1994-0002 as of January 27, 1995. 289 days late as of 2/14/95 per PATS Commitment Number 94-003328. Occurrence Report updated February 20, 1995, for late completion.

   Building 771 personnel and Criticality Safety personnel. This interim storage was part of the written instruction contained in Criticality Safety letter MVM-013-94. This situation has been referred to the Director of Waste Stabilization for action.

4. "Move three containers, ID numbers 07021035, 07061277, and 502293, from Vault Room 188 to the Staging Door Area in Room 114, Building 771, in accordance with letter from CSBS Engineering."

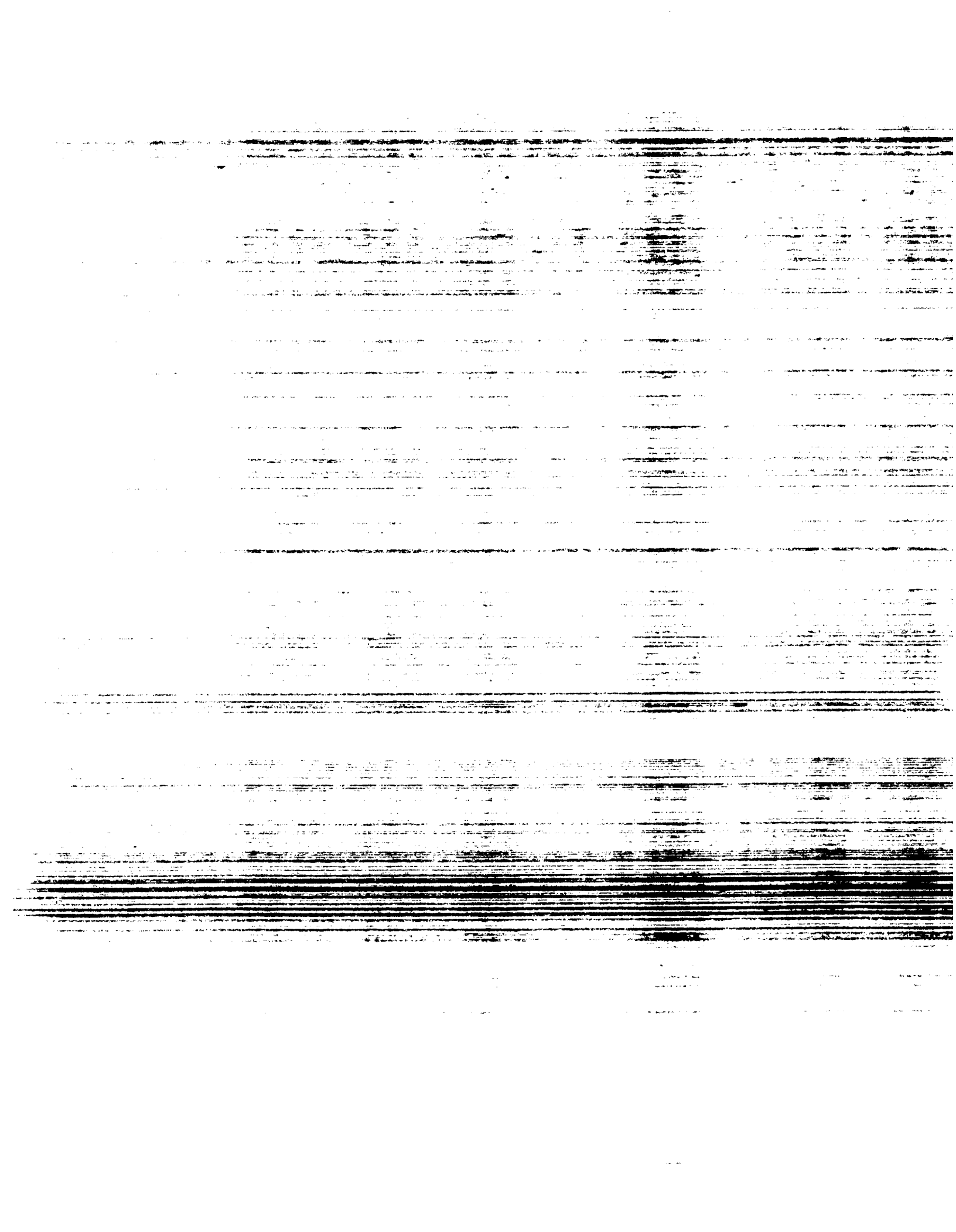
Observations: Completion date not given in RFO--EGGR-771OPS-1994-0002 as of January 27, 1995. 289 days late as of February 14, 1995, per PATS Commitment Number 94-003328. Occurrence Report updated February 20, 1995, to add completion date of April 19, 1994. PATS updated February 21, 1995, to show complete.

5. As part of the Criticality Safety Evaluation dated March 3, 1994, for NMSL/CSOI-940011, Moderated Versus Un-Moderated (Wet Versus Dry) Fissile Material, Criticality Analysis Engineering (CAE) determined the following: (a) The Building 707 wet/dry definition will be revised; (b) To maintain consistency across plantsite, the wet/dry general comment will be changed in all building manuals. As this action is beyond the scope of this occurrence report, the revisions will be tracked to completion by the Criticality Safety Engineering group. No other actions other than those listed will be performed under this occurrence report."
Observations: Shown complete per RFO--EGGR-771OPS-1994-0002 and PATS Commitment Number 94-003328 on May 4, 1994. Per review with Criticality Safety personnel on February 15 and 16, 1995, NMSL-940011 had not been issued to the Interim Nuclear Materials Safety Manual for Building 771 or to any other buildings. It was verified on February 21, 1995, that NMSL-940011 has not been distributed to the Building 771 Operations Manager's copy of the Interim Nuclear Materials Safety Manual for Building 771. The general comment nuclear material safety limit for moderation control NMSL-90088, cited as a problem in RFO--EGGR-771OPS-1994-0002, is still the current formal limit for Building 771.

Based on discussions with Criticality Safety personnel, the transfer of commitments to track and issue revised limits to Building 771 and extend the new limits sitewide for consistency between interacting buildings was not clearly communicated or formally accepted by the Criticality Safety Department. Per discussion with Building 771 personnel, they believe this transfer of commitments was clear and documented. As of February 15, 1995, this corrective action was not being formally or actively tracked by Criticality Safety. Per discussions with Criticality Safety personnel, there is no sitewide funding to address such generic criticality safety [illegible] Safety does not have [illegible] resources to complete the [illegible] except one are assigned to Programs with work schedules and priorities set by the Programs. Per discussions with Criticality Safety personnel, no work on this issue is currently underway or scheduled.

It was also noted that Final Occurrence Report RFO--EGGR-771OPS-1994-0002, Section 15, Description of Occurrence, and Section 22, Description of Cause, indicate that NMSL-940011 was issued and give the date as March 9, 1994. Contrary to the impression given by the occurrence report, this limit has not been distributed almost a year later.

It is the conclusion of this review that corrective actions to clarify and improve the general comment nuclear materials safety limits for moderation control have not been implemented and have therefore not been effective to prevent recurrence. This situation is considered as providing examples of (1) lack of clear definition of responsibilities, (2) less than adequate operations/criticality safety interface, (3) personnel and management inattention to criticality safety, and (4) inability of the program to drive a criticality safety issue with sitewide implications to closure with corrective actions to prevent recurrence in a timely manner. This situation has been referred to the Directors of Engineering and Waste Stabilization for action.



Attachment 2

Nuclear Facility Operation Safety Assessment Team
Report for Rocky Flats Environmental Technology Site
Report Number: SPA-95-0002, dated April 19, 1995

Nuclear Facility Operations Safety Assessment Team Final Report

for

Rocky Flats Environmental Technology Site

Report Number: SPA-95-0002

Prepared for
Director, Standards, Performance and Assurance
U.S. Department of Energy
Rocky Flats Field Office
April 19, 1995

Contents

Acronyms

DOE	U.S. Department of Energy
DOE/HQ	U.S. DOE/Headquarters
DOE/HQ-DP	U.S. DOE/Defense Programs
DOE/HQ-EM	U.S. DOE/Environmental Management
DOE/RFFO	U.S. DOE/Rocky Flats Field Office
EG&G	Edgerton, Germeshausen, and Grier
IPS	Integrated Planning and Scheduling
L	Liter
LO/TO	Lockout/tagout
NCSE	Nuclear Criticality Safety Engineer
NCSP	Nuclear Criticality Safety Program
NMSL	Nuclear Material Safety Limit
PPG	Procedure Preparation Guide
RFETS	Rocky Flats Environmental Technology Site
SRB	Safety Review Board
TIP	Task Information Package
USQD	Unreviewed Safety Question Determination

1. Executive Summary

1.1. Assessment Purpose

The purpose of the Nuclear Facility Operations Safety Assessment was to conduct an independent verification of the EG&G document "Root-Cause Analysis of the Building 771 Unauthorized Operation of Process Lines Reported in Occurrence Report RFO-EGGR-771OPS-1994-0062," (hereafter, the Root-Cause Analysis) at the Rocky Flats Environmental Technology Site (RFETS). In addition, recommendations were to be provided on actions that could be taken by the Department of Energy (DOE) and/or the new RFETS integrated management contractor to improve the safety of nuclear facility operations at the RFETS. This report describes the observations, conclusions, and recommendations from the assessment. It was prepared for and submitted to the Manager of the DOE Rocky Flats Field Office (DOE/RFFO).

1.2. Incident Description

The initiating incident (hereafter, the Incident) took place on September 29, 1994, at RFETS in Building 771 (B-771). During the midnight shift, a team used an approved procedure to drain Tank D467. The tank contained 210 liters (L) of solution with a plutonium concentration of about 0.5 g/L, which was placed in 52 4-L bottles inside Glove Box 42. When the tank was drained, all team members left the area, except one process specialist. The process specialist was to clean up the area and to monitor the vacuum system, which was to be left on for 1 hour to ensure complete removal of any remaining moisture in the tank and process lines.

Without authorization, the process specialist then drained an estimated 5 L of solution from the process line from Tank D973 into 4-L bottles. The liquid from the process line was darker in color than the solution drained from D467, which usually indicates a higher plutonium concentration. While the line was being drained, the production manager and foreman returned and observed the unauthorized actions of the process specialist. All three individuals then participated in a cover-up of the unauthorized activity.

On October 6, the production supervisor had an unauthorized sample of the solution from Tank D973 drawn and an unauthorized analysis conducted. The results indicated a plutonium concentration of 8.2 g/L. When informed of the results, the production manager notified the shift manager, who immediately terminated nuclear operations in the building and reported the Incident to EG&G and DOE/RFFO management. EG&G began an investigation and conducted a critique[1] on the morning of October 7. On October 7, as a result of the seriousness of the incident, Standing Order 34 was issued, which suspended fissile materials activities throughout the RFETS. Between October 1994 and January 1995, a number of reviews and investigations were conducted and the ensuing reports submitted, including a Root-Cause Analysis conducted by EG&G.

1.3. Chartering and Conduct of the Assessment

In early 1995, senior managers of the DOE/RFFO concluded that perhaps the Root-Cause Analysis may have been too narrowly defined and as a result might not have identified the actual root cause. Those managers determined that an independent review might clarify the root cause and suggest actions to improve the contractor, DOE Headquarters (DOE/HQ), and DOE/RFFO performances. A Team Leader (the Acting and now confirmed Deputy Manager of the DOE/RFFO) was selected who had no prior Incident involvement as he was assigned to RFETS after the Incident took place. Team members were selected with a broad variety of backgrounds and viewpoints. See Appendix B for a list of team personnel.

The Assessment Team was chartered (Appendix A) to verify the Root-Cause Analysis and to review DOE/RFFO comments to EG&G's Root-Cause Analysis. Furthermore, the Assessment Team was to review the program policy and guidance provided by the DOE/HQ-EM to the DOE/RFFO; to review the program policy and guidance provided by the DOE/RFFO to EG&G; to review the program policy and guidance provided by EG&G to facility operators; and to identify factors of the management of nuclear facility operations at the RFETS that may contribute to or are root causes of safety problems.

The Assessment Team conducted a 2-week onsite visit. During that visit, the members of Assessment Team conducted over 90 interviews, reviewed over 100 documents, and toured relevant facilities. Based on information gathered during the visit and substantial personal experience, the Assessment Team derived conclusions and recommendations.

[1] A post-incident critique gathered everyone who was in any way connected with the incident for a thorough discussion of the incident.

1.4. Major Conclusions

The Assessment Team evaluated the Root-Cause Analysis and the DOE/RFFO comments to the Root-Cause Analysis. The Assessment Team also reviewed management and safety practices of the DOE/HQ, the DOE/RFFO, and the contractor. Major conclusions relative to these evaluations follow.

1.4.1. Conclusions: Assessment of the Root-Cause Analysis and the DOE/RFFO Comments

The Root-Cause Analysis did not have a sufficiently broad scope to identify the management factors that contributed to the Unauthorized Tank-Draining Incident in B-771. The Assessment Team identified the root cause as the failure of the DOE/RFFO and contractor management to establish an appropriate safety culture at B-771, RFETS. In addition, the Root-Cause Analysis did not fully examine the serious criticality safety implications of the incident. Under similar circumstances, but involving tanks containing solutions of higher concentrations of plutonium, like actions might have resulted in a criticality accident.

The DOE/RFFO comments appropriately raised significant issues about the Root-Cause Analysis, including a concern that the EG&G management practices permitted unacceptable behavior by operating personnel in B-771. The DOE/RFFO also expressed valid concerns about the effectiveness of the corrective actions to prevent similar incidents in the future. The DOE/RFFO did not request and EG&G did not prepare a written response to the DOE/RFFO comments.

1.4.2. Conclusions: Assessment of Management Practices

The Assessment Team identified several management practices as contributing causes to problems in safety and work performance. These factors relate to business operations, organizational and work force stability, communications, and leadership.

- The lack of fully Integrated Planning and Scheduling (IPS) for dealing with the site-wide problems of deteriorating facilities and areas of increasing risk, including B-771 and its processes and equipment, is a serious problem.

- Frequent turnover in senior and middle DOE/RFFO and contractor management positions contributes to performance problems.

- Corporate and day-to-day communication techniques appear to be ineffective.

- DOE/HQ-EM and the DOE/RFFO failure to integrate and control programmatic directions from its various program offices to the contractor contributes to managerial ineffectiveness at RFETS.

- Deficiencies in the safety culture can be attributed to a large number of factors, including leadership failure at various levels. Management should have recognized the symptoms of a poor safety culture and corrected the deficiencies.

1.4.3. Conclusions: Safety Practices

Safety practices at RFETS, while clearly identifiable in terms of organization and function, are weak, particularly in resolution of safety issues.

- The Nuclear Criticality Safety Program (NCSP) is unable to provide timely support to programmatic operations as a result of a lack of experienced Nuclear Criticality Safety Engineers (NCSEs). This is aggravated by an inadequate training program.

- Contractor management actions have not sufficiently altered the safety culture of B-771 to restart high-risk operations without special measures. Substantial changes in safety attitude and effective rectification or mitigation of existing shortfalls must occur before high-risk activity resumes.

- The presence of the belief among operating personnel that "a criticality accident cannot happen here" is considered a major risk factor in future operations.

- Resolution of safety concerns does not appear to occur effectively, whether brought through line management or through the Safety Review Board (SRB).

- The Contractor and the DOE/RFFO management do not seem to use an Issues Management System to single out significant safety problems from minor issues.

1.5. Major Recommendations

The Team's major recommendations follow. Section 5, Management Practices, and Section 6, Safety Practices, provide additional detail.

- The DOE/RFFO and the contractor should expand and accelerate their IPS efforts. Consideration should be given to forming an IPS joint task force with DOE/HQ-EM, DOE/RFFO, and contractor personnel.

- The DOE/RFFO and the contractor should establish organizational and work-force stability as soon as possible. Consideration should be given to establishing performance-based criteria that promote organizational stability, particularly in senior and middle management.

- The DOE/RFFO and the contractor should improve dialogue within and between organizations to ensure achievable commitments are clearly understood and agreed upon.

- Contractor management should realistically evaluate the ability of Criticality Engineering to support program needs. Aggressive efforts should be made to address the training needs of the nuclear criticality staff.

- DOE/HQ-EM and DOE/RFFO should strengthen efforts to integrate and control the flow of guidance to the contractor.

- DOE/HQ-EM should retain the option to use DOE/HQ-Defense Programs (DOE/HQ-DP) technical support.

- The DOE/RFFO and the contractor should critically reexamine their communication initiatives and make innovative changes that overcome the widespread "this too shall pass" attitudes and achieve "real" communications with the work force.

- The SRB and the Nuclear Criticality Safety Committee should be revitalized.

- The new contractor should review and strengthen, as necessary, the management arrangements, operational controls, and procedures in B-771 (and in other facilities) in order to improve its safety culture.

- The DOE/RFFO should ensure that proactive identification of safety issues is encouraged. The contractor and the DOE/RFFO should ensure that alternative paths for reviewing safety concerns exist and are effective.

- The DOE/RFFO and the contractor should develop and implement an Issues Management System to differentiate between significant safety problems and minor issues.

1.6. Summation

The Assessment Team believes that the Incident was one of the most serious in recent history. There was a serious breach of criticality safety and management control. Two levels of supervision observed the failure and, instead of stopping the activity, took part in a cover-up of the event. The Incident demonstrates a serious lack of safety culture, technically and philosophically. When the existing problems in management are considered along with the destabilizing influences presently at work onsite, the safety of RFETS operations is at risk. That risk translates into an increased likelihood of a serious accident and demands aggressive and deliberate actions.

2. Introduction

This report by the Nuclear Facility Operations Safety Assessment Team (the Assessment Team) was prepared at the request of the Director Standards, Performance and Assurance, who is the independent assessor for the Manager, DOE/RFFO. The report identifies and evaluates factors that have contributed to or are the major elements of the root cause for safety problems in nuclear facility operations, specifically in B-771, at the RFETS.

2.1. Report Organization

This section describes the purpose, objectives, and methodology used by the Assessment Team and provides a summary of the Assessment Team's activities. Section 3 provides a brief background on B-771, a history of the Incident in B-771, and identifies Incident follow-up actions taken by EG&G management. Section 4 documents the assessment of the Root-Cause Analysis and the DOE/RFFO comments to the Root-Cause Analysis. An assessment of management practices by DOE/HQ-EM Offices, DOE/RFFO, and EG&G and their effect on efficient and safe operations at RFETS is discussed in Section 5. An evaluation of safety programs, specifically the criticality safety, facility safety, procedures and compliance, and overall safety functionality, is presented in Section 6. In Section 7, conclusions and recommendations are summarized. Appendices A through D provide additional background information.

2.2. Assessment Purpose, Objectives, and Methodology

The purpose of the assessment was to evaluate EG&G's Root-Cause Analysis and the DOE/RFFO's comments and management of nuclear facilities at RFETS and to make recommendations based on that evaluation. The assessment was conducted by a team of experienced top-level managers and experts in criticality safety and nuclear facility operations. The Acting (now confirmed) Deputy Manager, DOE/RFFO, was appointed Team Leader. The Deputy Manager had no prior-Incident involvement as he was assigned to

the RFETS after the Incident took place. He selected the Assessment Team members and scheduled the assessment. See Appendix A for the Charter of the Assessment Team and Appendix B for the composition of the Assessment Team.

The objectives of the assessment were to:

- Conduct an independent verification of EG&G's Root-Cause Analysis and Generic Implications and perform an independent review of the DOE/RFFO comments.
- Conduct a review of program policy and guidance (as it affects facility safety and management) provided by:
  - — DOE/HQ-EM to DOE/RFFO.
  - — DOE/RFFO to EG&G.
  - — EG&G to its personnel.
- Develop a report with recommendations.

The Assessment Team reviewed various documents provided as background material, including the Root-Cause Analysis, the DOE/RFFO comments to the Root-Cause Analysis, and the proposed corrective actions. Additional information was obtained from briefings by EG&G and the DOE/RFFO management during the Assessment Team's site visit (February 12 to 24, 1995) and through interviews with various line and staff personnel from EG&G and the DOE/RFFO organizations. Documents pertinent to the Assessment Team's inquiries were collected and reviewed. A list of all supporting documentation reviewed by the Team is provided in Appendix C.

2.3. Assessment Team History

The onsite visit by the Team began on February 12, 1995. At that time, the Incident was discussed at length and the Team came to consensus on how to proceed with the assessment. The Assessment Team met with the DOE/RFFO representatives and EG&G senior management for a briefing on the Incident and the status of all follow-up activities as described in the Root-Cause Analysis. The Team conducted over 90 interviews, reviewed over 100 related documents, and toured B-771 and other operational facilities. The Assessment Team then began to summarize its data and to identify potential conclusions. A Senior Management Group (Appendix B) comprised of senior DOE and industry officials

critiqued the conclusions and recommendations. On February 24, 1995, the Assessment Team conducted an Outbriefing to DOE and EG&G senior management. During the following week, DOE/RFFO conducted an Outbriefing for EG&G senior management. The Assessment Team's Report was prepared and submitted to the manager, DOE/RFFO on April 16, 1995.

3. Background

This section describes the facility, the Incident, and the post-Incident actions taken by EG&G and the DOE/RFFO.

3.1. Facility Background

B-771 at the Rocky Flats Plant became operational in 1953. Between 1953 and 1957, plutonium recovery and purification as well as plutonium component manufacturing were performed there. After 1957, only recovery and purification activities were conducted at B-771. The original facilities were expanded and by 1965 a total of 7 dissolution lines were active. Between 1968 and 1985, maintenance efforts were deferred because a replacement facility was planned and constructed. But upon completion, the replacement facility was incapable of operation. B-771 continued to handle plutonium recovery operations through December 1989, when plutonium production activities were curtailed. No stabilization of plutonium for an extended shutdown occurred at that time because the curtailment of production was thought to be temporary.

In 1990, EG&G became the Management and Operating Contractor for the Rocky Flats Plant. The opinion that resumption of production would occur persisted through 1992. Between 1990 and 1992, B-559 and B-707 infrastructure, systems, and equipment were substantially upgraded in order to be ready for the restart of production. During the upgrade, additional effort was expended in training the workforce and implementing the Conduct of Operations philosophy. Comparable efforts were not conducted in B-771. The difference in treatment of the buildings and the workforce has resulted in the growth of building-specific safety and work cultures, cultures with differences that can be clearly identified.[1]

In early 1993, the Rocky Flats mission was redefined by the DOE as environmental restoration. DOE management responsibility for the facility was transferred from DOE/HQ-

[1]Rocky Flats Environmental Technology Site, "Safety Culture Survey Report for B-771," February 1, 1995.

DP to DOE/HQ-EM in 1993 and the facility was renamed the Rocky Flats Environmental Technology Site.

To improve control of plutonium storage and resolve Resource Conservation and Recovery Act storage deficiencies, B-771 Phase 1 Liquid Stabilization Activities commenced in April 1992. EG&G conducted a readiness evaluation that was completed in May 1994 to expand Phase 1 to include tank-draining activities. Tank D454 was drained in June 1994 and Tanks D1001 and D1002 were drained in July 1994.

3.2. Incident History (Investigation Report AHB-216-94, October 13, 1994, Burlingame to Silverman)

During the midnight shift on September 29, 1994, an operations team used an approved procedure [Task Information Package (TIP)-005] to drain Tank D467 in B-771. The tank contained 210 L of solution with a plutonium concentration of about 0.5 g/L. The tank-draining team consisted of eight process specialists, one production foreman, one production manager, and one Shift Technical Advisor. A DOE/RFFO Facility Representative observed the task, but was not required to be present. 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 in September 1994.

The solution was drained from Tank 467 into 52 4-L bottles inside Glove Box 42 without incident. The process vacuum was to be left on for 1 hour to ensure complete removal of any remaining moisture in the tank and process lines. All personnel left the area except one process specialist, who was left to monitor the vacuum system and clean up the area.

Without authority or direction, the process specialist manipulated the valves and drained an estimated 5 L of solution thought to be from the process line from Tank D973. The liquid from the process line was darker in color than the solution drained from Tank D467. A darker color usually indicates a higher plutonium concentration. While the line was being drained, the production manager and foreman returned and observed the unauthorized actions of the process specialist. Neither individual stopped the unauthorized activities. The three individuals diluted the solution among 5 4-L bottles and participated in the falsification of the entries on the Glove Box 42 Nuclear Material Balance card. During interviews conducted by EG&G, the individuals attested that the shift manager questioned them about the bottles of a different color, but took no further action.

Between September 29 and October 6, the Chemistry Laboratory was closed due to maintenance. Because the production foreman was concerned about the presence of a higher concentration solution, he had an unauthorized sample of the diluted solution drawn from one of the bottles and an unauthorized analysis conducted by the Chemistry Laboratory. The results indicated a plutonium concentration of 8.2 g/L that violated the Nuclear Material Safety Limit (NMSL) of 5 g/L for Glove Box 42. Later analysis indicated that the 5 L of solution contained approximately 122 g of plutonium. When notified of the results, the production foreman then informed the production manager at home. Upon reporting to work on the evening of October 6, the production manager notified the shift manager of the events. The shift manager immediately terminated nuclear operations in the building and reported the Incident to EG&G and the DOE/RFFO management.

3.3. Incident Implications

The Incident has the following serious implications:

- The production foreman and manager covered up the unauthorized tank-draining activity. Such an action demonstrated a misunderstanding of the potential criticality safety implications and the principles of Conduct of Operations.

- The initial valve position as specified in the TIP-005 Procedure was changed without authorization. By making such a change, the process specialist demonstrated a misunderstanding of the potential criticality safety implications and the principles of Conduct of Operations.

- The shift manager noted the different color of the solution in some bottles and failed to follow up on his observation of unusual conditions during his rounds.

- The NMSL for Glove Box 42 was violated as a result of the unauthorized draining.

- An air-operated valve was ineffectively Locked Out/Tagged Out (LO/TO) and a manual valve was not LO/TO, which was a violation of the double contingency principle, that is, a criticality safety infraction.

- Authorization for obtaining an analytical sample and conducting the analysis was not obtained, which violated operational safety requirements.

- Process knowledge was an unreliable guide.

3.4. Post-Incident Actions

EG&G immediately began an investigation, including a critique conducted on the morning of October 7. Standing Order 34 suspending fissile material operations was issued on October 7. Between October 7 and 12, senior EG&G management conducted in-depth interviews with B-771 personnel and reviewed associated records and documents. On October 8, 1994, Occurrence Report No. RFO-EGGR-771OPS-1994-0062 was filed. On October 10, the DOE/HQ was notified, Standing Order 34 was revised, and EG&G began its Root-Cause Analysis. Between October 12, 1994, and January 6, 1995, a number of reviews and reports were generated. Appendix D provides highlights of the reviews and reports submitted as a result of the incident.

- An onsite DOE/HQ review was conducted by a representative of the Office of Environmental Management, Deputy Assistant Secretary for Transition and Management, Rocky Flats Office, with a resulting report.

- The Assistant Manager for Operations and Waste Management-DOE/RFFO, responsible for oversight, conducted a review.

- The EG&G Root-Cause Analysis was submitted to the DOE/RFFO.

- An independent review was requested by the DOE Assistant Secretary for Environment, Safety and Health.[1]

- The DOE/RFFO submitted its comments on the Root-Cause Analysis to EG&G Management.

[1] The Assessment Team was not provided with the report until February 24, 1995, the last day of the onsite visit. The Assessment Team made no attempt to validate any of the conclusions drawn by this report.

4. Assessment of the Root-Cause Analysis and DOE/RFFO Comments

4.1. Introduction

The Assessment Team Charter (Appendix A) requires an independent verification of the Root-Cause Analysis and an independent review of the DOE/RFFO comments to the Root-Cause Analysis.

4.2. Review of Root-Cause Analysis

The Assessment Team reviewed the Root-Cause Analysis and identified two areas of concern:

- The scope and results of the Root-Cause Analysis.
- The criticality safety aspects of the Incident.

Shortfalls in the scope of the Root-Cause Analysis concerned the Assessment Team, particularly since the Incident involved multiple safety infractions and a cover-up of the unauthorized activity. The list of personnel interviewed during the Root-Cause Analysis (Attachment III to the Root-Cause Analysis report) showed that interviews were conducted primarily with individuals who were involved in or associated with the tank-draining operation, or had knowledge of the particular circumstances of the events between September 29 and October 6, 1994.

The Assessment Team inquired of the DOE/RFFO and EG&G senior management why a DOE Type B Investigation was not initiated. The answer to the question can be paraphrased as: "EG&G took aggressive and immediate steps to handle the situation that were deemed

satisfactory." The Assessment Team believes that a formal and immediate Type B investigation, as suggested by DOE 5484.1, would have had a broader scope, permitted additional follow-up in-depth interviews with the three principal individuals before their employment was terminated, and might have discovered the management factors apparently missing from the Root-Cause Analysis.

The Root-Cause Analysis Team identified as the summary root cause: "Personnel failed to fully accept and implement the concepts of Conduct of Operations." The three root causes supporting the summary root cause are as follows: less than adequate task performance by a worker, that is, deliberately performing work outside the authorized scope of work; less than adequate supervision to prevent the unauthorized worker activity; and less than adequate barriers and controls that would have deterred the unauthorized solution transfer.

After the Root-Cause Analysis report was completed, an EG&G senior staff team conducted an evaluation of broader implications of the Incident. The Assessment Team recognizes and acknowledges that Attachment 2 of the Root-Cause Analysis for B-771, the Evaluation of Generic Implications of the Incident, identified four generic implications, each of which required management attention not only in B-771 but in other nuclear facilities at the site.

All three individuals who participated in this Incident and its cover-up violated Conduct of Operations principles. "The Safety Culture Survey Report for B-771,"[1] EG&G's Evaluation of Generic Implications of the Incident, and the interviews conducted by the Assessment Team establish that an unacceptable safety culture exists in B-771. The Assessment Team believes that this culture does not support the high-risk work environment in B-771 and RFETS in general, and that contractor and the DOE/RFFO management are responsible for the existence of this culture. The rejection of Conduct of Operations principles is a symptom of the direct cause of the Incident, but not the root cause. The Assessment Team believes that the contractor and the DOE/RFFO management's failure to effectively establish an appropriate safety culture is the root cause of this Incident.

Furthermore, the Assessment Team believes that neither DOE/RFFO nor the contractor satisfactorily analyzed the criticality safety significance of the Incident. Criticality experts from the Assessment Team and RFETS worked on answering the question posed by the Management Review Board, "How close was the unauthorized draining to an accidental criticality?" Based on the information provided in the Root-Cause Analysis and the post-Incident evaluation and criticality data for plutonium solutions in a planar array, the answer is, "In this particular situation and its likely variations, an accidental criticality was not likely

[1] Rocky Flats Environmental Technology Site, "Safety Culture Survey Report for B-771," February 1, 1995.

since the maximum incident inventory was only 10% of the needed critical mass." However, that knowledge was ascertained after the fact. At the time of the incident, the participants had no way of knowing how close they were to an accidental criticality .

Describing the criticality potential of a situation involves three primary variables: concentration, geometry, and volume. Plutonium-containing solutions in B-771 vary in concentration between 0.6 g/L and 140 g/L. For example, if a solution containing 50 g/L of plutonium was drained into 4-L bottles and then placed in a planar array,[1] 8 to 10 bottles (32 to 40 L) would be needed to create a critical configuration. In contrast, if a solution containing 140 g/L of plutonium was drained into 4-L bottles and then placed in a planar array, only 4 bottles (16 L) would be needed to create a critical configuration. The results of the post-Incident analysis of the 5 4-L bottles containing the diluted solutions from the process line to tank D973 showed that the bottles contained about 122 g of plutonium. In addition, there were about 40 g of plutonium in the solution drained from Tank D463. Thus, the total plutonium mass stored in Glove Box 42 in a planar array was about 10% of that necessary for a critical configuration.

The process specialist, when interviewed after the Incident by EG&G, stated that he believed that the tank and piping were virtually empty and that he expected the solution concentration to be similar to that drained during the authorized operation. From this interview, it is evident to the Assessment Team that some workers fail to recognize that their "process knowledge" is over 5 years old (in some cases) and that conditions in tanks and process lines may have changed significantly.

Furthermore, they do not clearly understand the criticality safety implications of their actions (Section 6.1, Criticality Safety Program). The Assessment Team is concerned that the contractor did not fully explore the criticality safety implications of this incident. The Assessment Team did explore the possibility further and determined that if either higher concentrations or greater volume of solutions had been present and the participants had acted in the same or similar unauthorized ways, an accidental criticality could have resulted.

[1] A planar array is a single layer of bottles, each bottle placed adjacent to another. No stacking is permitted.

4.3. Review of the DOE/RFFO Comments to the Root-Cause Analysis Report

The Root-Cause Analysis report, including Attachment 2, the Evaluation of Generic Implications of the Incident and copies of memoranda specifying follow-up actions were submitted to DOE/RFFO on November 28, 1994. The DOE/RFFO Comments on the Root-Cause Analysis of the Incident are dated December 16, 1994. The DOE/RFFO expressed a perception "that management by its actions created an environment that would allow such actions," that is, the unauthorized tank-draining event and the concealment of this action. The DOE/RFFO also raised several concerns about the corrective actions proposed by the contractor. The DOE/RFFO letter did not request a formal response to the DOE/RFFO's comments, but stated that future "restart plans should clearly differentiate between 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." The Assessment Team met with an EG&G senior manager who stated and a representative of the DOE/RFFO who confirmed that a meeting occurred between the contractor and the DOE/RFFO senior managers. At that time, the comments were discussed and it was agreed that no formal response was required.

4.4. Conclusions

The Assessment Team concludes the Root-Cause Analysis did not have a sufficiently broad scope to identify the management factors that contributed to the Incident. The real root cause is the failure of the contractor and the DOE/RFFO management to properly assess the operating environment in B-771 and take necessary actions to correct deficiencies. In addition, the Root-Cause Analysis did not fully examine the serious criticality safety implications of the incident. Under different circumstances, similar unauthorized actions could have resulted in a criticality accident. A more rigorous independent investigation might have identified these issues.

The DOE/RFFO comments appropriately raised significant issues about the Root-Cause Analysis, including a concern that contractor management practices permitted unacceptable behavior by operating personnel in B-771. The Assessment Team shares DOE/RFFO's concern that the corrective actions proposed for primary root causes cannot prevent the reoccurrence of a willing and knowing violation of the Principles of Conduct of Operations and subsequent nondisclosure of such violations. Such behaviors cannot be tolerated and

serious questions must be raised concerning the environment in which such behaviors could originate. The DOE/RFFO should have asked for and EG&G should have documented its response to the DOE/RFFO comments.

4.5. Recommendations

- Using DOE 5484.1, the DOE/RFFO should establish guidelines for deciding when formal investigation procedures should occur and in situations where less rigorous methods are used, the DOE/RFFO's review and commentary should be formally responded to by the contractor.

5. Assessment of Management Practices

The Assessment Team examined leadership, communication, discipline and appraisal systems, and business practices to determine whether problems in any of these areas contributed to the Incident.

5.1. Leadership

Leadership is fundamental to the function of any organization, regardless of size or nature. Leadership is a global term that may be used to describe how policy and priority decisions are made, disseminated, and implemented through and across organizations.

5.1.1. Introduction

The Assessment Team identified and interviewed representatives from various levels of the workforce, including managerial, supervisory, professional, and worker ranks.

5.1.2. Issues

Leadership issues include: direction from DOE/HQ; problem solving and closure; turnover and training; trust and loyalty; and the performance appraisal and discipline systems.

DOE/HQ Management

Interviews at RFETS show that inconsistent direction and competing programmatic priorities are provided to the DOE/RFFO, and in some cases, directly to the contractor, from various headquarters offices, such as:

- Deputy Assistant for Transition and Management (EM-60), which has overall site and landlord responsibility.

- Office of the Deputy Assistant Secretary for Waste Management (EM-30).
- Deputy Assistant Secretary for Environmental Restoration (EM-40).
- Office of the Deputy Assistant Secretary for Compliance and Program Coordination (EM-20).
- Assistant Secretary for Environment, Safety and Health (EH-1).

The DOE/HQ communication with the DOE/RFFO and the contractor tends to channel directly to the program, project, or individual directly affected. At RFETS, the process is commonly referred to as "stovepipe" communication. Many interviewees related that direction is given by the DOE/HQ personnel to lower-level DOE/RFFO and contractor personnel instead of to the appropriate DOE/RFFO Assistant Manager.

In addition, contractor management and staff (and some DOE/RFFO personnel) believe that DOE/HQ does not always define clear expectations and frequently does not stay the course for expectations once established. Both the DOE/RFFO and the contractor have been unable to resolve these problems and the anomalies that result from such stovepipe communication, not only from DOE/HQ, but also from other regulatory and oversight agencies. These include the Defense Nuclear Facilities Safety Board, the Colorado Department of Public Health and Environment, and the Environmental Protection Agency, Region VIII. The contractor and DOE/RFFO personnel commented that DOE/HQ occasionally makes decisions in direct conflict with DOE/RFFO or contractor decisions. Such conflicts often have long-term consequences and can severely impair the DOE/RFFO's and the contractor's capacity to manage and lead.

Personnel from DOE/RFFO and Headquarters and various contractor personnel asserted that the hand-off from DP to EM was not handled well. Confusion existed on how or whether existing and ongoing DP improvement programs would be continued and funded. Questions also existed concerning lines of authority and funding policies. Widespread perceptions of consequent problems exist. According to senior DP executives, DP offered in 1993 to aid in the safe shutdown of the facilities, an offer that was apparently not accepted. Follow-up with DOE/HQ-DP personnel indicated that technical and managerial support continues to be available upon request.

Problem Solving and Closure

Management can only act when it is aware of a problem. However, the Assessment Team has been able to document occasions where the use of formal and informal communication channels to advise management of problems has not resulted in appropriate problem resolution. For example, the RFETS Safety Review Board and the Nuclear Criticality Safety Committee are chartered to evaluate and/or bring to management's attention those indications, events, or situations that require escalated management involvement or intervention. Reviews, assessments, and memoranda pointing out specific safety concerns in B-771 were provided to management. In spite of these warnings, there is no indication that effective action was taken.

Turnover and Training

A review of records for the DOE/RFFO reveals the following turnover in key management positions (including "Acting" appointments) since 1989:

Level I:
7 Managers and 4 Deputy Managers

Level II:
3 Operations and Waste Management Assistant Managers

Level III:
4 Operations Division Directors

Level III:
4 Occupational Safety and Health Physics Division Directors

A review of records for Rockwell and EG&G reveals the following turnover in key management positions since 1989:

Level I:
5 Presidents/General Managers

Level II:
7 Waste Stabilization Directors/Assistant General Managers

Level II:
7 Engineering and Safety Services Directors/Assistant General Managers

Level III:
7 B-771 Operations Managers

Organizational and personnel assignment instability within the contractor and the DOE/RFFO has helped to create and continues to exacerbate a middle management communication block. The sender and the content of the messages transmitted to subordinates changes so often that subordinates cannot integrate and act on the changes before the message or the sender changes again. Substantiating evidence was reported across a wide cross section of personnel. Frequent changes in management positions have been disruptive and result in significant loss of continuity. They also drain experience and reduce overall expertise.

Leadership training appears to be inconsistently applied to various DOE/RFFO and contractor organizational supervision levels. The contractor has provided Leadership Academy training to those reporting to the president and to new supervisors, but the training is not consistently required for middle-management levels. According to information obtained in interviews, prior to the Incident, none of the managers and foremen from B-771 had attended the Leadership Academy.

Loyalty and Trust

Some DOE/RFFO and contractor employees stated that they distrusted and felt little loyalty to contractor management. They also indicated that they believe that a clear mission and expectations are not communicated from the contractor or the DOE/RFFO, that planning is inadequate, and that the contractor and the DOE/RFFO fail to communicate what planning is in place. The Assessment Team confirmed through interviews that relationships between employees and immediate supervisors are generally satisfactory. However, as the number of management layers increases, trust and confidence in management as well as the reliable flow of information decreases. Moreover, the DOE/RFFO and contractor management's inability to communicate, to engender trust or loyalty, or to bring issues to closure has state regulators concerned. Representatives of the Colorado Department of Public Health and Environment stated to the Assessment Team that as a result of the impending layoffs, morale could further deteriorate and intentional or inadvertent problems could result. Many operating support staff voiced frustration because their assigned responsibilities are unclear to them. Poor morale is pervasive. Many interviewees blamed poor morale on the failure during the past 5 years to accomplish "real" work. It was not apparent to the Assessment Team that these issues were being properly resolved.

5.1.3. Conclusions

- DOE/HQ-EM and the DOE/RFFO have failed to integrate and control programmatic directions from its various program offices to the contractor, which contributes to managerial ineffectiveness at RFETS.
- Deficiencies in the safety culture can be attributed to a large number of factors, including leadership failure at various levels to recognize the symptoms of a poor safety culture and to correct these deficiencies.
- The contractor or the DOE/RFFO has been unable to take corrective action and to bring issues to closure. In particular, Safety Review Oversight was not effective in correcting the safety culture in B-771.
- The DOE/RFFO and EG&G have had excessive turnover in their upper and middle-management staff over the past 5 years.
- Many RFETS employees distrust and have little allegiance to contractor management.

5.1.4. Recommendations

- The DOE/HQ should centralize and integrate its direction to the DOE/RFFO.
- The DOE/RFFO should control how interacting regulatory and oversight organizations direct efforts within the DOE/RFFO and the operating contractor. Official requests should be handled by a stringent change-control process.
- All levels of contractor and DOE/RFFO management should be provided with leadership training that provides skills for team building, decision making, and issue resolution.
- Recognizing the imminent contractor turnover, the DOE/RFFO and contractor should stabilize managerial and technical staff turnover as quickly as possible.

5.2. Discipline and Performance Appraisal Systems

The Root-Cause Analysis identified the perception that the inconsistent application of discipline at RFETS is so strong that some personnel may be afraid to report unauthorized or unsafe activities. The Assessment Team reviewed the effectiveness of performance

appraisals to determine whether supervisory expectations of employees and achievement feedback is provided. Furthermore, the Assessment Team reviewed the disciplinary system to determine whether the system is just.

5.2.1. Introduction

The Assessment Team examined the discipline and performance appraisal issues. Applicable documents were reviewed and interviews were held with 11 contractor employees, representing virtually all levels of management. Eight DOE/RFFO employees, representing as many levels of management, were interviewed about the contractor's application of discipline and performance appraisal systems.

5.2.2. Issues

Discipline System

Some employees think that the contractor unevenly applies disciplinary measures. Fear of discipline is thought to impede the reporting of mistakes at RFETS. Upon examination, the formal contractor disciplinary system appears to be generally fair and consistent. As a part of the action coming from the Root-Cause Analysis, past practices are under study and will be the subject of a report being prepared by the EG&G General Counsel. The report is due in July 1995 and may shed additional light on the consistency of the discipline system at RFETS as well as reveal areas that can be improved. A factor that must be considered, which is admittedly difficult to examine, is that any disciplinary system's fairness can only be judged by those cases that are submitted to the system. In terms of cases submitted to the system, two factors appear to create the perception of unfairness. First, among supervisors there are differing thresholds for elevating an incident of misconduct by an employee into the formal contractor system for applying discipline. Second, no two disciplinary situations are identical: the particulars of the event and the individual's work history and past record of disciplinary action make each situation unique. This uniqueness can give the impression of differing standards of discipline to the outside observer.

Personnel Appraisal System

The DOE/RFFO and contractor job description and appraisal systems are inconsistent in providing employees with management expectations in the form of an accurate position description and performance feedback. The appraisal process at RFETS has been most successful in the upper echelons of management, but rapidly loses substance as the process works its way into middle management and below. A new appraisal system will be used by

the contractor for 1995 evaluations. Conceptually, it is a modern method that can provide employees with specific performance expectations and broad-based feedback. Clearly, it will only be effective in meeting its intent if it is thoughtfully applied by all levels of management. As current efforts to develop detailed integrated plans and schedules mature, the ability to establish clear performance measures at the worker level should be enhanced.

5.2.3. Conclusions

- The formal discipline system appears just, but additional supervisory training is warranted.
- The appraisal system is not effectively implemented.

5.2.4. Recommendations

- Managers and supervisors should be trained so that a level standard is used to identify misbehavior that warrants formal discipline.
- The DOE/RFFO and the contractor should use meaningful job descriptions and performance standards and appraisals throughout their organizations.
- The EG&G General Counsel should accelerate the schedule for completion of their report on the discipline systems and submit the report prior to contractor turnover.

5.3. Communication

The role of communication is vital because it is how management informs and directs the efforts of the workforce. Communication problems frequently exist in large organizations and may be vertical or horizontal in nature. Business communication has two main purposes: corporate communication (messages to, from, or about the group as a whole) and day-to-day communication (what group members say to one another about the tasks they wish to accomplish).

5.3.1. Introduction

The Assessment Team identified and interviewed representatives of the workforce to determine how communication, corporate and day-to-day, is conducted and whether it is effective.

5.3.2. Issues

Communications issues include the failure to communicate a clear mission and the inability of the DOE/HQ, the DOE/RFFO, or the contractor to communicate effectively within their own organizations or between organizations.

Corporate Communications Initiatives

While the DOE/RFFO and the contractor appear to have the necessary corporate communication tools and appropriate techniques in place, employees do not seem to accept the messages. The colocation of the corporate communications groups of the DOE/RFFO and the contractor is commendable and indicative of a high degree of teamwork. Corporate communications appear to be planned and executed carefully. The President of EG&G communicated very effectively on a number of highly pertinent issues during an All-Hands Meeting at B-771. During the two-week onsite visit, the Assessment Team also noted appropriate corporate messages throughout the RFETS. In sharp contrast, the work force does not affirm the messages. It is evident, particularly in B-771, that many employees have not accepted the mission change for the RFETS. Additional management action, perhaps through the use of quality-circle-type programs that involve operating and staff personnel, could correct this situation.

Day-to-Day Communication

The Assessment Team noted problems in how communication is managed internally within the DOE/RFFO and the contractor and between the two. Formal communication between the contractor and the DOE/RFFO and within each organization is conducted generally by formal correspondence. However, mixed signals may be sent to the contractor by different Assistant Manager Offices within the DOE/RFFO. Program direction and funding provide the formal basis, however direction may not be consistent from one EM office to another. As a result, priorities may conflict. For example, the definition of parameters that define an acceptable operating and safety envelope from a safety perspective may conflict with the programmatic objectives. Formal resolution of such conflicts has not been fully effective and as a result, lower-level managers and their respective staffs are sending mixed signals to the contractor. Similar situations exist within the contractor organization. Informal communication occurs with the contractor at all levels and may result in perceived redirection or alteration of work scope, mission resolution, or safety issues. Changes may not be properly documented or authorized by the necessary DOE/RFFO or contractor official. Failure to officially document such changes is problematic, particularly when management is new to the position, which is often the case for many contractor and DOE/RFFO managers.

5.3.3. Conclusions

- Employees have not embraced corporate messages.
- Day-to-day communication concerning redirection, alteration of scope, mission resolution, or safety issues often goes undocumented within or between the DOE/RFFO and the contractor.

5.3.4. Recommendations

- The contractor and the DOE/RFFO management should use their noteworthy survey expertise to measure communication effectiveness and suggest improvements.
- The contractor and the DOE/RFFO management should provide training throughout its workforce, and in particular in the management and supervisory ranks in formal and informal communication skills that emphasizes methods of creating formal assent and documentation of verbal negotiation and agreements.

5.4. Business Practices

Many changes, some considered destabilizing factors, face RFETS. A number of these changes are directly related to fundamental business practices and the formality with which they are implemented and managed. Some of these changes, including actions to downsize the work force and to institute contract reform, create an environment where employee concerns and distractions can result in unexpected and unsatisfactory behavior. A number of interviewees indicated that because of poor forecasting, people's assignments and priorities were frequently altered and morale and efficiency were impaired. The Assessment Team examined the status and progress of actions by DOE and the contractor to increase the formality and competency of business operations that can refine the predictability and stability of work processes and thus improve the behavior of employees.

5.4.1. Introduction

A number of key actions have been initiated to significantly improve stability and predictability. For example, the Liquid Stabilization Program is using Integrated Planning and Scheduling (IPS) tools. These tools include a detailed Work Breakdown Structure, activity-based logic diagrams, detailed schedules, and schedule resource loading, including support groups' input with signature commitments by the appropriate cost-center managers.

Other programs associated with liability reduction have begun the IPS process but are generally much further behind. Other positive actions include the initiation of systems engineering techniques, the commitment to develop site-wide IPS, and the issuance of a RFETS Strategic Plan.

5.4.2. Issues

Notwithstanding these positive steps, based on interviews with DOE and the contractor personnel and a review of work products, the Assessment Team identified a number of issues that need to be evaluated and resolved. Issues associated with business practices include the following: IPS; change control; and systems engineering and strategic planning.

Integrated Planning and Scheduling

While the DOE/RFFO and contractor efforts to develop liability-reduction program plans are noteworthy, effective implementation of these program plans in light of the deteriorating plant equipment, the growing unknowns in process streams, and the attrition of experience represents a major challenge.

The IPS tools developed to date are dysfunctional because so little of the site's resources have been entered into the IPS system. Involved DOE and contractor staff estimated that 5% to 15% of total resources has been loaded into the baseline. At the current rate, many months will be required before meaningful plans and integration of all site resources into an effective schedule will be possible. Levels of uncertainty will remain high until other programs, site infrastructures, and facility safety envelope resources are incorporated into the IPS.

A site-wide program-focused standardized Work Breakdown Structure has not been established. To date, the Work Breakdown Structure and baselining effort have been derived primarily from existing and changing financially driven Management Control System Work Breakdown Structures. In contrast, most businesses determine that the Work Breakdown Structure and control systems should be based on the Program/Product needs and drivers. Then, financial reporting and control systems are adjusted to fulfill the critical functions of cost tracking, reporting, and control.

There are a number of DOE/RFFO and contractor senior and middle managers who are knowledgeable in the requirements and techniques necessary to implement IPS across the RFETS. However, the inadequate numbers of planning and scheduling professionals and the fragmentation of management direction of IPS activities suggest that, while DOE/RFFO and contractor senior management appear to understand the critical importance of developing IPS

tools, the effort lacks focus and commitment to completion. There is no central contractor IPS group from which planning and scheduling expertise is matrixed to program and line management. Currently, program, line, and support organizations must individually contract for planning and scheduling expertise or assign such duties to untrained staff.

The contractor and some members of the DOE/RFFO staff believe that the DOE/HQ-EM policies, procedures, and funding rules are fragmented, inconsistent, and impede development of meaningful short- and long-term planning. For example, the Assessment Team was informed that funding for the deactivation program has been allocated on an almost quarterly basis, precluding meaningful plans and schedules. In some programs such as Residue Stabilization, IPS development is impeded because of an inability to establish clearly defined end states for program or material parameters. In these cases, a balance must be established between waiting and using best estimates with subsequent change-control adjustments. In other cases, line management appears unable to realistically forecast needs. For example, criticality safety personnel advised the Assessment Team that line management customers typically missed forecast needs by as much as 50%.

Change Control

The DOE/RFFO and contractor personnel indicated that it has been common for contractor management to commit to changes without defining the impacts of the change and without meaningful cost–benefit analysis. The customer (that is, the DOE/RFFO or DOE/HQ) has typically accepted such unsupported commitments without challenge. A pattern of schedule failures, as seen at RFETS, is often the result of a myriad of incremental challenges and seemingly minor changes that were not effectively dealt with, due at least in part to the lack of rigorous change control.

The institutional change-control process now used at RFETS is not effective in dealing with the frequent challenges to program-level activities. For example, the Liquid Stabilization Program Manager was recently informed to expect no radiological control technician support for "the next few weeks due to 10 CFR 835 training demands." No change-control process was exercised. Similar examples were cited by other managers where resources that were committed to program schedules were diverted by the affected cost-center manager or line management. Without a simple and rigorous IPS change-control process, IPS credibility is soon lost and the schedule is undermined. During the IPS development process, an online IPS change-control process or some other form of continuous reconciliation is needed.

Based on interviews with both DOE/RFFO and contractor personnel, there is fundamental misunderstanding concerning the appropriate business use of change control. Many

interviewees consider change control only as a high-level process to perform budget reconciliation or to account for major program shifts. Several staff members stated that use of rigorous change-control systems would be considered confrontational. Many of the staff interviewed consider IPS change control as a tool to resist change or to reconcile failures. In fact, IPS change control should impose an objective analysis of inputs, eliminate the chaff, or facilitate changes if they are truly needed. The process should deal with changes before failure results. IPS is a tool to be used between the customer and the contractor and among line and support managers to: define the facts; examine cost–benefit ratios; identify impacts; and revise schedules, resource commitments, goals, and individual performance appraisals.

Systems Engineering and Strategic Planning

Based on interviews with DOE/RFFO and contractor personnel, the purpose and expectations of the systems engineering process are unclear and there is no common focus on what standards are to be applied. Systems engineering is defined in this context as a disciplined technical process that facilitates meaningful assessment of a complex mission, including inputs and variables, so that uncertainties are identified and reduced, costs are minimized, and mission success is enhanced. No strong systems engineering connection to the IPS development approach seems to exist. The DOE/RFFO, rather than the contractor, appears to be the principal driver for developing and implementing a more proactive systems engineering process.

The contractor has appropriately initiated efforts to develop site-wide IPS. The systems engineering process will help to define the proper integrated program logic and will likely identify areas of physical, regulatory, human resource, budgetary, and process/waste stream restraints and conflicts that affect the IPS. Until both the IPS and the systems engineering process become more mature and closely connected, recipients and users of the site schedule should use it with caution because of its many uncertainties.

5.4.3. Conclusions

- Formal IPS and change-control tools have not been consistently or fully implemented at RFETS. As a result, high levels of uncertainty exist concerning planning, scheduling, priorities, and changes to major programs.

- The systems engineering process is not closely tied to the IPS effort.

5.4.4. Recommendations

- The DOE/RFFO and the contractor should expand and accelerate IPS efforts.

  Current efforts should be expanded to include all site programs and infrastructure resources. A phased approach to the accelerated and expanded effort may be appropriate. The first phase would be the identification of initial baselines and schedules site wide. The second phase will take several months to complete and would define the increased level of detail to reduce uncertainties to a satisfactory level. To be successful, such an effort would require significant senior management involvement and sponsorship and the development of a detailed strategy and plan for accomplishment.

- The DOE/RFFO should form an IPS joint task force to include DOE/RFFO, DOE/HQ-EM, and contractor personnel.

  Led by a senior manager, this task force would comprise middle managers representing all key divisions who are knowledgeable and supportive of the IPS tools and techniques. The efforts of the task force could include ensuring the adequacy and consistency of IPS standards; establishing consistent expectations for the IPS effort; defining a site-wide IPS communications and training program; defining the need for planning and scheduling of professional resources; and developing a simple IPS change-control process that will be rigorously used across the site to maintain the plans and schedules.

- Both the DOE/RFFO and the contractor should examine their organizations, including systems engineering, to ensure a near-term and continuing institutional focus on the IPS process.

  The contractor, for example, may consider modifying the current Planning and Integration organization to include maintenance of IPS standards, coordination of IPS change control, and distribution of IPS resources in a similar manner as is now used to distribute other key support resources.

- The DOE/RFFO should evaluate alternatives for setting performance measures for the new contractor in light of the significant uncertainties in current plans and schedules.

  Initially, the DOE/RFFO may wish to consider applying significant weight to the completion of acceptable levels of integrated plans and schedules so that future performance objectives are realistic and can be defended. One of the strategies of contract reform is to establish objective performance criteria with well-defined schedule

milestone expectations for the new contractor. The current significant uncertainties in baselines, resource identification, and schedules leave the DOE/RFFO highly vulnerable to errors in setting meaningful goals. Errors due to uncertainty will favor the contractor, not the DOE/RFFO.

6. Assessment of Safety Programs

DOE-managed site operations must be conducted with a reasonable assurance that work is performed safely. The presence of a deficient safety culture in B-771 suggests that such assurance cannot be given for operations conducted there. Aspects of a safety culture include perceptions and resolution of safety issues, facility and criticality safety programs, and procedure infrastructure and compliance.

6.1. Resolution of Safety Issues

Safety issues are normally resolved by being brought to the attention of the appropriate manager and if necessary passed upward through line management. If the response by line management seems inappropriate, then employees can use an alternative method to bring safety issues to the attention of senior management. How employees believe management views the raising of safety concerns is also relevant.

6.1.1. Introduction

The Assessment Team examined how employees believe safety issues are perceived and handled.

6.1.2. Issues

The Role of Contractor Safety and the DOE/RFFO Safety Oversight Personnel

Interviewees described the environment at RFETS as one in which long-time employees' expertise may be disregarded and new employees may lack experience in nonreactor nuclear or chemical-processing facilities. Many DOE/RFFO and contractor personnel were described as tending to focus on legalistic compliance rather than addressing real safety issues. The contractor and the DOE/RFFO do not seem to use an Issues Management System to separate significant safety issues from minor issues. Further, appropriate problems are not brought to the attention of senior management for resolution and closure. The Assessment

Team appreciates the difficult decisions that the DOE/RFFO and contractor management must make—balancing commitments to various regulatory agencies and the DOE/HQ while carrying out operations safely. However, based on interviews, some contractor and DOE/RFFO safety oversight staff believe that proactive safety stances are unappreciated. Some safety staff members believe that they are relegated to finding and reporting incidents or out-of-tolerance conditions rather than acting as proactive partners in the design and execution of safe operations. Some members of the contractor's independent safety and the DOE/RFFO's safety support organizations indicated they feel their efforts are ineffective.

The Role of the Safety Review Board and Nuclear Criticality Safety Committee

The Assessment Team understands that the SRB is supposed to make major safety decisions. However, based on interviews, the SRB takes a passive role—reflecting safety issues back to recommending groups or individuals rather than recommending action when appropriate. Interviewees strongly suggested that the Nuclear Criticality Safety Committee functions only on paper and that the SRB has not acted on recommendations made by the committee. The DOE/RFFO comments to the Root-Cause Analysis included recommendations regarding the Employee Concerns program. The Assessment Team made no specific effort to determine whether the program is effective, although some evidence suggests that employees do not believe it is effective.

6.1.3. Conclusions

- Some safety issues do not appear to be effectively resolved. When brought to either DOE/RFFO or contractor management's attention, safety issues are neither effectively dealt with nor sent to the next level of management for resolution. Some appeals to the SRB have been ineffective.

- No effective Issues Management System appears to be in place.

- Some contractor safety support and DOE/RFFO safety oversight personnel do not believe their efforts are effective.

6.1.4. Recommendations

- The DOE/RFFO should ensure that proactive identification of safety issues is encouraged. The contractor and the DOE/RFFO should ensure that alternative paths for reviewing safety concerns should exist and be effective.

- The DOE/RFFO and the contractor should develop and implement an Issues Management System to differentiate between significant safety problems and minor issues.

6.2. Criticality Safety

Because the Incident involved a potential criticality infraction and a NMSL violation, the Assessment Team evaluated the effectiveness of the NCSP.

6.2.1. Introduction

In developing the sections that follow, approximately 30 hours of discussion with 22 people were held. The individuals interviewed were from the DOE/RFFO (Environment, Safety and Health and Operations and Waste Management) and the contractor (Engineering and Safety Services, Performance Assurance, and Operations and Waste Management).

6.2.2. Issues

Four primary problems were identified: turnover and experience levels among the current Criticality Engineering staff; current training plans for NCSEs; the RFETS Nuclear Criticality Safety Committee effectiveness; and RFETS personnel perceptions about criticality safety.

NCSE Turnover and Experience

The average experience level of contractor NCSEs has decreased steadily over the past several years due to the high rate of staff turnover. The staff consists of 17 NCSEs. Three individuals have 5 to 6 years of experience. The remaining 14 staff members have less than 5 years of experience, which means they have never seen the plant in operation. The group averages 2.5 years of experience. The high turnover rate among NCSEs can be attributed in part to these causes:

1. Before an operation involving fissile material is approved, an evaluation is performed by Criticality Engineering to ensure the operation will remain subcritical under normal and credible abnormal conditions. The requirements for the content of this evaluation have changed dramatically at RFETS since 1989, the time of shutdown. Prior to 1989 there was little formal documentation for the rationale for approving an operation. (Most documentation was in the form of notes in an individual engineer's logbook.) In the early 1990s, the requirements were altered with respect to the level of conservatism to the point of being unattainable. As a result, several experienced criticality engineers terminated

their employment with the contractor. Current documentation requirements are realistic in light of plant conditions.

2. Frequent reorganizations within contractor Criticality Engineering have created an atmosphere of instability and confusion over job functions and an ill-defined chain of command.

3. The lack of experienced criticality engineering staff has led to severe schedule pressures with these consequent effects on remaining NCSEs:

   — The perception that schedule is dominant over safety. That perception has resulted in further staff losses, thus increasing the problem.

   — In an effort to make criticality engineering more responsive to operational needs, most NCSEs have been matrixed to the operations managers, leaving inadequate staff to address RFETS-wide or generic issues. When such needs arise, NCSEs are reassigned from operational support and as a consequence schedules slip and misunderstandings and conflicts occur.

   — Demands on senior NCSEs preclude expeditious training of new engineers.

4. Due to staff shortages, new engineers are placed in situations in which they are technically insecure and may not have adequate experienced technical backup.

5. The NCSEs believe their salary structure is significantly below the average for the DOE Complex. The Assessment Team was not in a position to confirm that assertion, but based on the evidence of one team member with relevant expertise, the assertion may be true.

All Criticality Safety Evaluations require peer review. In most criticality safety programs, the peer reviews are performed by a senior engineer with equal or more knowledge of the process being analyzed than that of the original analyst. The lack of senior NCSEs (three individuals are currently available) has resulted in a large backlog of peer review work and a high level of frustration over the inability to catch up. The peer reviewers sometimes have marginal knowledge of the specific process being reviewed. Inexperienced engineers work more slowly and are understandably more conservative. These conditions can only be corrected with time and experience.

NCSE Training

In light of the current level of inexperience, the most important issue with regard to criticality safety staffing is training. Recent program appraisals have documented that criticality safety is learned through apprenticeship. In most criticality safety organizations, there are sufficient experienced engineers to provide such apprenticeships. To reach the journeyman level generally requires approximately 3 years of good-quality one-on-one mentoring. At RFETS, the depleted senior engineer ranks cannot provide adequate mentoring in a realistic time frame. The only alternative is to supplement the limited availability of internal resources by sending inexperienced personnel to other facilities (for example, Y-12 or Los Alamos National Laboratory) for training. However, the Nuclear Criticality Safety budget provides for only 150 man hours of training per person per year. At that rate, it could take 5 to 10 years for the entire staff to reach a level of acceptable competence.

Contractor personnel believe that the staff production (output) problems can be solved by using criticality consultants. Some consultants are being used to augment the current staff with marginal effectiveness. Over the past few years, several sites have tried this approach (RFETS, Y-12, Portsmouth Gaseous Diffusion Plant, and Paducah Gaseous Diffusion Plant). These attempts have been viewed by those sites' criticality safety personnel as marginally successful. There are several consultants who have some level of generic criticality safety expertise (that is, they are computer-code literate), but very few have real process analysis experience. Even experienced personnel need time to become familiar with the specific process and/or equipment being analyzed.

RFETS Nuclear Criticality Safety Committee

The contractor has a RFETS Nuclear Criticality Safety Committee, which reports to the SRB. This committee is to periodically evaluate the status of the RFETS Criticality Safety Program, to apprise management of its findings, and to serve as the RFETS conscience with regard to criticality safety. The committee has been aware of the continuing decline of the site criticality safety competence, but has been unable to find an effective mechanism for highlighting the impacts of this decline and initiating meaningful change.

Criticality Safety Perceived as an Obstacle

Criticality safety is considered by many RFETS operations staff as an obstacle to overcome rather than a necessary and welcome line of defense. Furthermore, many operations personnel believe that insufficient credit is given for "process knowledge." These two perceptions can lead to an unsafe working environment and are the cause of much friction

between the NCSEs and the Operations Staff. The working relationships between the Operating Specialists and the NCSEs are fairly good, but relationships become more strained as one proceeds up the management chain.

Some RFETS personnel believe that double contingency is an unnecessarily conservative approach to safe operations (possibly due to the word "double"). They also feel that inadequate credit is given for "process knowledge." They fail in some cases to realize that their knowledge is over five years old and that the possibility of tank stratification and valve-seat leakage has made the knowledge suspect. The two perceptions are of concern when the causes of all eight industrial criticality accidents in the U.S. are considered. All of the accidents occurred with solutions and each accident was related to difficulties with equipment, procedural inadequacies and violations, or combinations thereof. None of the accidents was attributable to erroneous criticality information or to an error in its interpretation.

6.2.3. Conclusions

- The contractor NCSP is a major critical-path item in all RFETS operations involving fissile materials and has, for the past few years, been unable to provide timely support to those operations. The program has undergone several reorganizations and restructurings in an effort to increase the program's output. However, the situation has not improved.

- For a staff with an average experience of 2.5 years, the current commitment to training is inadequate.

- Perceptions of salary inequity may have validity.

- The RFETS Nuclear Criticality Safety Committee has been unable to effect managerial responses to issues the committee raises.

- Some operations personnel believe criticality safety is an obstacle rather than a line of defense.

6.2.4. Recommendations

- RFETS Management should realistically evaluate the ability of Criticality Engineering to support RFETS needs and adopt a scheduling system that is based on resource capability rather than artificial schedule commitments.

- The new Program Manager of Nuclear Criticality Safety should be given adequate time and appropriate support to develop the program. Time should be devoted to training (and the use of that time should be considered in resource scheduling and priorities).

- A study of contractor/NCSE salary structure versus other DOE weapons complex sites should be initiated and the results shared with the NCSEs.

- The RFETS Nuclear Criticality Safety Committee should be revitalized.

- Physical controls should be used where practicable. Physical controls that ought to be considered include: using racks to provide positive spacing of fissile liquid storage or transfer bottles inside and outside of glove boxes; cutting transfer lines connected to identified high-risk tanks and adding removable spool pieces, etc.

- A Criticality Training Program for Operations Personnel should be developed that:

  — Demonstrates the basis and validity of double contingency.

  — Eliminates the perception that process knowledge can replace safety analysis.

  — Helps operators better understand the similarities between the current situation and historic criticality accident conditions.

6.3. Facility Safety

The contractor and the DOE/RFFO management would like to accelerate the schedule for restart of tank-draining activities. The Assessment Team concluded that the Incident was the result of an inadequate safety culture in B-771. To safely support such a schedule acceleration, changes in the safety culture and the current mode of operation must first take place.

6.3.1. Introduction

Aspects of building operation were examined to determine the current status of the safety culture.

6.3.2. Issues

Problems were identified in the following areas: facility management; the roles of the Facility Representative and the Shift Technical Advisor; B-771 physical plant; operational controls; and worker attitudes and work practices.

Facility Management

EG&G senior management has taken action to clearly define the roles and responsibilities of building operations management personnel, including shift managers and Shift Technical Advisors through a continuing senior mentor program. Following another incident in B-771 in December 1994, the B-771 Operations Manager was replaced. While the new Operations Manager has undergone training in the facility, he has had limited experience with fissile-solution operations. The Assessment Team is concerned about the technical expertise held by management personnel concerning fissile-solution operations and their unique safety issues.

The Roles of the Facility Representative and the Shift Technical Advisor

The DOE/RFFO Facility Representative is chartered to provide day-to-day technical observation of operations, operational support systems, and vital safety systems performance within a facility in accordance with DOE-STD-1063-93 to assure safe and efficient operations. Interviews with Facility Representatives and with various site personnel indicated that the role of the Facility Representative is confused. Interviewees were unable to articulate crisp answers regarding the safety role of the Facility Representative. Some Facility Representatives stated they knew safety was a role, but they felt that involvement in supervision and management of facility activities was necessary to ensure progress. Others interviewed stated that some Facility Representatives give contractor direction, lead the contractor, and even rewrite contractor work procedures. Other factors contributing to dilution of the safety oversight role of Facility Representatives include their involvement in management of budget, RFFO line management activities, and facility management as shown by their interaction with facility supervisors and managers. The role of Facility Representatives as operations oversight personnel has been further confused by conflicting guidance and a lack of leadership from their management. Competing pressures were consistently identified during discussions and interviews. The Assessment Team is concerned that safety objectivity may be lost if the Facility Representative is involved in operations.

While only 3 of 11 Facility Representatives have completed their qualifications, all Facility Representatives interviewed or observed exhibited an understanding of the philosophy of Conduct of Operations and strong technical inquisitiveness. The Assessment Team finds it disturbing that so many Facility Representatives have not completed their qualifications.

The nuclear industry created the Shift Technical Advisors to focus on plant operational safety. The Shift Technical Advisor is a highly qualified person who is not to be involved in the routines of the line organization for production, but who is to act in an overview capacity. The role of the Shift Technical Advisor was to focus on all elements that impacted safety and not to be assigned non-safety-related issues. Over time and within small tight-knit organizations, Shift Technical Advisors at RFETS have assumed the role of shift supervision directing the use of resources and other production-oriented duties. Some Shift Technical Advisors are qualified shift foremen, and depending on schedule requirements, may work in either position. As a result, some individuals may have difficulty in keeping their roles separated. Evidence of a Shift Technical Advisor acting inappropriately for the defined role was related to the Assessment Team.[1]

B-771 Physical Plant

Several members of the Assessment Team toured B-771 and observed, albeit briefly, some operational aspects of the facility. The facility has undergone many years of service during which routine maintenance was deferred. The resulting problems of age and neglect are apparent even to the casual observer. While it may not be appropriate for all valves to be locked or tagged out, within B-771 many of the numerous valves in the process lines are not locked or tagged out. Some valves are shrink-wrapped and provided with a leak indicator. The operator accompanying the Assessment Team members on the tour stated that leaks are fairly common and that it is not known which valves leak even when in an apparently closed position. Corrosion of valve components by acidic fissile solutions appears to be a significant concern.

Upgrades to the electrical system, including the emergency power for the ventilation system, were in progress during the Incident. The Root-Cause Analysis report states that because of the electrical upgrades, the tank-draining activities were scheduled for the midnight shift. In November, the emergency generator failed the monthly surveillance. The utility engineer who accompanied Assessment Team members on a tour indicated that the emergency power system is unreliable at this time and that work continues to fix the problems.

[1] Contractor and the DOE-RFFO management indicated that they were aware of the problem and had taken appropriate remedial action.

Operational Controls

The original authorization basis for B-771 is contained in an obsolete Safety Analysis Report. Building operations management maintains a computerized database of Unreviewed Safety Question Determinations (USQDs) by title for B-771 and B-774. It contains an estimated 200 or more USQDs, the majority of which apply to B-771, that were logged between February 1991 and February 1995. The USQD process and the resulting compensatory measures provide the basis for continued safe operations. However, the status of the required compensatory measures resulting from the USQDs is not tracked.[1] Therefore, the existence and the effectiveness of the measures cannot be ensured. Furthermore, compensatory actions recommended by Nuclear Criticality Engineering, namely the physical isolation of tanks with high concentrations of plutonium using spool pieces, have not been implemented. To the Assessment Team's knowledge, no formal resolution of this issue has been documented. The potential absence of some compensatory measures and the inability to verify the existence and effectiveness of other compensatory measures concerns DOE Facility Representatives and was recognized as such by EG&G in its Evaluation of Generic Implications of the Root-Cause Analysis.

Standing Order 34 suspended fissile-material processing. As a result, the 4-L bottles containing the solutions drained from tank D467 and from the process line of tank D973 are still stored in glove boxes. Originally, the solutions from tanks in B-771 were to be solidified and then stored as waste in drums. The temporary storage of the low-concentration solutions inside glove boxes within 4-L bottles is not an immediate safety concern, although it is not good long-term safety practice. However, draining of high-concentration tanks in B-771 (and in other buildings) into bottles should not be undertaken unless geometrically safe arrays with fixed spacers have been provided for storing bottles inside glove boxes and for transporting the bottles to other facilities.

Worker Attitudes and Work Practices in B-771

Several hourly workers and supervisory personnel expressed a concern over job security and frustration with the inability to complete the tank-draining task. However, management's actions to provide more resources to B-771 and to address worker safety concerns are viewed favorably. Workers expressed continuing concern over management's inconsistent disciplinary action when incidents are reported. Some interviewees stated that fear of unfair or arbitrary treatment might prevent the reporting of incidents. When questioned about the

[1] The DOE/RFFO Assistant Manager for Environment, Health and Safety has requested that the measures be tracked.

termination of employment of the three individuals involved in the Incident, interviewees guardedly concurred with management action, but voiced concern for the loss of over 50 years of process knowledge.

Between October 6, 1994, and January 31, 1995, about 70 unusual and off-normal occurrences were reported for B-771. The DOE/RFFO and contractor management have advised the Assessment Team that as a consequence of the Incident, increased managerial attention has been placed on operational conditions and safety culture at B-771. Management believes that the number of unusual and off-normal occurrences reflect the increased managerial attention. The Assessment Team did not evaluate these occurrences, but notes that some of these incidents suggest a continuing lack of understanding among workers concerning acceptable work practices. The reported incidents include, among others: failure to obtain, using an incorrect, or violating the requirements of a Radiological Work Permit; eating, drinking, or chewing tobacco in the Radiological Controlled Area; violation of NMSLs; deviations from written procedures; unauthorized and unreported repair of damaged glove box gloves; and silencing a tank high-level alarm without prior approval from the shift manager as required by an Operations Order. The Assessment Team is concerned that unauthorized activity continues. Summaries of three incidents further substantiate that Conduct of Operations principles are neither fully understood nor accepted:

- Near the end of December 1994, during a walkdown of LO/TO for tanks, an individual closed the valves to the sight gauge of some tanks. He did not report his actions to building management. Subsequently, the out-of-position valves were discovered and altered (again without authorization) when the levels of liquids in tanks were inspected.

- During daily checks of alpha particle monitoring instruments by electronic technicians, a highly contaminated alpha meter attached to B-box-1 in Room 159 and several pairs of used gloves inside the same glove box were discovered. The contamination incident is believed to have occurred either on February 15 or 16, 1995. Neither the shift manager nor the building operations manager had authorized work for this glove box on those days. No one reported a contamination incident. The room was under the 2-person rule.

- On February 21, 1995, a process specialist inadvertently operated an air-operated valve while performing the monthly vent valve verification on tanks equipped with Raschig rings (to meet compensatory actions specified in an USQD). The control switch for the air-operated valve was under a LO/TO. The action was a violation of the LO/TO program. The Operations Order for conducting the verification activity apparently was unclear.

6.3.3. Conclusions

- Contractor management actions have not sufficiently altered the safety culture of B-771 to restart high-risk operations without special measures. Substantial changes in safety attitude and effective rectification or mitigation of existing shortfalls must occur before high-risk activity resumes.

- The status of compensatory measures is not tracked.

- Unauthorized access and activity continue to occur.

- The frequency of safety incidents and general facility condition, specifically the inability to maintain an appropriate authorization basis, increase the likelihood of an accidental criticality or serious industrial accident.

6.3.4. Recommendations

- The contractor should provide managerial direction to and role clarification for Shift Technical Advisors. The DOE/RFFO should provide managerial direction and role clarification to Facility Representatives. The DOE/RFFO should take a renewed interest in the Facility Representative qualification process and set goals for expeditiously qualifying Facility Representatives.

- The contractor should carefully review and strengthen, as necessary, the management arrangements, the operational controls, and emergency procedures for B-771. In addition, positive steps should be taken to encourage workers to report immediately all incidents to management.

- Individuals assigned to B-771 management should have germane technical experience.

- Pertinent safety-related equipment problems in the building, for example, the unreliable emergency power system, should be resolved before tank-draining activities commence.

- The DOE/RFFO and contractor management should confirm that the compensatory measures established by the USQD process are being tracked and effectively implemented.

- The contractor and the DOE/RFFO should continue the activity-based planning process for draining tanks, including a reanalysis of the tank and process piping volumes and

plutonium concentrations. However, tank-draining activities should only be executed after the Operational Readiness Review confirms that plant and equipment conditions, procedures, and personnel are ready to perform the work safely.

6.4. Procedural Infrastructure and Compliance

As part of its review, the Assessment Team reviewed the contractor's policy and procedure system, which is required by DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities."

6.4.1. Introduction

EG&G has developed a well-documented procedural infrastructure. A system is in place for controlling and revising these documents as needed. Newly issued DOE Orders and Directives are formally transmitted for implementation to the contractor Vice-President for Standards from the DOE/RFFO Office of Standards Performance and Assurance. The process for generating technical and administrative procedures is described in detail in the Procedure Preparation Guide (PPG) Manual. Compliance with this new standard for all past procedures is not required until December 1997. Until then, procedures prepared using earlier versions of the procedure guide may be used. The site-wide process for Operations Managers to correct/repair a deficient piece of equipment, or to modify structures, systems, and components, and to perform preventive maintenance is documented in the Integrated Work Control Package Manual. The contractor has a procedure compliance policy (Policies and Procedures Manual, Section 7.1) and a Conduct of Operations Manual that clearly emphasizes working in accordance with procedures.

6.4.2. Issues

The Assessment Team identified these issues: site-wide procedure implementation; procedure development process; procedure use and conduct of operations; and ineffective corrective actions.

Site-Wide Procedure Implementation

Compliance with the PPG Manual requirements is not uniformly implemented in all facilities. For example, in B-771, about 25% of the surveillance procedures have been written, reviewed, verified, and validated with the rigor specified in the PPG Manual. None of the emergency response procedures and few of the utility and chemical operations procedures (for example, procedures for fans, diesel generators, etc.) conform to the PPG standard. Some of these procedures were developed by the process developed in 1989; others were developed by the facility using other preparation formats and review processes,

for example, the TIP-005 procedure process. In contrast, B-707 uses procedures that meet the PPG standard. Until January 1995, the procedure development effort for B-771 was not accorded high priority relative to other facilities. Additional personnel have been assigned, but in view of inexperience, lack of security clearances, or insufficient training, as well as the unavailability of reliable piping diagrams, progress will continue to be slow.

Procedure Development Process

Procedure development, review, validation, and approval are viewed as costly, time consuming, and complex by both workers and operations management. For example, the conversion of an existing 26-page procedure used in B-707 to the new standard resulted in a 168-page document. With the assistance of the building staff, the document was reduced to a more manageable 48 pages.

Considerable dissatisfaction exists with the procedure development, verification, validation, review, and change process. Terms commonly used to describe the process included: "cumbersome," "overkill," and "not end-user friendly." Similar procedure-related comments were found in the recently published RFETS Safety Culture Survey Report. Process specialists in B-771 strongly believe that their process knowledge needs to be incorporated in procedures, but feel they are not sufficiently involved in the development process.

Workers and operations and program management characterize the time it takes to effect a procedure change as excessive. Most procedure changes should require only days instead of weeks. According to B-771 Operations Management, during the independent, parallel review process by the appropriate safety disciplines, the assigned discipline reviewer may have provided some comments that require resolution by a technical expert and a technical writer. When the procedure is returned for re-review, a different discipline expert may be assigned and interpret the requirement differently. As a consequence, the comment resolution cycle is reiterated. These and similar issues tend to frustrate efficient procedure development and change. Concurrence by all parties in the various review steps is mandatory for procedure approval. As more concurrence signatures are needed, accountability by the approving manager for the procedure may be decreased.

Procedure Use and Conduct of Operations

Based on interviews, Conduct of Operations principles may not be clearly understood by B-771 personnel, including some supervisors and management personnel. Conduct of Operations philosophy supports the use of procedures. The distrust by process operators of the procedure development and use process can be partly attributed to the fact that when it

was introduced, the Conduct of Operations was described as an additional set of requirements rather than a more formal approach to doing work. Emphasizing Conduct of Operations at only two buildings onsite, at the expense of the other facilities, reinforced the misconception that Conduct of Operations has selected applicability and is a product rather than a philosophy.

Interviews with B-771 personnel indicated that some supervisors and managers have taken actions that suggest that they do not accept the Conduct of Operations philosophy. Such actions tacitly give permission to some process specialists to reject Conduct of Operations. The safety culture survey indicates that operators distrust supervisors and managers. That distrust may have been caused in part by the failure to effectively instill the Conduct of Operations philosophy.[1]

The existing verification of procedural compliance is spotty at best, based upon examining B-771 practices. Shift managers do perform spot checks during their rounds. Management at B-771 plans to establish and use Internal Surveillance Teams to verify adherence to procedures during the planned restart activities. Implementation of increased operations oversight as a corrective action to the unauthorized tank-draining event at B-771 may be an effective short-term measure to mitigate recurrence of a similar event. However, until operators accept the philosophy of Conduct of Operations and understand why process knowledge is complementary to and not a replacement for using technically accurate procedures, increased management attention will exacerbate this problem. Increased surveillance as a short-term measure must be followed up with an aggressive campaign to make operations personnel in B-771 advocates of the Conduct of Operations philosophy.

Ineffective Corrective Actions

The contractor and the DOE/RFFO management have taken corrective actions, but they do not generally appear to have been effective. The Root-Cause Analysis for the Incident stated that personnel were supposedly instructed regarding management expectations for Conduct of Operations, that procedures were to be followed, and if unable to comply with the procedures, the activity should be terminated and procedure resolution obtained prior to proceeding further and that no nuclear-related procedure or process should go forth without use of an approved procedure. However, on two subsequent occasions incidents have occurred that indicate the message has not been understood or it has been rejected by facility

[1] Rocky Flats Environmental Technology Site, "Safety Culture Survey Report for B-771," February 1, 1995.

operations personnel.[1] The contractor and the DOE/RFFO management actions to preclude such events appear inadequate.

6.4.3. Conclusions

- EG&G recognized the problems in this area and has developed an extensive, integrated procedural infrastructure to support the performance of its mission and to establish the necessary management controls to perform work safely and in compliance with applicable Environment, Safety and Health requirements. Formal procedure-writing process and work-control systems have evolved over the past four years and now are firmly in place. However, the procedural and work-control requirements established by these systems are not uniformly or consistently implemented by most facilities.

- The Assessment Team believes that a smarter way needs to be found to meet the target date for compliance with the PPG standard by all facilities. More technical writers are not the only answer. Criteria need to be developed to adjust the procedural detail and level of reviews relative to the hazards of the operation. Further simplification and streamlining of the procedure revision process would greatly enhance the acceptance of procedures by workers.

- EG&G Organizational Effectiveness has initiated work to define Job Aids for inherently simple or safe tasks, but the real need is simplifying the whole process for operations involving low hazards.

- EG&G has developed a compliance review process based on organizational audits, surveillances, self-assessments, and independent assessments, but the process may not assess the degree to which the philosophy of Conduct of Operations, including the principle of "working to procedures" has taken hold in the work force.

- Acceptance of Conduct of Operations by first- and second-line supervisors and managers is not universal and perhaps as a result, acceptance by process operators and operations support personnel is not universal.

[1] Preliminary Notification of Reportable Occurrences, dated February 20, 1995 submitted by B-771 Facility Representative.

6.4.4. Recommendations

- The DOE/RFFO should guide the new integrated contractor through retention of the administrative and procedural infrastructure and should explore approaches to increase the overall efficiency of the process and in particular, evaluate the role of process personnel in developing procedures.

- Upper management should continuously reinforce its belief in the Conduct of Operations principles. First- and second-level supervisors need to lead by example.

- The contractor and the DOE/RFFO should:

  — Focus initial efforts to gain acceptance of Conduct of Operations philosophy on operations supervisory and management personnel.

  — Consider using a team of Conduct of Operations experts to evaluate operations supervisory personnel with respect to their understanding and acceptance of formality of operations philosophy and provide training and mentoring as necessary.

  — Ensure that management personnel serving as operations supervisors and managers firmly espouse the Conduct of Operations philosophy.

7. Summary of Conclusions and Recommendations

The Assessment Team attempted to identify a single, major broken link that might explain some of the performance problems at RFETS, but could not identify such a single factor. Instead, several management-related factors are contributing causes to both safety and work performance. These factors relate to leadership, business operations, organizational and work force stability, communications, and safety management.

7.1. Conclusions: Assessment of the Root-Cause Analysis and the DOE/RFFO Comments

The Root-Cause Analysis did not have a sufficiently broad scope to identify the management factors that contributed to the Incident. The Assessment Team concludes that the real root cause is the failure of the contractor and the DOE/RFFO management to establish an appropriate safety culture in B-771. In addition, the Root-Cause Analysis did not fully examine the serious criticality safety implications of the incident. Under similar circumstances, but involving tanks containing solutions of higher plutonium concentrations, like actions might have resulted in a criticality accident.

The DOE/RFFO comments appropriately raised significant issues about the Root-Cause Analysis, including a concern that the EG&G management practices permitted unacceptable behavior by operating personnel in B-771. The DOE/RFFO also expressed valid concerns about the effectiveness of the corrective actions to prevent similar incidents in the future. DOE/RFFO should have asked for and EG&G should have documented its response to the DOE/RFFO comments.

7.2. Conclusions: Assessment of Management Practices

7.2.1. Business Operations

One of the most pressing issues at RFETS is the lack of a fully integrated IPS for dealing with the site-wide problems of deteriorating facilities and areas of increasing risk, for example, B-771 and its processes and equipment. As a result, employees are routinely reassigned due to poor planning, scheduling, and resource loading, which results in low morale and frustration. The Assessment Team appreciates the DOE/RFFO and EG&G efforts to develop liability reduction programs, but the ability to effectively implement these programs in light of deteriorating plant equipment, the growing unknowns in process streams, and the attrition of experience represents a major challenge for all levels of the organizations.

7.2.2. Organization and Employee Stability

Frequent turnover in senior and middle DOE/RFFO and EG&G management positions is a contributing cause to performance problems. The problem is destined to continue in the near future with the planned change of contractors and the massive reduction in work force.

7.2.3. Communications

The DOE/RFFO and EG&G employ a variety of communication techniques that are used by troubled organizations faced with destabilizing and negative factors. These communication techniques appear to be ineffective. Employees hear but do not seem to accept the messages. Both organizations readily communicate at all management levels with DOE/HQ-EM program offices, within and between DOE/RFFO and the contractor, regulatory agencies, and oversight organizations, but both the contractor and the DOE/RFFO lack a process for formalizing decision making and approving commitments.

7.2.4. Leadership

The management transfer of the Rocky Flats Plant from DP to EM was not handled well and has had lingering organizational and administrative consequences. The DOE/HQ-EM and the DOE/RFFO have failed to integrate and control programmatic direction to the contractor, which contributes to managerial ineffectiveness at RFETS. Deficiencies in the safety culture can be attributed to a large number of factors, including leadership failure at various levels.

Management should have recognized the symptoms of a poor safety culture and corrected these deficiencies. Strong leadership at all levels of DOE and the new contractor will be required to achieve real progress in the reduction of liabilities and cleanup of the site.

7.3. Conclusions: Safety Practices

7.3.1. Nuclear Criticality Safety

The NCSP has undergone several reorganizations and restructurings in an effort to improve its effectiveness. Notwithstanding these efforts, the NCSP is unable to provide timely support to programmatic operations, for example, the liability reduction programs, for lack of experienced NCSEs. This situation is aggravated by an inadequate training program for the NCSEs. The absence of an adequate criticality safety training program for operating personnel that overcomes operator belief that "a criticality cannot happen here" is considered a major risk factor in future operations. The Nuclear Criticality Safety Committee has been ineffective in addressing and resolving these management issues.

7.3.2. Safety Culture

EG&G management actions have not brought about a sufficient change in the safety culture of B-771 to restart high-risk operations under the present conditions without special measures. Concerns over pending layoffs and possible changes in building management, a reluctance to report safety incidents due to fear of reprisal or of what is perceived by operating personnel to be unfair disciplinary actions, and the lack of clear directions and procedures appear to be linked to the continuing frequency of safety incidents. These conditions and the inability to maintain an appropriate facility authorization basis increase the likelihood of an accidental criticality or serious industrial accident.

Some proactive safety actions have been inadequately resolved. When brought to the DOE/RFFO or EG&G management's attention, some safety issues are not effectively dealt with or are not sent to the next level of management for resolution. Closure appears to be weak. Furthermore, the apparent lack of an effective Issues Management System to effectively address significant safety issues at the senior management level is a problem.

7.4. Recommendations

The Assessment Team's major recommendations follow. The reader is referred to Sections 5 and 6 of this report for additional detailed recommendations.

- The DOE/RFFO and the contractor should expand and accelerate their IPS efforts. Consideration should be given to forming an IPS joint task force with DOE/HQ-EM, DOE/RFFO, and contractor personnel.

- The DOE/RFFO and the new contractor should establish organizational and work force stability as soon as possible. Consideration should be given to establishing performance-based criteria that promote organizational stability, particularly in senior and middle management.

- The DOE/RFFO and the contractor should improve dialogue within and between organizations to ensure achievable commitments are clearly understood and agreed upon.

- Contractor management should realistically evaluate the ability of Criticality Engineering to support program needs. Aggressive efforts should be made to address the training needs of the nuclear criticality staff.

- DOE/HQ-EM and DOE/RFFO should strengthen efforts to integrate and control the flow of guidance to the contractor.

- DOE/HQ-EM should retain the option to use DOE/HQ-DP technical support.

- The DOE/RFFO and the contractor should reexamine their communication initiatives and make innovative changes that overcome the widespread "this too shall pass" attitudes and achieve "real" communications with the work force.

- The SRB and the Nuclear Criticality Safety Committee should be revitalized.

- The new contractor should review and strengthen, as necessary, the management arrangements, operational controls, and procedures in B-771 (and in other facilities) in order to improve its safety culture.

- The DOE/RFFO should ensure that proactive identification of safety issues is encouraged. The contractor and the DOE/RFFO should ensure that alternative paths for reviewing safety concerns exist and are effective.

- The DOE/RFFO and the contractor should develop and implement an Issues Management System to differentiate between significant safety problems and minor issues.

7.5. Summation

The Assessment Team believes that the Incident was one of the most serious in recent history. There was a serious breach of criticality safety and management control. Two levels of supervision observed the failure and instead of stopping the activity, took part in a cover-up of the event. The Incident demonstrates a serious lack of safety culture, technically and philosophically. When existing problems in management are considered, along with the destabilizing influences presently at work onsite, the safety of RFETS operations is at risk. That risk translates into an increased likelihood of serious accident and demands aggressive and deliberate actions.

Appendix A. Nuclear Facility Operations Safety Assessment Charter

DEPARTMENT OF ENERGY
ROCKY FLATS FIELD OFFICE

CHARTER

NUCLEAR FACILITY OPERATIONS
SAFETY ASSESSMENT TEAM

1. **Team's Official Designation:**

Nuclear Facility Operations Safety Assessment Team (the "Assessment Team").

2. **Objectives and Scope of Activities:**

To conduct an independent verification of EG&G's Root Cause Analysis and Generic Implications of the Unauthorized Draining of a Process Line in Building 771 and an independent review of the Rocky Flats Field Office (RFFO) comments to EG&G's Root Cause Analysis.

To develop a report with recommendations on actions, which might be taken by the DOE and/or the new site management contractor to improve the management of nuclear facility operations at the Rocky Flats Environmental Technology Site (RFETS).

To conduct a review of the program policy and guidance provided by the office of Environmental Management to the RFFO and of the DOE institutional management of RFETS nuclear facility operations to identify factors that may contribute to or are root cause for safety problems in nuclear facility operations.

To conduct a review of the program policy and guidance provided by the Rocky Flats Field Office (RFFO) to EG&G Rocky Flats, Inc. and of the RFFO institutional management of RFETS nuclear facility operations to identify factors that may contribute to or are root cause for safety problems in nuclear facility operations.

To conduct a review of the policy and guidance provided by EG&G Rocky Flats, Inc. to facility operators and of the management of nuclear facility operations at the RFETS to identify factors that may contribute to or are root cause of safety problems in nuclear facility operations.

The Assessment Team may use whatever techniques the members deem appropriate, including the review of selected documents, management presentations by DOE and EG&G, interviews with staff and management personnel, and facility tours.

3. **Description of the Assessment Team's Duties:**

The Assessment Team shall conduct the assessment (Section 2) and develop a report with recommendations on actions, which might be taken by the DOE and/or the new site management contractor to improve the management of nuclear facility operations at the RFETS.

4. **Officials to Whom this Assessment Team Reports:**

The Assessment Team shall report to the Manager, Rocky Flats Field Office (RFFO). The Team's report, with recommendations, and briefing(s) shall be provided to the Manager.

5. **Duration and termination Date:**

The Assessment Team shall terminate thirty (30) days after submission of its report and recommendations to the Manager, RFFO.

6. **Organization Responsible for Providing Necessary Support:**

M. H. Chew & Associates, Inc. shall provide all administrative and logistical support to the Assessment Team under terms of the Support Services Contract DE-AC-92RF000105. Interface by the Assessment Team with the DOE and with EG&G Rocky Flats, Inc. shall be provided by the RFFO through the office of Standards, Performance, and Assurance.

7. **Estimated Travel and Number and Frequency of Meetings:**

The entire Assessment Team is expected to be at the RFETS for approximately two (2) weeks for the onsite review. Some members will be required to travel to DOE/HQ, Washington, DC, to interview senior DOE personnel. The HQ interview visits are estimated to last less than one (1) week.

Prior to the onsite review, members will be required to read documents at their respective home offices. The draft report will be produced during the two (2) weeks of the onsite review, however, additional time will be needed to develop recommendations and complete the report.

Some members will be required to travel to DOE/HQ to brief senior DOE personnel and the Defense Nuclear Safety Board. This briefing trip is estimated to last less than one (1) week.

8. **Members:**

Approximately ten (10) Assessment Team members shall be selected. Membership shall include both DOE and outside experts, who are recognized senior technical and management experts in nuclear facility operations. They shall include experts in nuclear and criticality safety, nuclear facility operations, plutonium processing, and waste management. Membership shall reflect a balance of expertise and viewpoints.

9. **Team Leader:**

Mr. Keith Klein, Acting Deputy Manger, RFFO, will be the Team Leader.

This Charter for the Nuclear Facility Operations Safety Assessment Team named above is hereby approved on:

Date: January 19, 1995

Mark N. Silverman, Manager
Rocky Flats Field Office

Charter for the Nuclear Facility Operations Safety Assessment Team:

Submitted by:

Date: 1-18-95

Dero W. Sargent

Reviewed by:

Date: 1-19-95

Keith A. Klein

Appendix B. Assessment Team and Senior Review Group Rosters

Assessment Team

Keith Klein (Team Leader); Deputy Manager, Rocky Flats Field Office, Department of Energy.

Melton H. Chew; Former Health Physicist and Environment, Safety, and Health Leader of Chemistry, Test Program, and Laser Program for Lawrence Livermore National Laboratory (LLNL), President and CEO, M.H. Chew & Associates, Inc.

James S. Dittig; Former Deputy Department Head of Hazards Control and Deputy Manager of Plant Services for LLNL.

Klaus Ernst; Former Plant Services Manager and Plutonium Facility Manager for LLNL.

Milton Haas; Former Plutonium Finishing Deputy Plant Manager, Hanford Site and Former Group Leader, LANL TA-55 Aqueous Processing.

Joe Legare; Director, Office of Operations Assessment, DOE/HQ-EM-25.

Paul D. Rice; Former Vice President at Westinghouse Savannah River Company for Reactor Restart, Vice President at Georgia Power for Vogtle Nuclear Project, Naval Reactors Program, and Member of the DOE Advisory Committee on Nuclear Facility Safety.

Alfred J. Rizzo; Former DOE Richland Operations Office Assistant Manager (AM) for Operations, AM for Energy Programs, and AM for Facility and Laboratory Management and Reactor Safety Engineering and Operational Safety.

George Toto; Principal, Inglewood Group, Inc., Conduct of Operations, Operational Readiness Reviews, and Radiological Control.

Richard G. Vornehm; Former Superintendent of Y-12 Nuclear Criticality Safety Department, Oak Ridge, TN.

Senior Review Group

Xavier Ascanio; Surplus Facility Transfer Coordinator (DOE/HQ-DP-31).

Wayne Rickman; Consultant, Sonalyst.

Victor Stello; Principal Deputy Assistant Secretary for Quality (DOE/HQ-DP-3).

Mark H. Williams; Acting Associate Deputy Assistant Secretary for Nuclear and Facility Safety (DOE/HQEH-3).

Appendix C. Reference Document List

Table C-1. Reference document list.

Team document number	Document number	Date	Title
MAT-001	1-PO4-SCMP-16.00	12/5/94	Sitewide Commitments Management Process
MAT-002	deleted		
MAT-003	N/A	2/13/95 (FAX)	The Leadership Academy
MAT-004	N/A	2/1/95	Safety Culture Survey Report
MAT-005	N/A	2/13/95	Briefing; Unauthorized Draining of Process—Line-B-771
MAT-006	Chart	8/2/93	EG&G RFO Organization Charts
MAT-007	EG&G Letter, 95-RF-01683	2/14/95	Contractor Change-Control Board Meeting, February 15, 1995
MAT-008	EG&G Letter, 95-RF-0401	2/6/95	Plan of Action for the Operational Readiness Review for B-771 Tank-Draining to Bottles
MAT-009			Safety Culture Questionnaire, Various Buildings
MAT-010	DOE/RFO Memo	9/1/94	FY95/1 Performance Evaluation Plan for Period October 1, 1994–March 31, 1995
MAT-011	Task Force Report	2/95	Alternative Futures for the DOE National Laboratories
MAT-012	EG&G Letter 94-RF-11784	11/28/94	Root-Cause Analysis and Generic Implications of the Unauthorized Draining of a Process Line in B-771 AHB-275-94

Table C-1. Reference document list (cont'd.).

Team Document Number	Document Number	Date	Title
MAT-013	Plan	9/19/94	RFETS Strategic Plan
MAT-014	NUREG/CR-5455	2/16/93	Development of the NRC's Human Performance Investigation Process (HPIP); Investigator's Handbook
MAT-015	NUREG/CR-5455	2/16/93	Development of the NRC's Human Performance Investigation Process (HPIP); Summary
MAT-016	NUREG/CR-5455	2/16/93	Development of the NRC's Human Performance Investigation Process (HPIP); Development Documentation
MAT-017	INP Report	10/2/92	SOER 92-1, Reducing the Occurrence of Plant Events through Improved Human Performance
MAT-018	EG&G Report No. 95-0170	2/3/95	Weekly COOP and Criticality Safety Report
MAT-019	Standing Order 34	1/9/95	Suspension of Fissile Material Movements
MAT-020	Brochure	1995	Leadership Academy 1995
MAT-021	Policy	8/31/93	Policy 7-1, Policies and Procedures System
MAT-022	Description	7/1/92	Management Control System
MAT-023	Position Descriptions	9/26/94	EG&G Position Descriptions
MAT-024	Implementation Plan	Undated	RFETS Safety Analysis Program Implementation Plan
MAT-025	Procedure	4/26/93	RFETS Procedure Process
MAT-026	Procedure	4/26/93	RFETS; Procedure Edit, Review, and Comment
MAT-027	Procedure	11/4/93	RFETS; Procedure Writing
MAT-028	Occurrence Report	2/9/95	10-day update on Occurrence Report No. RFO-EGGR-771OPS-0062
MAT-029	Informal Memo	3/8/93	My Personal "Gut Feel" Criticality Concerns at EG&G RF
MAT-030	Organization Effectiveness	2/14/95	Organization Chart
MAT-031	System Integration	6/21/94	Project Management
MAT-032	Procedure Process	2/9/95	Memo

Table C-1. Reference document list (cont'd.).

Team document number	Document number	Date	Title
MAT-033	Vision/Priorities	2/2/95	Presentation
MAT-034	Survey Model	1/9/95	Graphic Model
MAT-035	Management Turnover	3/1/94	Report
MAT-036	Maintenance Implementation Plan	6/30/92	Report (Loaner)
MAT-037	Maintenance and Plant Support; Strategy	5/1/94	Report (Loaner)
MAT-038	1-NSM Nuclear Safety Manual	5/5/92	Nuclear Safety Manual
MAT-039	INPO; Significant Operating Experience Report	10/2/92	Summary Memo
MAT-040	EG&G ORR Plan of Action	Unknown	Memo
MAT-041	Conceptual Project Plan	2/9/95	Draft Report
MAT-042	Mission Statement	9/21/94	Mission Memo
MAT-043	Award Fee Materials	12/22/94	Various letters, memos, etc.
MAT-044	Bid	7/7/94	RFP description
MAT-045	EG&G Manual	7/13/93	Training User's Manual (Loaner)
MAT-046	EG&G Manual	11/01/94	Integrated Work Control Program (Loaner)
MAT-047	EG&G Manual	7/90	Policy Manual (Loaner)
MAT-048	EG&G Manual	8/91	Health and Safety Practices, Vol. 1 (Loaner)
MAT-049	EG&G Manual	8/91	Health and Safety Practices, Vol. 2 (Loaner)
MAT-050	DOE Report	9/94	Pu Working Group Report on ES&H Vulnerabilities associated with DOE's Pu Storage
MAT-051	ODP-1100.2, Rev 4	7/19/93	Facility Representative Program Division Organization.

Table C-1. Reference document list (cont'd.).

Team document number	Document number	Date	Title
MAT-052	ODP 5480.19-03	8/05/94	Facility Representative Program Operations Division Shift Routines
MAT-053	DOE Document	n/a	SES Performance Appraisal, Assistant Manager for Site Support and Security
MAT-054	DOE Document	n/a	SES Performance Appraisal, Assistant Manager for Project Management and Engineering
MAT-055	DOE Document	n/a	SES Performance Appraisal, Assistant Manager for Environmental Restoration
MAT-056	DOE Document	n/a	SES Performance Appraisal, Manager, RFFO
MAT-057	DOE Document	n/a	SES Performance Appraisal, Senior Technical Advisor
MAT-058	DOE Document	n/a	SES Performance Appraisal, Assistant Manager for Operations and Waste Management
MAT-059	DOE Document	n/a	SES Performance Appraisal, Assistant Manager for ES&H
MAT-060	DOE Document	n/a	SES Performance Appraisal, Deputy Manager, RFFO
MAT-061	DOE Document	n/a	SES Performance Appraisal, TQM
MAT-062	DOE Document	n/a	SES Performance Appraisal, Planning and Integration
MAT-063	DOE Document	n/a	SES Performance Appraisal, Training and Development
MAT-064	DOE Document	n/a	SES Performance Appraisal, Field Chief Financial Officer
MAT-065	DOE Document	n/a	SES Performance Appraisal, Standards, Performance and Assurance
MAT-066	DOE Document	n/a	SES Performance Appraisal, Office of Chief Counsel
MAT-067	DOE Document	n/a	SES Performance Appraisal, Communications and Economic Development

Table C-1. Reference document list (cont'd.).

Team document number	Document number	Date	Title
MAT-068	DNFSB Report	4/14/94	Pu Storage Safety at Major DOE Facilities
MAT-069	OTA Background Paper	3/93	Hazards Ahead: Managing Cleanup Worker Health and Safety at the Nuclear Weapons Complex
MAT-070	DOE Manual	5/89	ES&H Technical Safety Appraisal Reference Manual (Vol. 1)
MAT-071	DOE Draft	7/25/89	Operations and Management Assessment Team; Solid Waste and Residue Management Systems at RFETS, Rev. 1
MAT-072	Advisory Committee on Nuclear Facility Safety Report	11/91	Final Report on DOE Nuclear Facilities to the Secretary of Energy
MAT-073	DOE Plan	4/25/94	DOE Pu ES&H Vulnerability Assessment Plan
MAT-074	RFFO	n/a	Miscellaneous Job Position Announcements
MAT-075	National Research Council	1989	The Nuclear Weapons Complex, Management for Health, Safety, and the Environment
MAT-076	DOE Standard	7/94	RFFO Operations Division Facility Representative Qualifications Standard and Qualifications Card
MAT-077	Draft Description	1/16/95	RFETS Document Hierarchy
MAT-078	1-50000-ADM-05.01	3/5/93	RFETS Document Hierarchy Definition and Administration
MAT-079	EG&G, 1-A01-PPG-001, 1-A02-PPG-003, 1-A03-PPG-004, Manual	n/a	Procedure Process, Procedure Writing, Procedure Edit, Review and Comment (Loaner)
MAT-080	EG&G Manual	2/1/95	Conduct of Operations (Loaner)
MAT-081	EG&G	1/18/95	Training Roster—All Hands Training
MAT-082	EG&G Roster	n/a	Root-Cause Analysis Required Reading Rosters
MAT-083	EG&G Manual	1/9/95	Standing Orders (Loaner)
MAT-084	DOE Document	n/a	SES Performance Appraisal, Civil Rights and Diversity

Table C-1. Reference document list (cont'd.).

Team document number	Document number	Date	Title
MAT-085	DOE Facility Representative Program, ODP 1100.1	5/6/91	Facility Representative Charter
MAT-086	DOE Memo	3/2/94	FY94/2 Performance Evaluation and Plan for 4/1 to 9/30/94
MAT-087	DOE Document	9/4/92	Performance Evaluation Plan for EG&G RFETS, 10/1/92 to 3/31/93
MAT-088	DOE Document	3/1/93	Performance Evaluation Plan for EG&G RFETS, 4/1/93 to 9/30/93
MAT-089	EG&G Letter	10/5/94	Letter with Attachments; Cost Plus Award Fee Self-Assessment Report, 4/1/94 to 9/30/94
MAT-090	DOE Memo	12/6/93	Revised Performance Evaluation Plan 10/1/93 to 3/31/94
MAT-091	EG&G Letter	4/11/94	To M. Silverman: Transmittal of EG&G Cost Plus Award Fee Self-Assessment Report, 10/1/93 to 3/31/94
MAT-092	DOE Report	4/94	Fueling a Competitive Economy; Strategic Plan (CAI Library)
MAT-093	DOE Book—EM	1/95	Closing the Circle on the Splitting of the Atom (CAI Library)
MAT-094	DOE Report S-0107	2/94	Making Contracting Work Better and Cost Less (Loaner)
MAT-095	DOE/RFFO Report	11/9/93	Business Strategy Report and Model Request for Proposal
MAT-096	EG&G Reports	n/a	Miscellaneous Mentor Reports for B-771 Only
MAT-097	EG&G TIP No. 771-OPS-94-005	8/18/94	B-771 Movement from Tank D-467 to Glove Box 42
MAT-098	EG&G Procedure No. 4-92400-RI-2204	2/22/93	Performance Testing of Selective Alpha Air Monitoring System
MAT-099	USQD 771-94.1187-SDG	9/8/94	Transfer Solution from D-467 to Glove Box 42

Table C-1. Reference document list (cont'd.).

Team document number	Document number	Date	Title
MAT-100	Burlingame Memo	12/15	Handwritten Memo to Mark Silverman with enclosure (EG&G Interoffice Correspondence dated 10/27/94; Garcia's involvement with solution stabilization)
MAT-101	EG&G FAX	2/21/95	Critique Notes of Fire Watch Incident
MAT-102	EG&G Staff Requirement	6/11/93	Shift Technical Advisor
MAT-103	Listing	n/a	Realignment of Standards, Audits, and Assessments Organizational Activities
MAT-104	RFP Document RR-93-96	2/8/93	Compensatory Actions for Safety Envelope Deficiencies

Appendix D. Summation of Post-Incident Reviews and Reports

D-1. DOE/HQ-EM-64 Review (October 24, 1994, Juroff to Silverman)

DOE/HQ-EM-64 conducted an onsite review on October 18–19. The review noted "clear systemic problems which may need correction before safety-significant nuclear activities are undertaken." Six recommendations were made to the DOE/RFFO:

1. Formal documentation of the activities or facilities that have been shut down for safety reasons should be approved before the determination of what corrective actions are to be approved. The scope of the shutdown must be clearly identified, because it is used to determine the scope of restart.

2. The pervasiveness of attitude problems concerning safety culture and Conduct of Operations should be determined by the contractor.

3. The contractor should document by specific reference exactly what policies, standards, and procedures were violated by the workers.

4. The DOE/RFFO should review previous expectations for the safety basis and controls needed to support activity-based work in the light of lessons learned from this occurrence.

5. The DOE/RFFO should request HQ support to assist in participation/oversight of any Organizational Readiness Review required by this Incident.

6. The DOE/RFFO should require EG&G to document the safety basis for recommendations to resume suspended operations, including the safety significance of the operation being resumed, and the reasons why the resumption is appropriate.

D-2. Root-Cause Analysis (November 23, 1994, AHB-275-94, Burlingame to Silverman)

The Root-Cause Analysis identified the Summary Cause as, "Personnel failed to accept and implement the concepts of Conduct of Operations."

Root causes were identified as "Task performance was less than adequate in that a worker deliberately performed work outside 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."

Contributing causes were "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 B-771 is less than adequate."

Potential problems included "The perception of the inconsistent application of discipline at RFETS is so strong that some personnel may be afraid to stop and report unauthorized or unsafe activities; and the removal of the lockout/tagout per TIP-005 was not in compliance with compensatory measures established for the Raschig ring tank USQD.

The Generic implications identified by EG&G management review included 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 the process for creating and maintaining authorization bases.

D-3. DOE/RFFO, Operations and Waste Management Response to the Incident (December 8, 1994, Smith to Sargent)

Following the Incident, DOE/RFFO Operations and Waste Management conducted a self-evaluation of DOE/RFFO's oversight activities (December 1994). The review recommended that Standards, Performance, and Assurance should conduct an independent review. The self-evaluation noted these issues:

- Key shortcoming in DOE/RFFO oversight was a failure to consider that operators might willfully and significantly operate outside the scope of procedures.

- Better communication and coordination are necessary between Environment, Safety and Health and Operations and Waste Management personnel to facilitate more timely resolution of significant safety issues.

- The DOE/RFFO failed to spot check areas of known or suspected weaknesses in EG&G's controls, such as implementation of USQD compensatory measures and criticality safety evaluation assumptions and controls.

The self-evaluation noted these corrective actions:

- Briefing DOE/RFFO Facility Representatives on the lessons learned from the Incident (completed).

- Issuing protocol on how effective interface between DOE/RFFO support organizations and Facility Representatives can occur (due February 1, 1995).

- Developing Operations and Waste Management inspection plan for restarting tank-draining activities, which includes the process for implementing USQD compensatory measures and criticality safety evaluation assumptions and controls in B-771 (due March 1, 1995).

D-4. DOE/RFFO Comments on EG&G Root-Cause Analysis, B-771 (December 10, 1994, Silverman to Burlingame)

The DOE/RFFO considered the Root-Cause and corrective actions sufficient to proceed with review of the restart plans, but asked that EG&G review the DOE/RFFO comments for applicability and to incorporate them into Standing Order 34 restart plans. The DOE/RFFO noted that it would only review those restart plan actions resulting from the Root-Cause Analysis. The comments can be summarized as follows:

- The Root-Cause Analysis does not appear to address or explain why the management environment allowed these types of situations to exist.

- The Root-Cause Analysis does not address inappropriately obtained and improperly processed laboratory sample (Operational Safety Requirement violation).

- The Root-Cause Analysis indicates EG&G assumed that the Conduct of Operations would not be fully implemented. How should the site-wide infrastructure be revised to correct this situation?

- Training concerning safety should be broadened to include not only criticality, but also industrial, electrical, radiological, etc., safety issues.

- Acknowledgment that conflict between Conduct of Operations principles and process knowledge continues as a result of a number of factors. Recommend that EG&G consider training class on procedures that includes procedural compliance.

- EG&G management needs to acknowledge what it will do to facilitate procedure compliance in addition to laying out its expectation for operator compliance.

- Corrective actions do not appear to address the lack of discipline and the need of a process for establishing and maintaining appropriate authorization bases for hazardous activities.

- The Root-Cause Analysis fails to identify the safety significance of action taken after the operator left the TIP.

- The corrective actions do not address the on-going issue that employees can report concerns without fear of reprisal.

- The Root-Cause Analysis does not appear to deal with the issue that first-line management may be resistant to the implementation of Conduct of Operations.

- Some corrective actions of the Root-Cause Analysis direct specific Facility Representatives actions. The descriptions should be reviewed for clarity, measureability, and practicability.

D-5. Independent Environmental Management Investigation (Case No. 94-007, Report dated January 6, 1995)

An independent investigation was requested by the DOE Office of the Deputy Assistant Secretary for Nuclear and Facility Safety and conducted by the Enforcement and Investigation Staff. There are no apparent discrepancies in the specific facts of the unauthorized draining of Tank D973 between the "Report of Investigation, Rocky Flats,

Investigation of Nuclear Criticality Safety Infraction at B-771, Rocky Flats, Case No. 94-007," and that of the EG&G Incident Description (dated) and the Root-Cause Analysis. However, the detailed description of the events of September 28 and 29, 1994, differ significantly. The Report for Case No. 94-007 provides a comprehensible backdrop for the Incident and suggests that systemic disregard for safety principled behavior exists and will continue to be problematic. This document was provided to the Team on February 24, 1995, the last day of the Assessment Team's onsite visit. The Assessment Team did not make any attempt to validate the conclusions drawn by this report.

Attachment 3

Safety Culture Survey Preliminary Findings for Building 771
Second Administration
May 23, 1995

SAFETY CULTURE SURVEY

PRELIMINARY FINDINGS

FOR

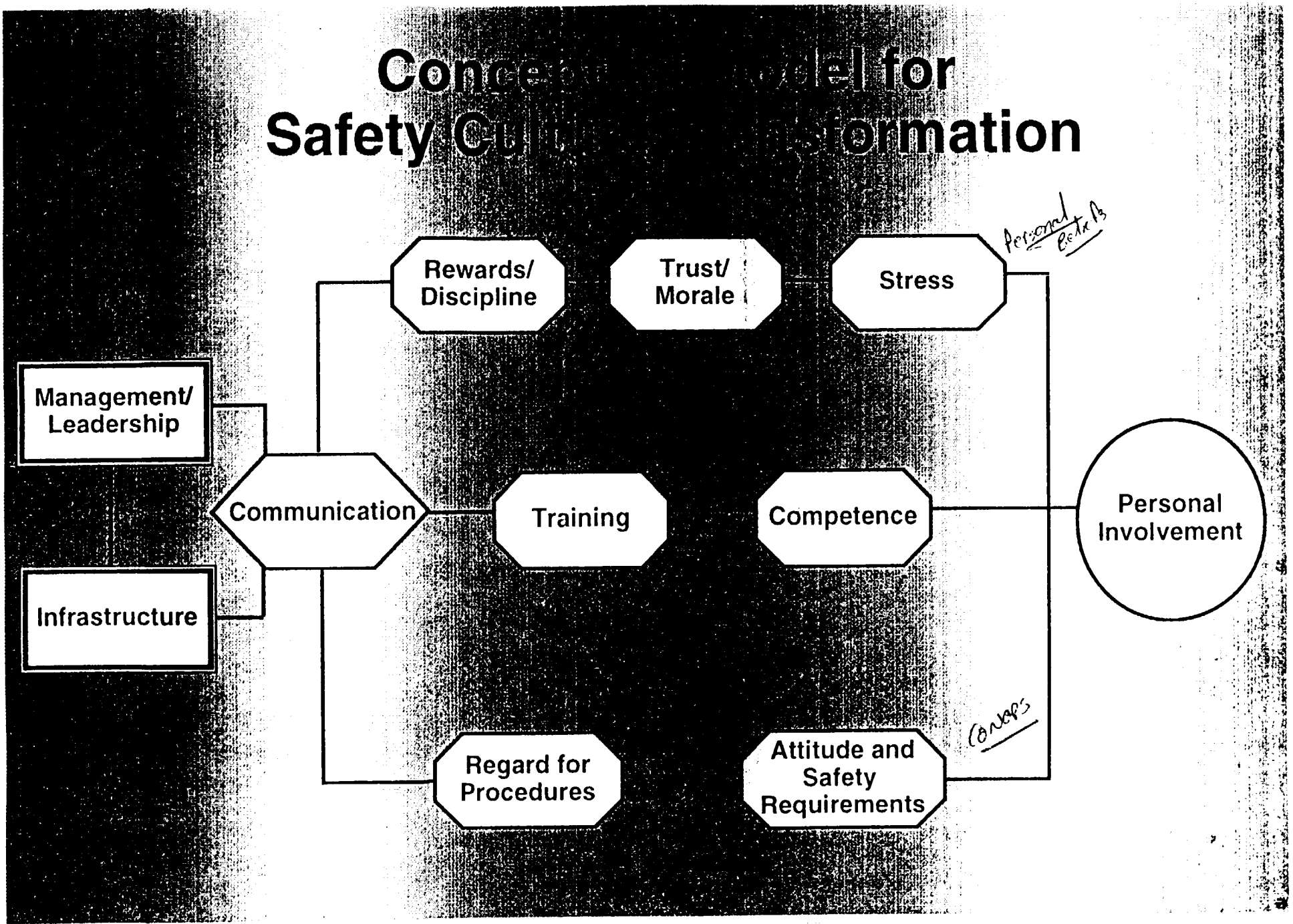
BUILDING 771

SECOND ADMINISTRATION

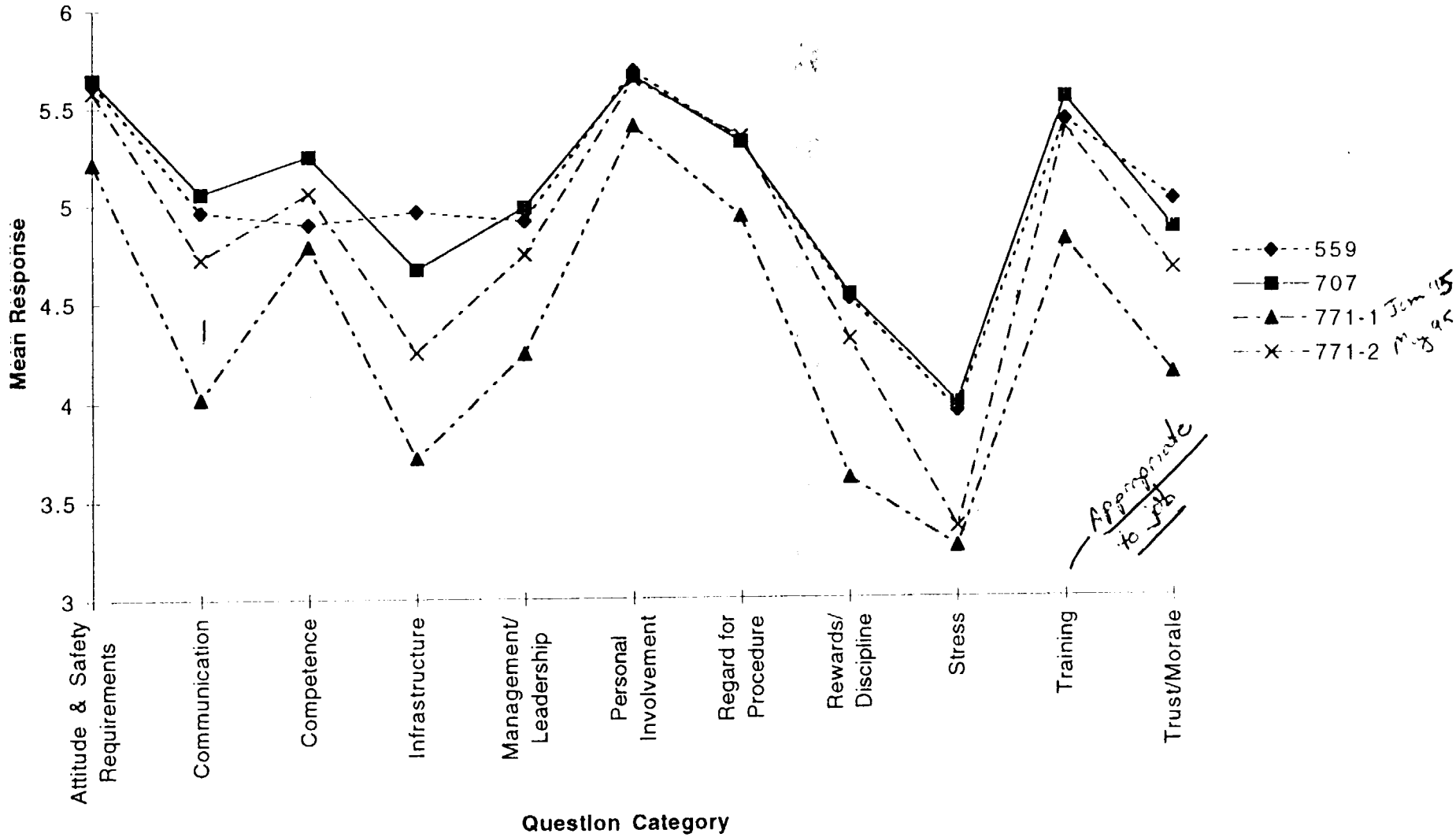
May 23, 1995

Eugene J. Nuccio, Ph.D., Systems Analysis
David I. Gertman, Ph.D., Jason Associates
Al D. Palachek, Ph.D., Statistical Applicaitons

Conceptual Model for Safety Culture Transformation



Safety Culture Survey Category Means



Category	559	707	771-1	771-2	Difference
Communication	4.9621	5.0554	4.0146	4.7195	0.7049
Rewards/ Discipline	4.5061	4.5286	3.6056	4.302	0.6964
Training	5.4164	5.53	4.8045	5.3705	0.566
Trust/Morale	5.005	4.8621	4.1238	4.6547	0.5309
Infrastructure	4.9597	4.6657	3.7143	4.2407	0.5264
Management/ Leadership	4.9094	4.9782	4.2339	4.7386	0.5047
Regard for Procedure	5.308	5.3076	4.93	5.3335	0.4035
Attitude & Safety Requirements	5.6249	5.6451	5.207	5.5765	0.3695
Competence	4.8968	5.2408	4.7818	5.051	0.2692
Personal Involvement	5.6723	5.6467	5.39	5.6268	0.2368
Stress	3.9418	3.9856	3.2551	3.355	0.0999

Building 771- Second Survey Administration

Management Notes

May 24, 1995

The changes in Building 771, as assessed by comparing the initial and re-survey findings, are dramatic. Every Safety Culture category showed improvement, with four categories (Attitude and Safety Requirement, Personnel Involvement, Regard for Procedure, and Training) achieving mean scores equal to the Resumption Buildings (i.e. Buildings 559 and 707) Two of these categories (Attitude and Safety Requirement, and Regard for Procedure) combine to create the Conduct of Operations dimension in the Safety Culture Transformation Model. This is an area where Building 771 personnel have received significant training and mentoring.

The remaining seven categories, while showing varying degrees of improvement in mean scores (from significant improvement, i.e. > 0.5, in the areas of Communication, Infrastructure, and Reward/Discipline, to minimal improvement, i.e. < 0.1, for Stress), are still below levels achieved by the Resumption Buildings. These represent areas where management needs to heighten its efforts within Building 771.

One finding that tempers our enthusiasm for these generally positive results was that 52 of the 142 survey respondents (about 37%) claim not to have previously completed a Safety Culture Survey. We are attempting to determine if this represents personnel who are new to the Building, possibly bringing more positive attitudes toward safety than previous Building personnel. While this relatively large percentage of personnel not represented in the previous Survey results calls into question whether the change is primarily due to the training received by Building personnel, the overall positive results do reflect the current "state of the Building" with regard to safety culture, regardless of the origins of these beliefs.

Preliminary findings from the re-administration of the Building 771 safety culture have been determined and the following trends noted:

- Thirty-two survey items (25%) obtained from the first Building 771 survey were rated differently (at least 2.0 rating points or greater) from the resumption Buildings. On the second survey, the number of items that showed this same magnitude of difference was 11 (8.7%).

- A number of specific improvements to Building 771 safety culture (as evidenced by median scores) are notable. For example, personnel are better informed when a procedure related to their work changes and personnel writing procedures are perceived to understand workers tasks better than before. Ratings also indicate that pre-ev procedures and pre-ev briefings are improved.

- The positive increase in Trust/Morale scores determined by the second survey administration indicates that Building 771 management has worked hard to improve culture during these last few months.

- Building 771 results indicate that first line managers and senior managers are viewed as offering more support to their staff and are more knowledgeable regarding the extent to which workers are under stress. Building personnel feel that unsafe things are more apt to get fixed than before. However, room for improvement exists as evidenced by other findings. For example, Building 771 personnel's survey response indicates that personnel feel there to be many unresolved safety questions. We intend to clarify precisely what they mean by this. EG&G will strive to identify and address each safety question, document, and establish a resolution plan and corresponding action list.

- Building 771 management is making notable progress in rewarding safe practices, and that safety requirements are uniformly understood by everyone in their individual work groups. Since the last

Building 771 survey, training is less apt to be postponed and lessons learned from readiness reviews conducted in B-559 and 707 are being formally shared with a much larger group of personnel.

- Building 771 staff have pride in how their Building operates and report that work there is performed safely. They also now feel that they are more valued by their immediate supervisors, their Director and by the Rocky Flats President. I feel this to be important in establishing the culture we desire and that the public has a right to expect from us.

- Training no longer is perceived to take a back seat to schedule and management is being perceived by workers to be leading by example. These are important achievements. We still can improve in the areas of providing management follow-through for fixing safety problems and responding to perceived hazards.

- As part of this survey re-administration 14 new items directed to toward assessing the degree of safety culture change were developed and administered. Data obtained from these new items validates the instances of positive culture change noted above First, immediate supervisors and other managers in the management chain have been more actively promoting safety since the last survey. Secondly, supervisors and managers demonstrated that they care about the safety of workers. This is encouraging and shows that our diligence and concern regarding improving the culture is being acknowledged by the work force. Survey results indicate that things still need to get better. We have to improve our maintenance of the back areas, work on our communication between organizations, and make sure that we have obtained proper work authorization before performing *any* job performed in B -771. I am personally committed to making these improvements.

- More detailed review of these culture change items shows that all groups-- union/bargaining, salary-exempt, management, non-exempts, (even individuals refusing to indicate their employment status) believed their supervisors to be promoting safely more actively than ever before. The same is true in terms of caring about worker safety. All groups also indicate a more heightened awareness regarding doing their job more safely.

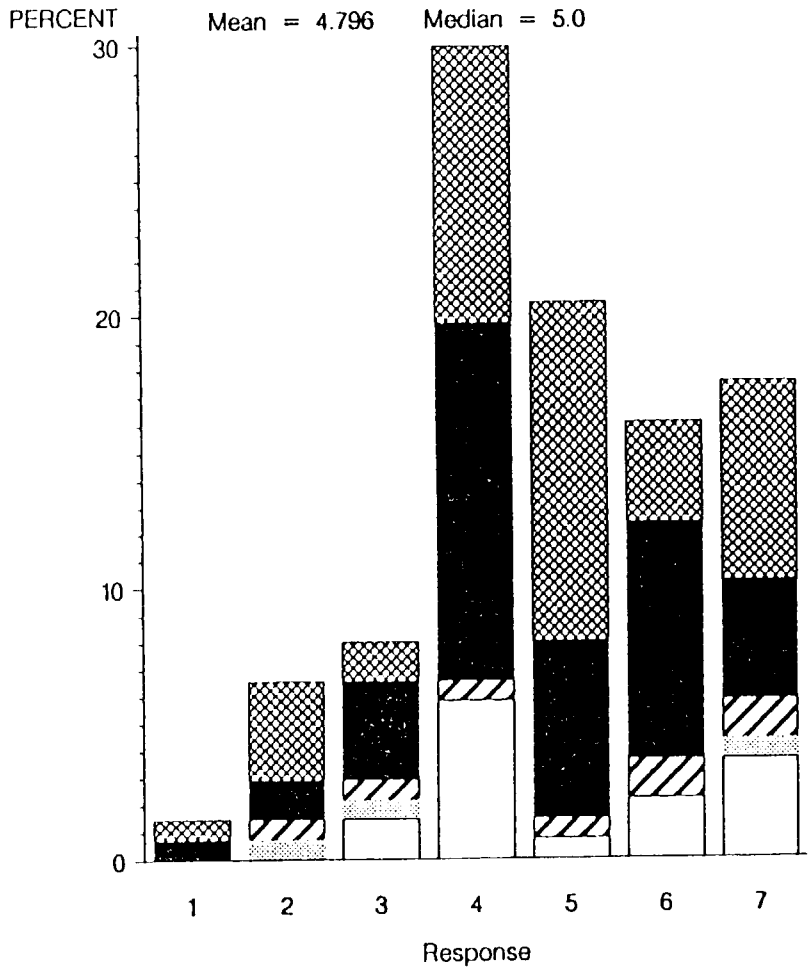
Building- 771 Safety Culture Survey

Change Category Items

(128 through 141)

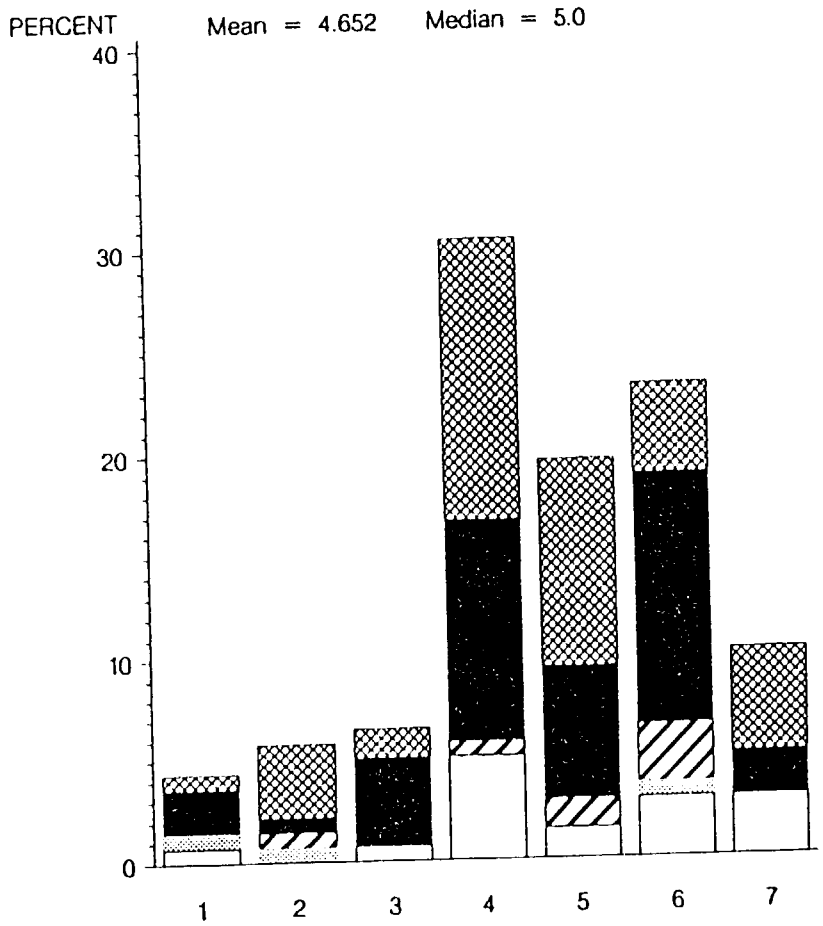
Building 771 – Question 128

My immediate supervisor has been more actively promoting safety since the last safety culture survey.



Building 771 – Question 129

The other managers in my management chain have been more actively promoting safety since the last safety culture survey.

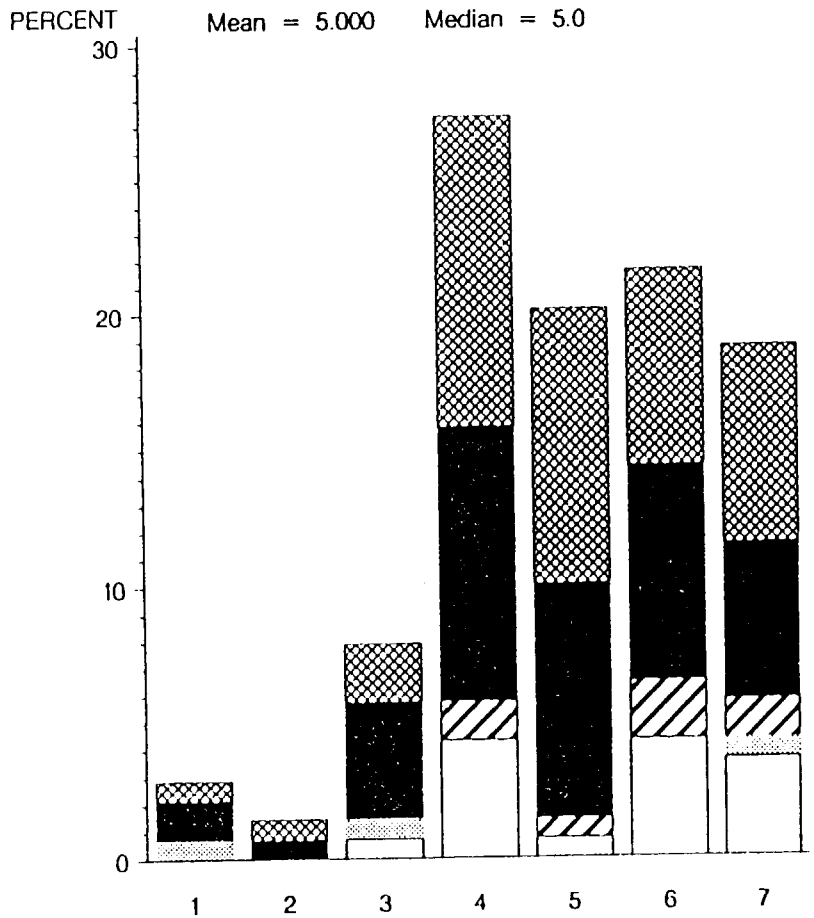


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

Building 771 – Question 130

I have received encouragement from my work group to perform my job safely since the last safety culture survey.

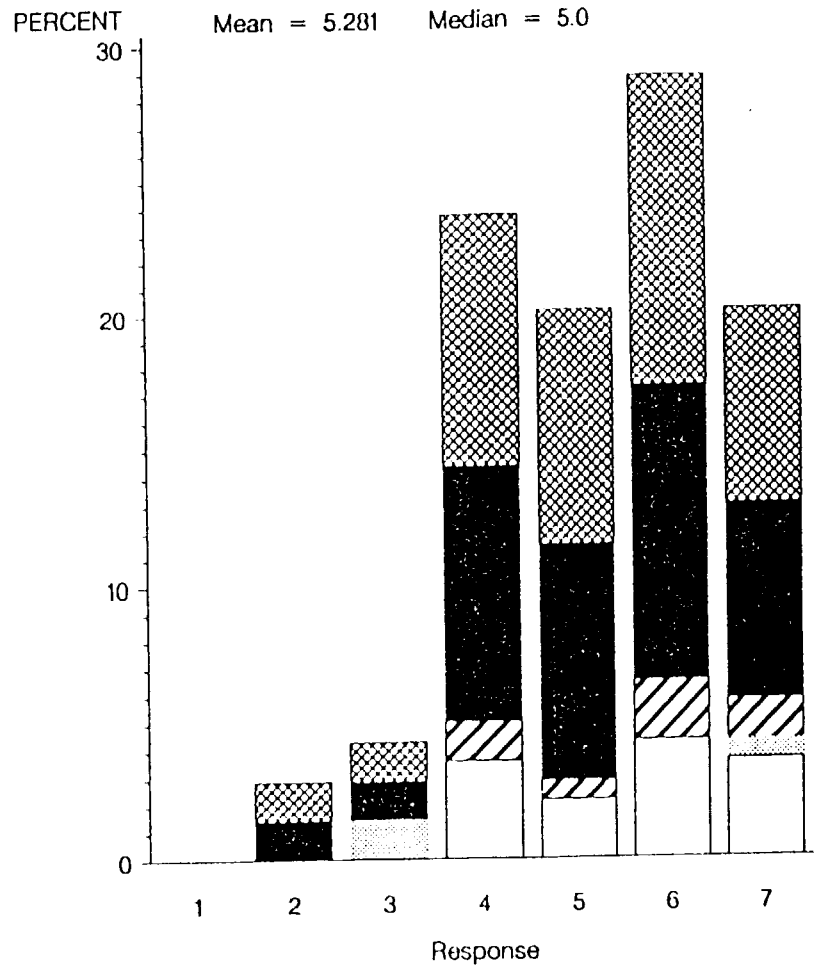


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

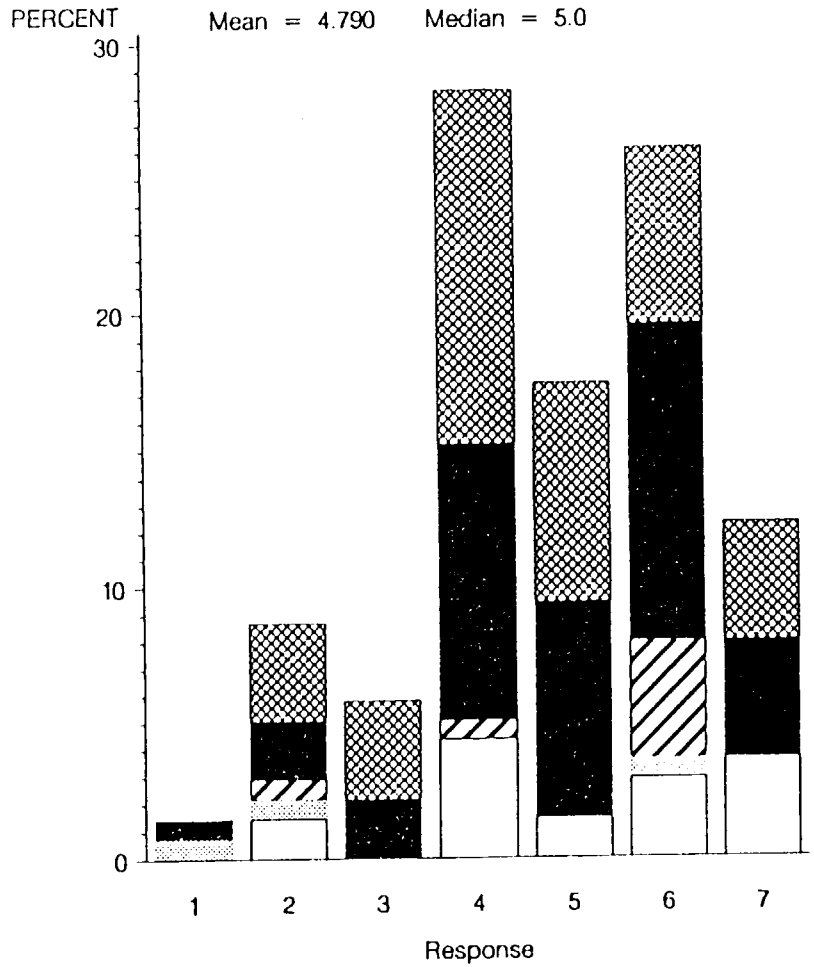
Building 771 – Question 131

Since the last safety culture survey, my immediate supervisor has demonstrated that he or she cares about the safety of workers in my work group.



Building 771 – Question 132

Since the last safety culture survey, other managers in my management chain have demonstrated that they care about the safety of Building XXX personnel.

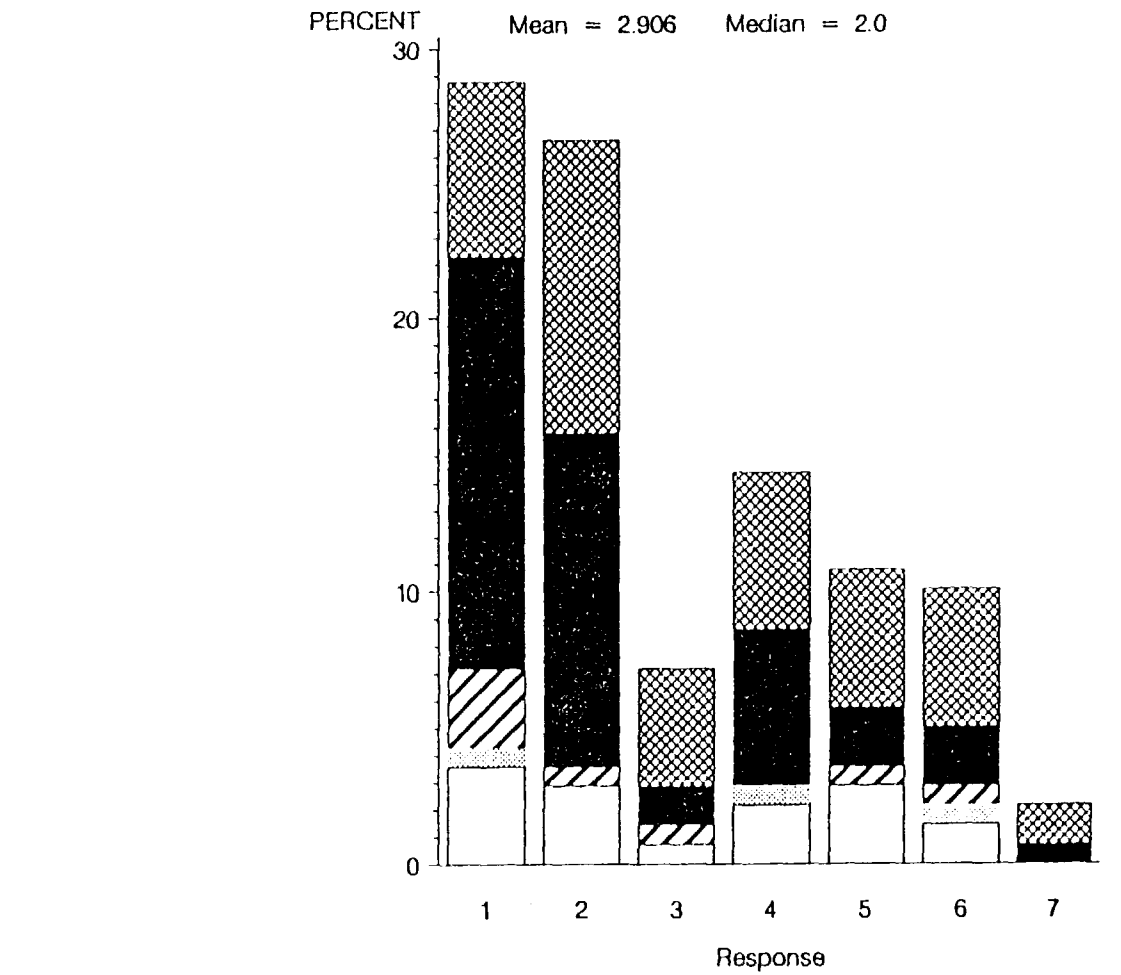


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

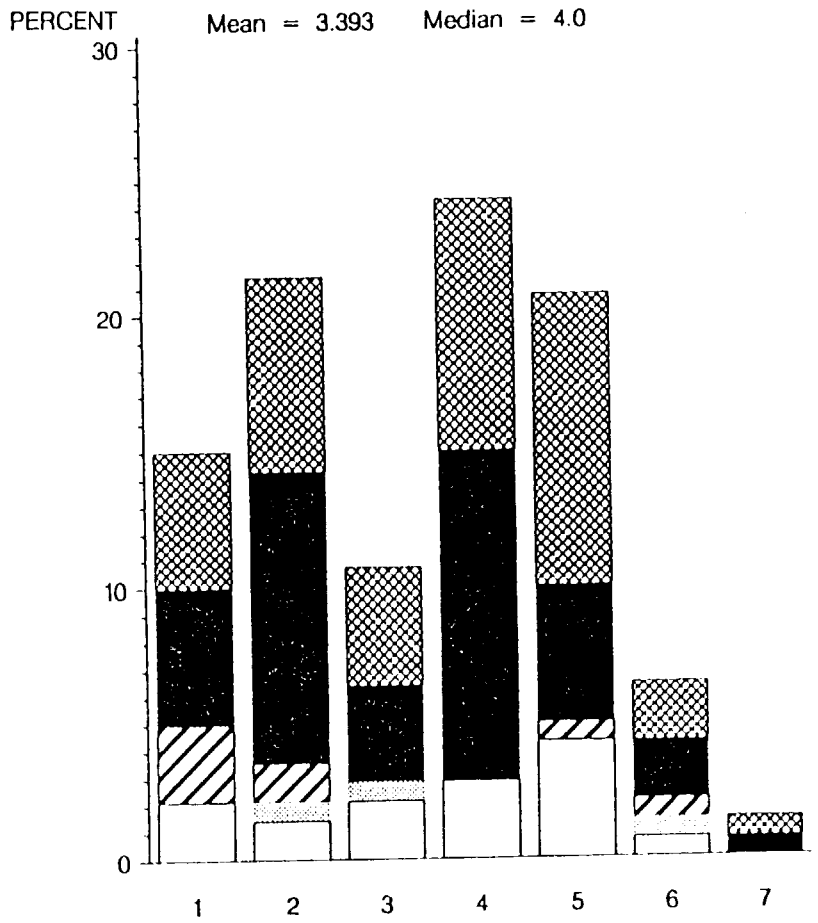
Building 771 – Question 133

(R) – My safety training has been postponed during the last five months.



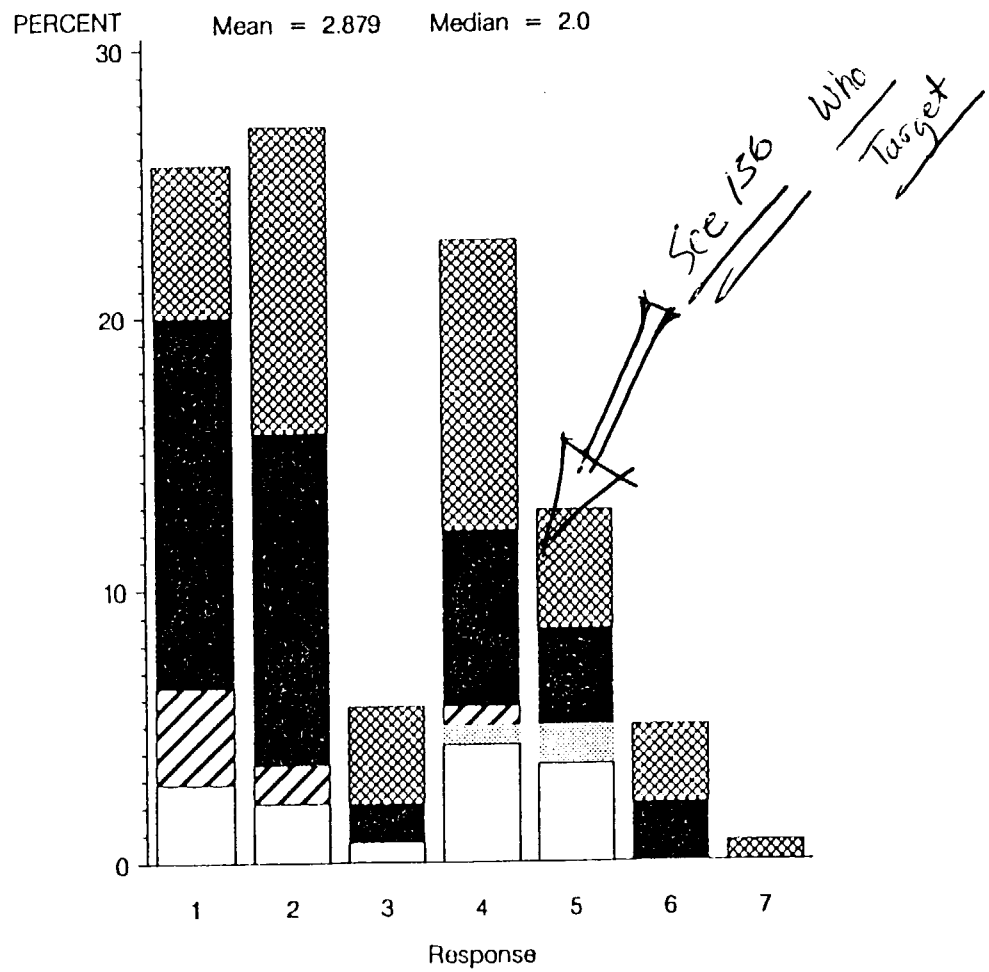
Building 771 – Question 134

(R) – Since the last safety culture survey, people have failed to obtain required authorization before doing work.



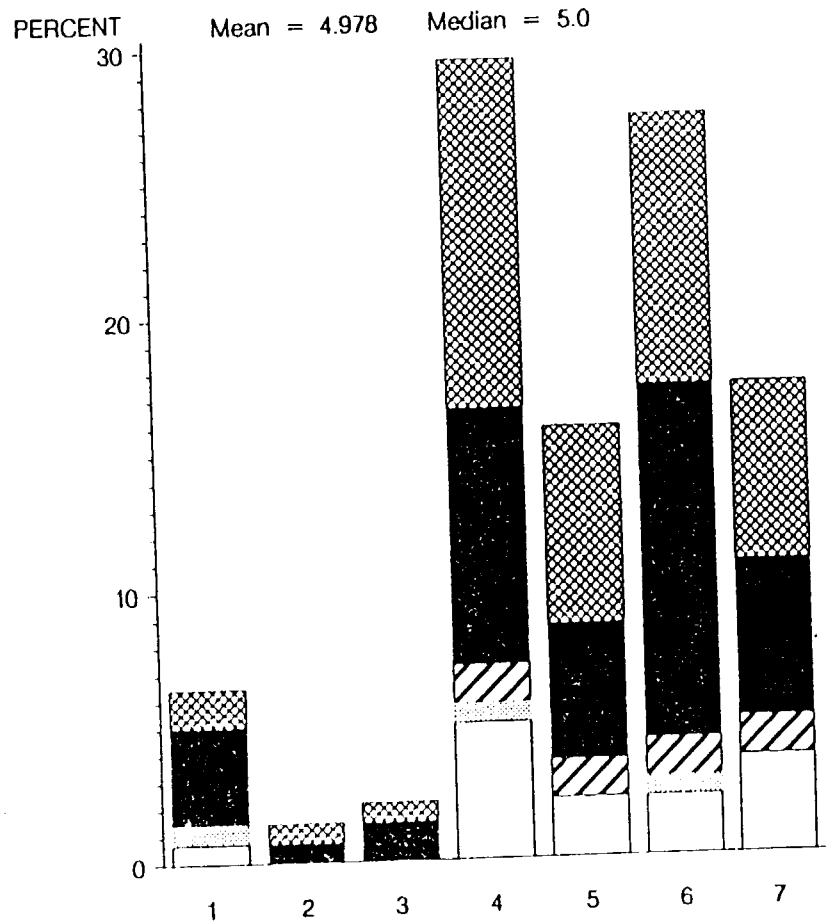
Building 771 – Question 135

(R) – I have seen people working in unsafe conditions since the last safety culture survey.



Building 771 – Question 136

I am more aware of doing my job safely since the last safety culture survey.

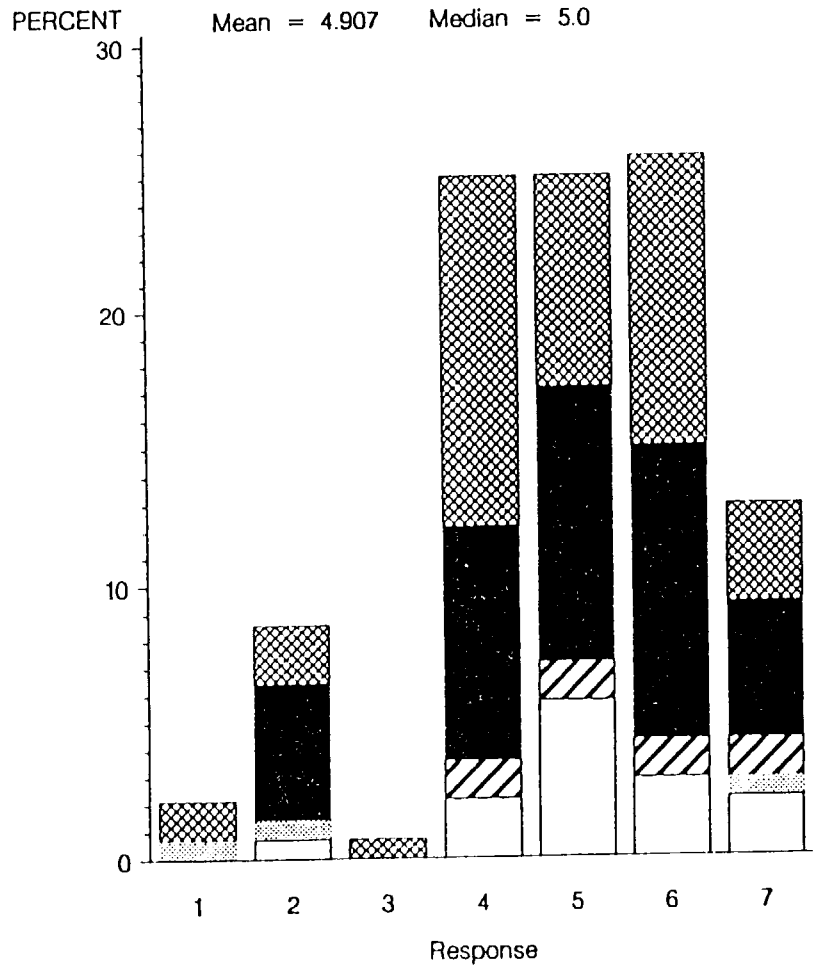


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

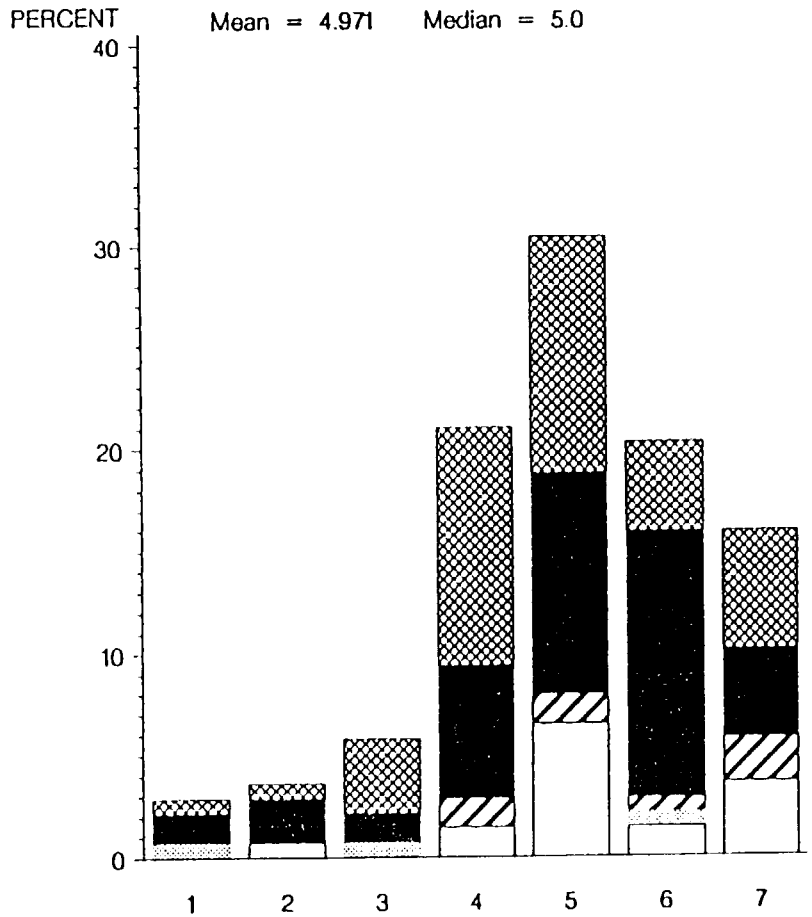
Building 771 – Question 137

Since the last safety culture survey, the information shared in safety meetings has been valuable to me.



Building 771 – Question 138

In general, safety in Building 771 has improved since the last safety culture survey.

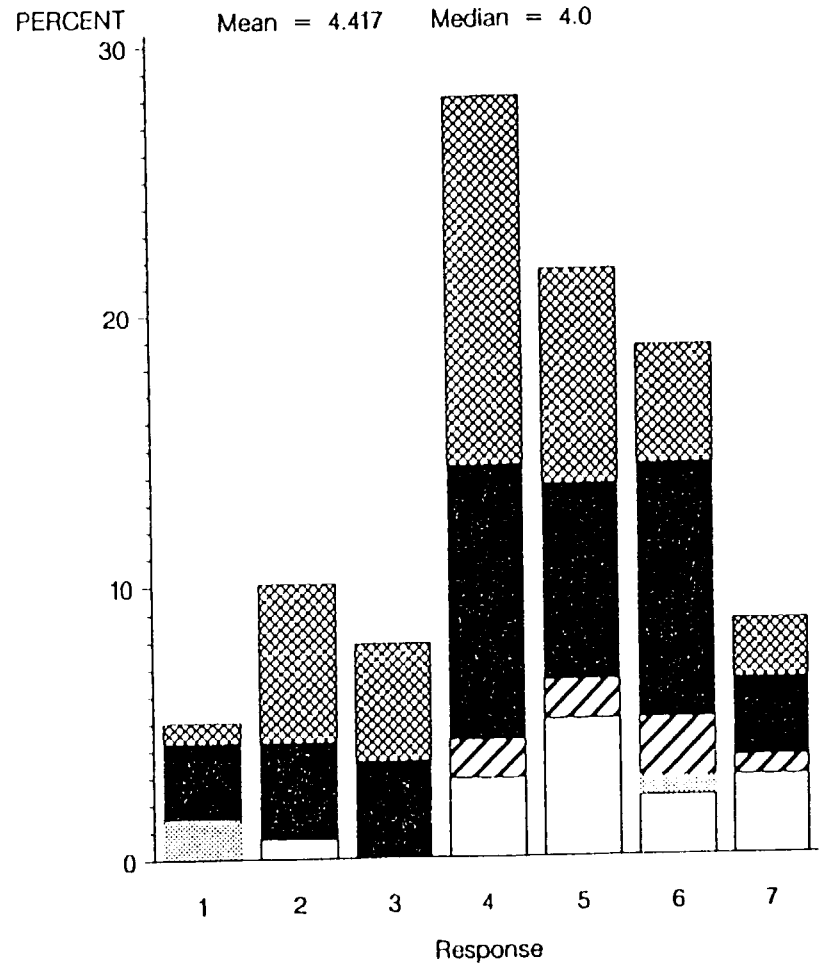


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

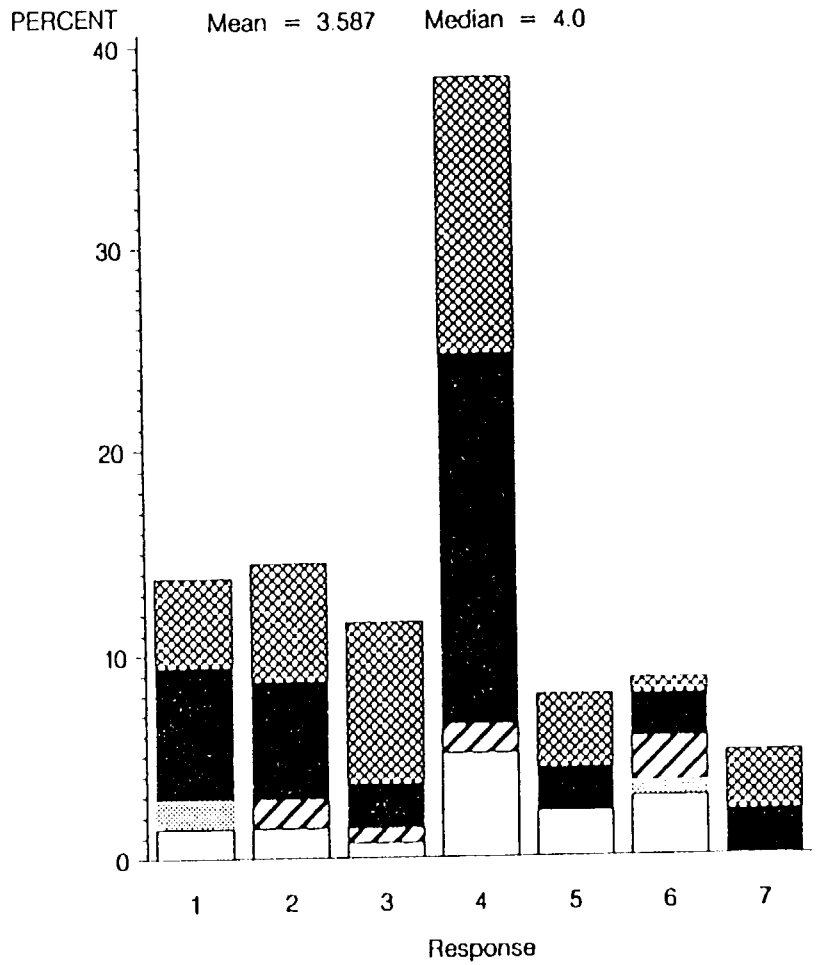
Building 771 – Question 139

There has been more communication among different organizations in Building XXX since the last safety culture survey.



Building 771 – Question 140

Rewards and discipline have been even-handed since the last safety culture survey.

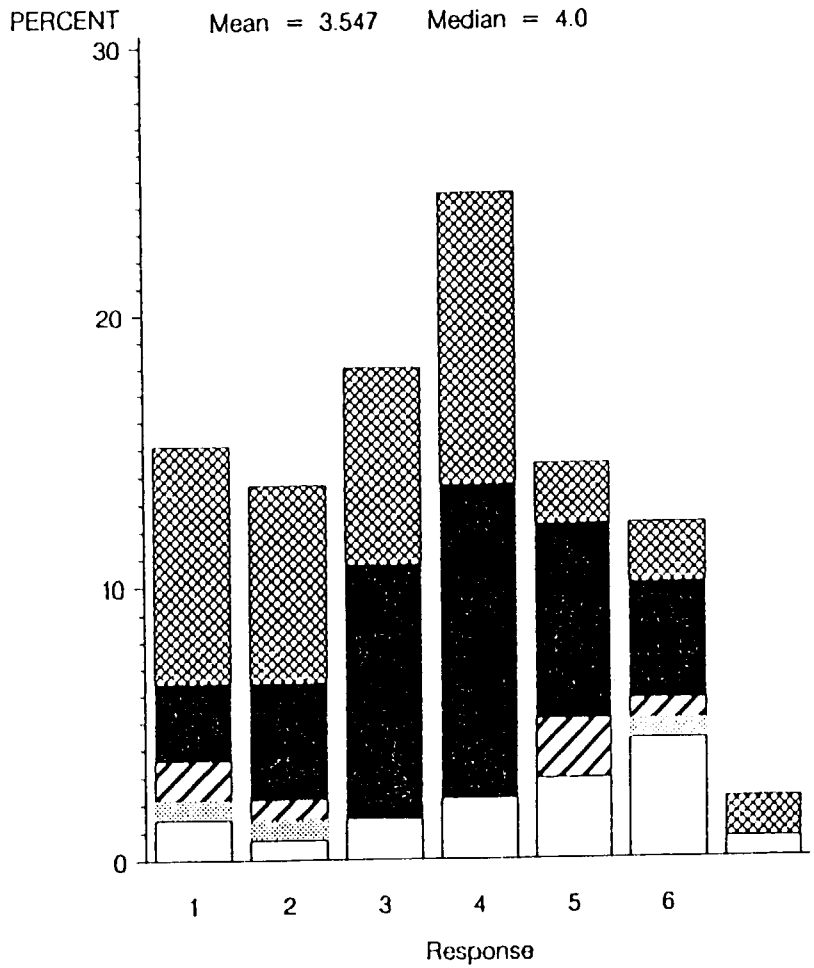


Demographic Question 1:

- Management
- Salary – Exempt
- No Answer
- Union/Bargaining
- Non – Exempt

Building 771 – Question 141

During the last 5 months, maintenance of back area systems has improved.



Building 771- Median Differences of 2.0 or Greater

Management/Leadership

Q 20. My immediate supervisor is aware of how much stress his or her workers feel.

- Low -771 1st (3.0) High-771 2nd (5.0)
- Salary exempts and union made full use of the scale. The most frequently occurring rating was 6.0 (29% of all responses).

Infrastructure

Q 107. Training takes a back seat to schedule in Building 771. (R)

- Low -771 1st (4.0) High-771 2nd (2.0)
- Management, salary exempts, and union bargaining responses were distributed along the total range of the scale. The most frequently occurring rating was 2.0 (32% of all responses) indicating strong disagreement with this negative item.

Trust/Morale

Q 46. Safety training in Building 771 covers the right material.

- Low - 1st (3.0) High- 2nd (5.0)
- Seven per cent of scores were 1 or 2 indicating opportunity for improvement in specific areas. The most frequently occurring rating was 5.0 (26% for all responses) followed by 6.0 (23%)

Q32. I understand the Unreviewed Safety Question Determination (USQD) process.

- Low- 1st (3.0) High 2nd (5.0)
- Full range of the rating scale was used by all groups with the exception of management. Management ratings ranged from 2 through 7. The most frequently occurring score was 6.0 (26% of all responses). Ratings of 5.0 and 7.0 each received 18% of all responses.

Rewards/Discipline

Q 55. Safe practices are rewarded in Building 771.

- Low -771 1st (2.0) High-771 2nd (4.0)
- Although improved over the first survey the median score obtained from the second administration indicates only moderate agreement with the statement. 22% of ratings were 4.0, the next most frequently occurring score was 5.0 (20%). Management was distributed along the length of the scale.

Communication

Q 69. Different organizations in Building 771 communicate well with one another.

- Low- 771 1st (2.0) High-771 2nd (4.0)
- Although improved over the first survey the median score obtained from the second administration indicates only moderate agreement with the statement. With the exception of ratings of 7 which only received 4 % of the total response, the response across management,

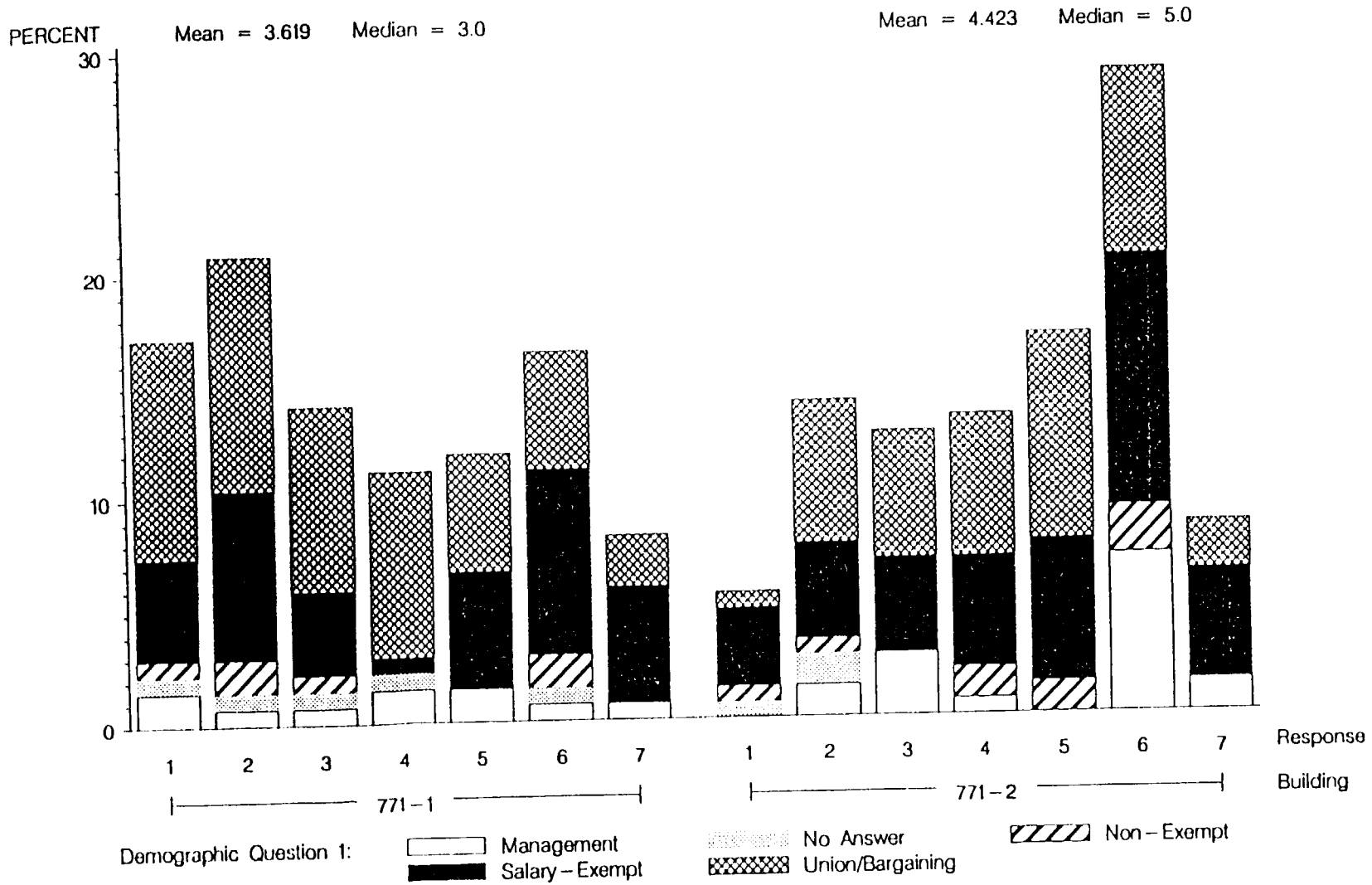
union/bargaining, and salary exempt was relatively flat. The most frequently occurring response was 2.0 (20% of all responses).

Q 71. The lessons learned from readiness reviews conducted in Buildings 559 and 707 have been formally shared with me.

- Low- 771 1st (3.0) High-771 2nd (5.0)
- Union /bargaining and salary-exempt made full use of the scale. Management ratings ranged from 3 to 7. The most frequently occurring score was 6.0 (28% of all responses).

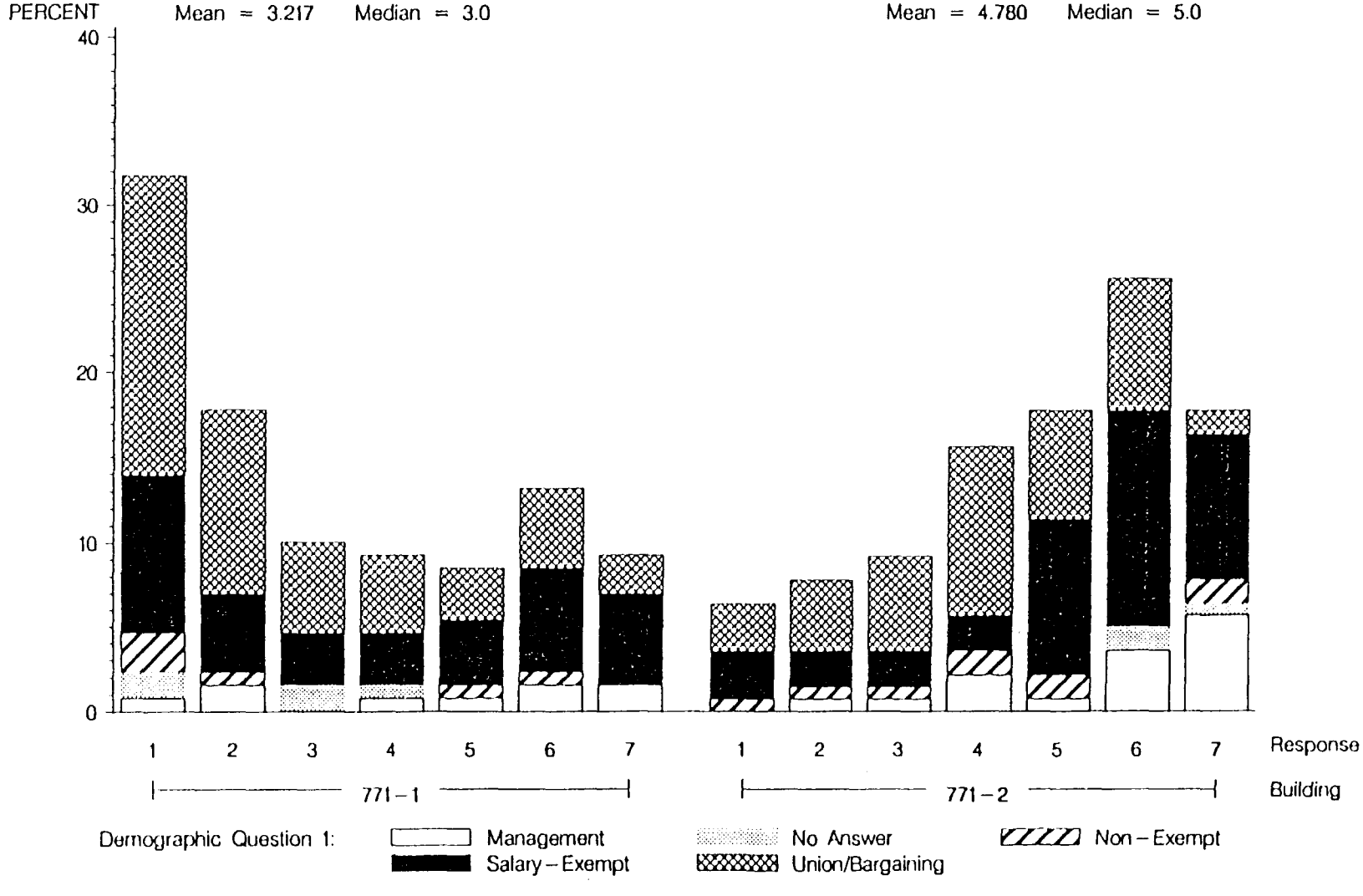
Question 20

My immediate supervisor is aware of how much stress his or her workers feel.



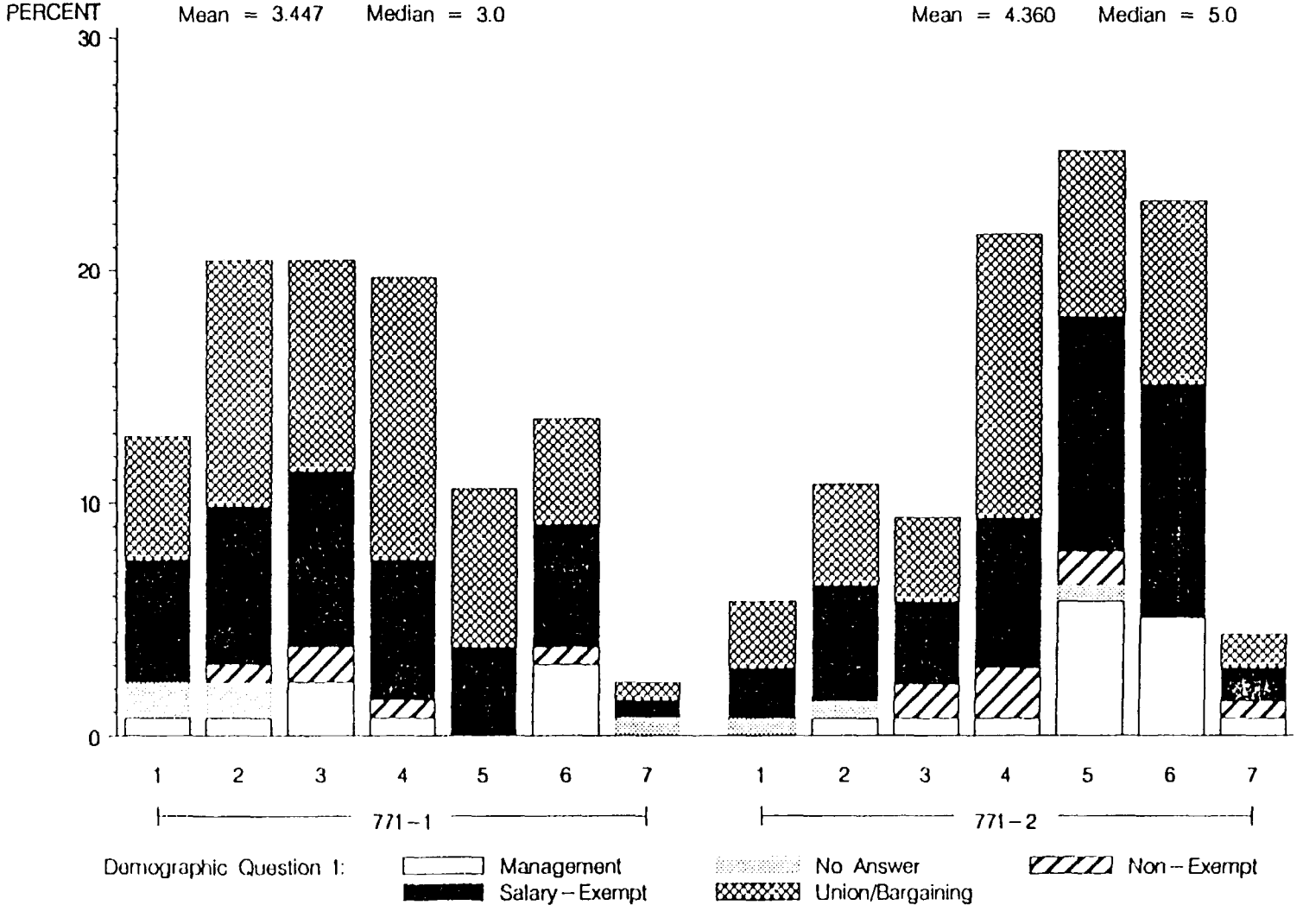
Question 32

I understand the Unresolved Safety Question Determination (USQD) process.



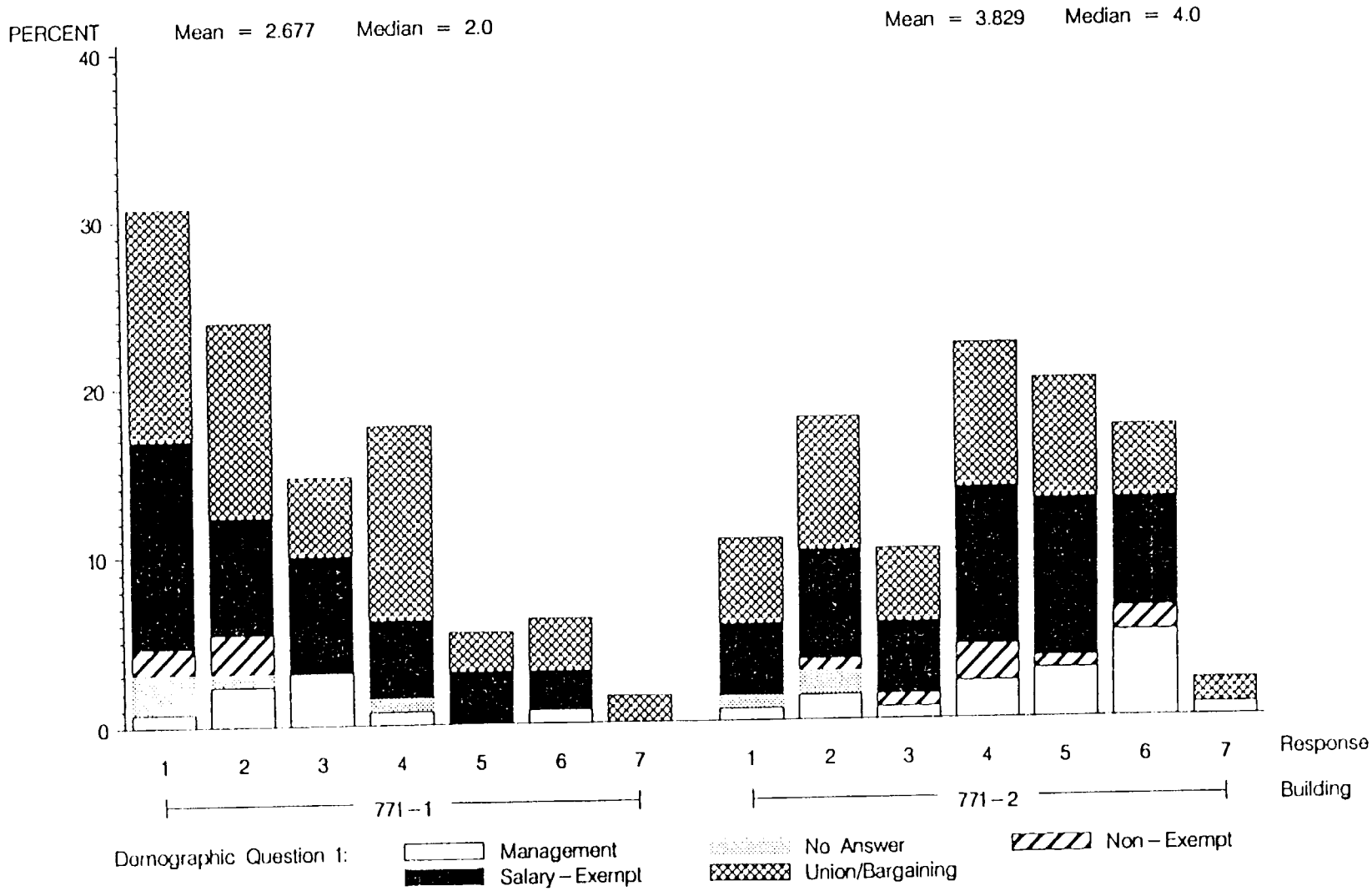
Question 46

Safety training in Building XXX covers the right material.



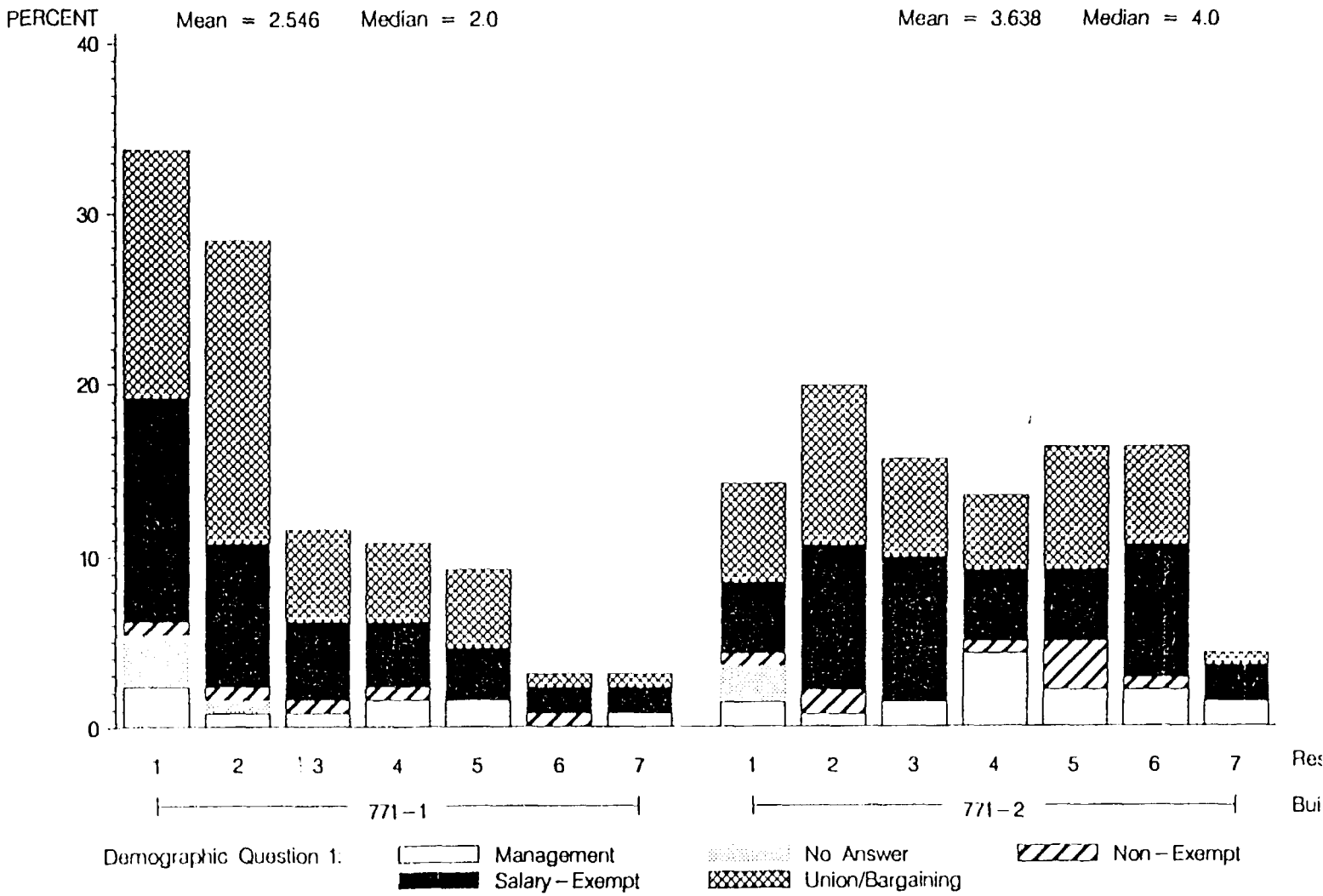
Question 55

Safe practices are rewarded in Building XXX.



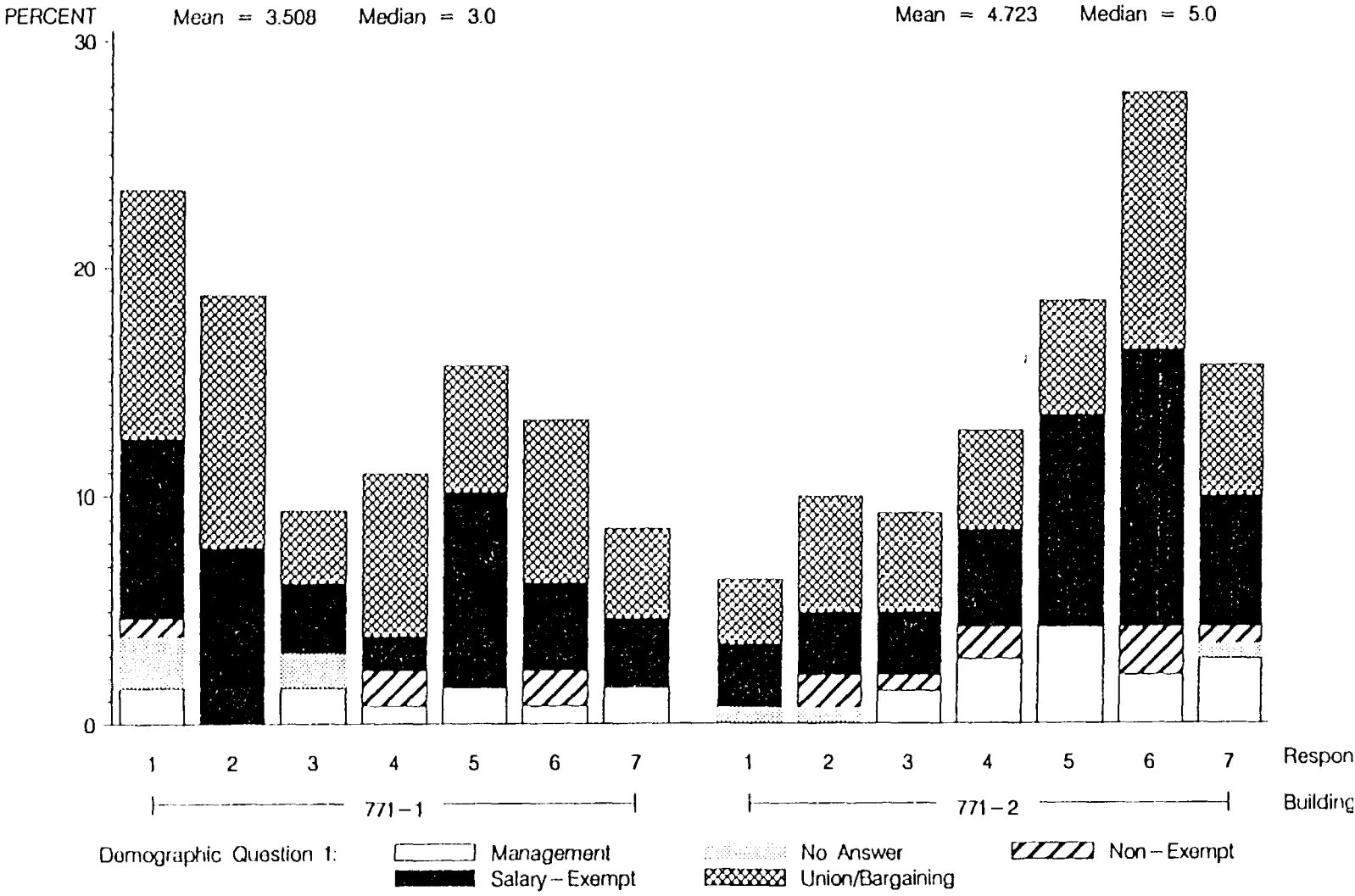
Question 69

Different organizations in Building XXX communicate well with one another.



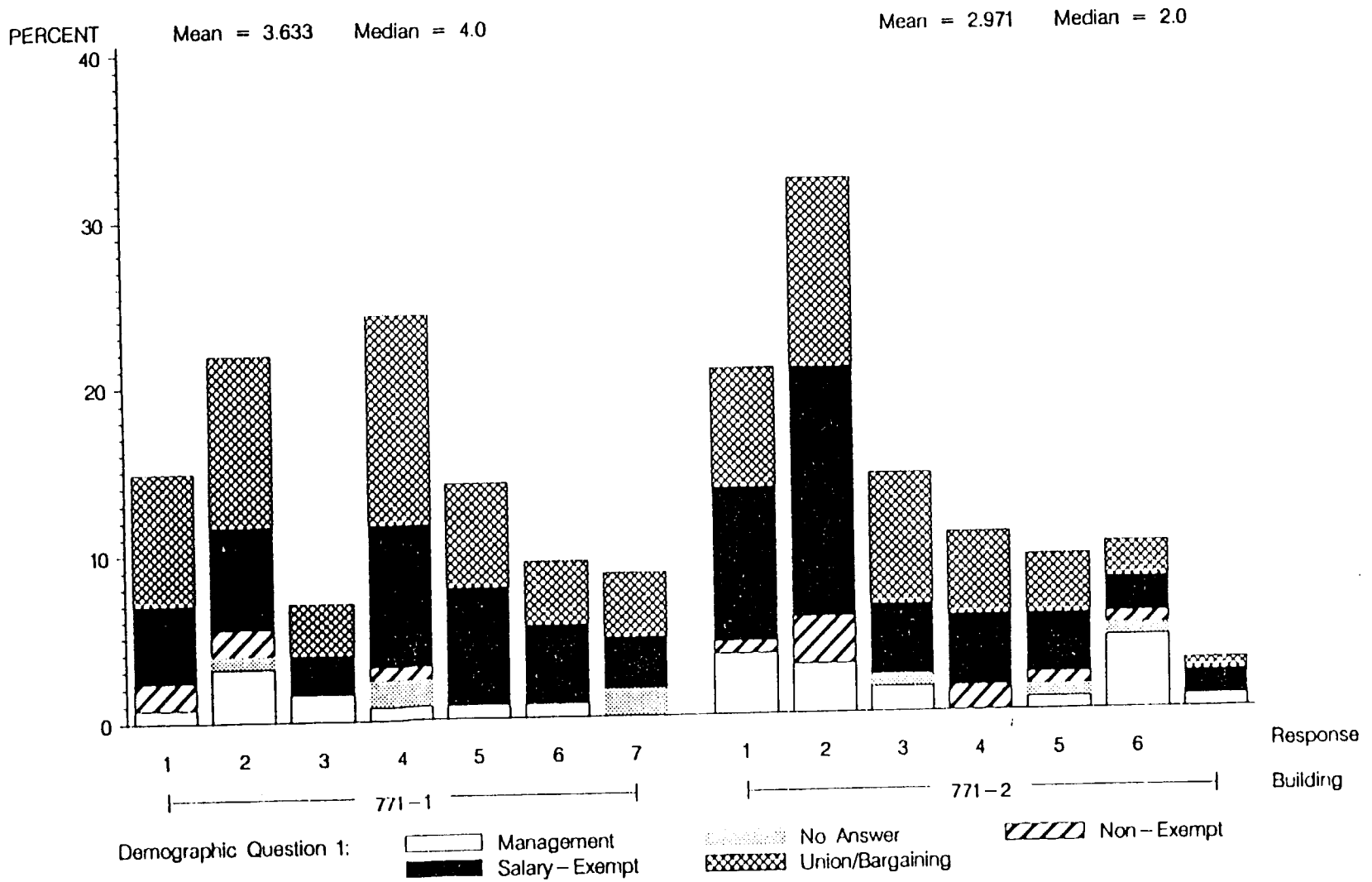
Question 71

The lessons learned from readiness reviews conducted in Buildings 559 and 707 have been formally shared with me.



Question 107

(R) – Training takes a back seat to schedule in Building XXX.



Building 771- Box Plot Scores

Attitude and Safety Requirements

Mean ratings for 15 out of 17 items were higher for the second survey administration. The means for the remaining two attitude and safety requirements survey items were identical .

Communication

All 7 communication items were rated higher during the second survey administration.

Competence

Mean ratings for 10 out of 13 competence items were higher for the second adminstration. Three items were lower.

Infrastructure

All 17 infrastructure items were rated higher for the second survey administration.

Management/Leadership

Mean ratings for 21 out of 24 management/leadership items were higher for the second survey administration. Two management/leadership items were lower, and one item mean was identical.

Personal Involvement

Mean ratings for 5 out of 8 personal involvement items were higher for the second survey administration. Two personal involvement item scores were identical and one score was lower.

Rewards/Discipline

Mean ratings for 4 out of 5 rewards/discipline items were higher for the second survey administration. The mean score for the remaining rewards/discipline item was identical.

Regard for Procedure

Mean ratings for 7 out of 8 regard for procedure items were higher for the second survey administration. The mean score for the remaining item was identical.

Stress

Overall, mean ratings associated with stress showed no improvement since the first administration. Mean ratings for 5 out of 10 items were slightly more positive, three item scores were lower, and two item scores were identical.

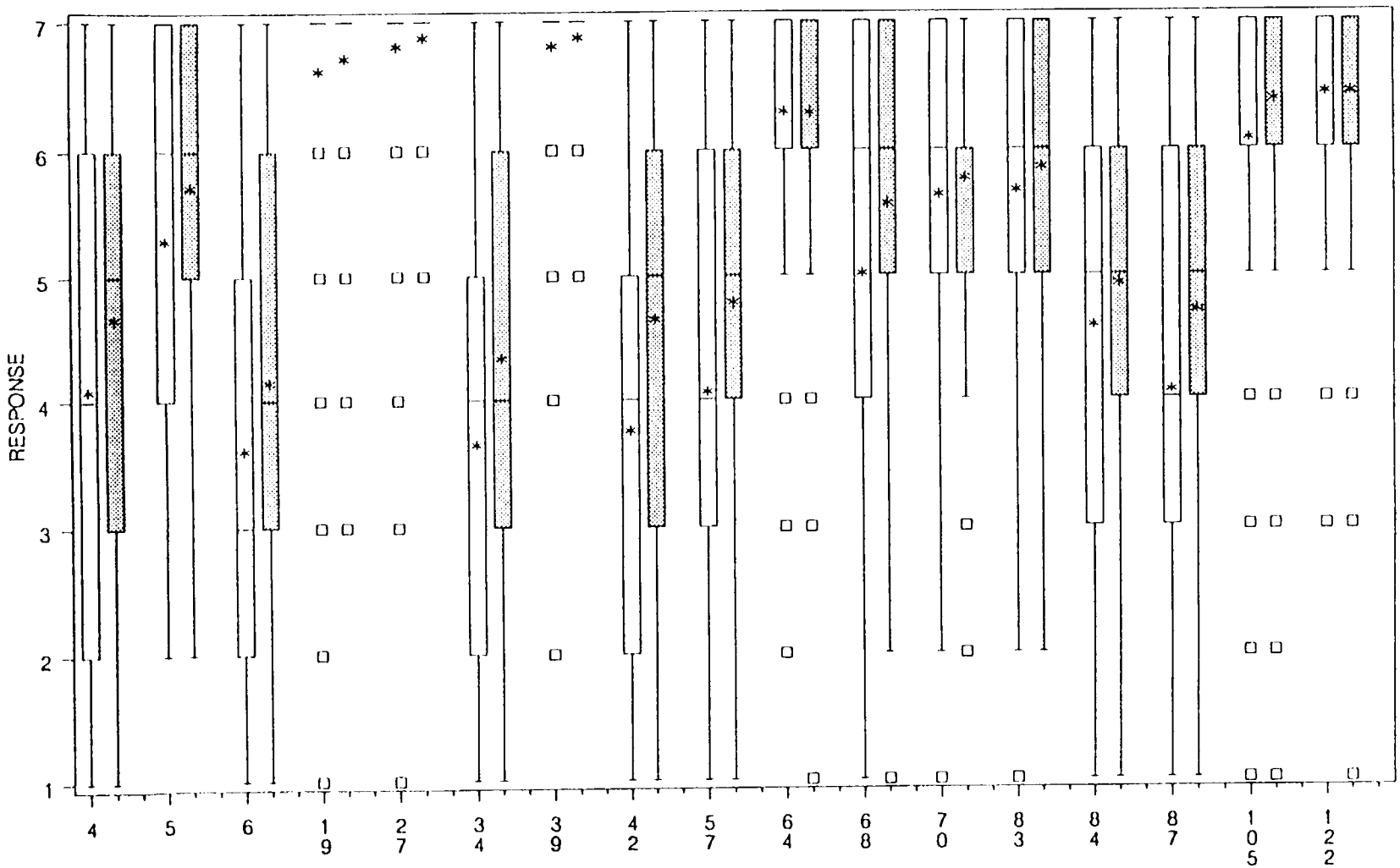
Training

Mean ratings for all 8 training items were higher for the second survey administration.

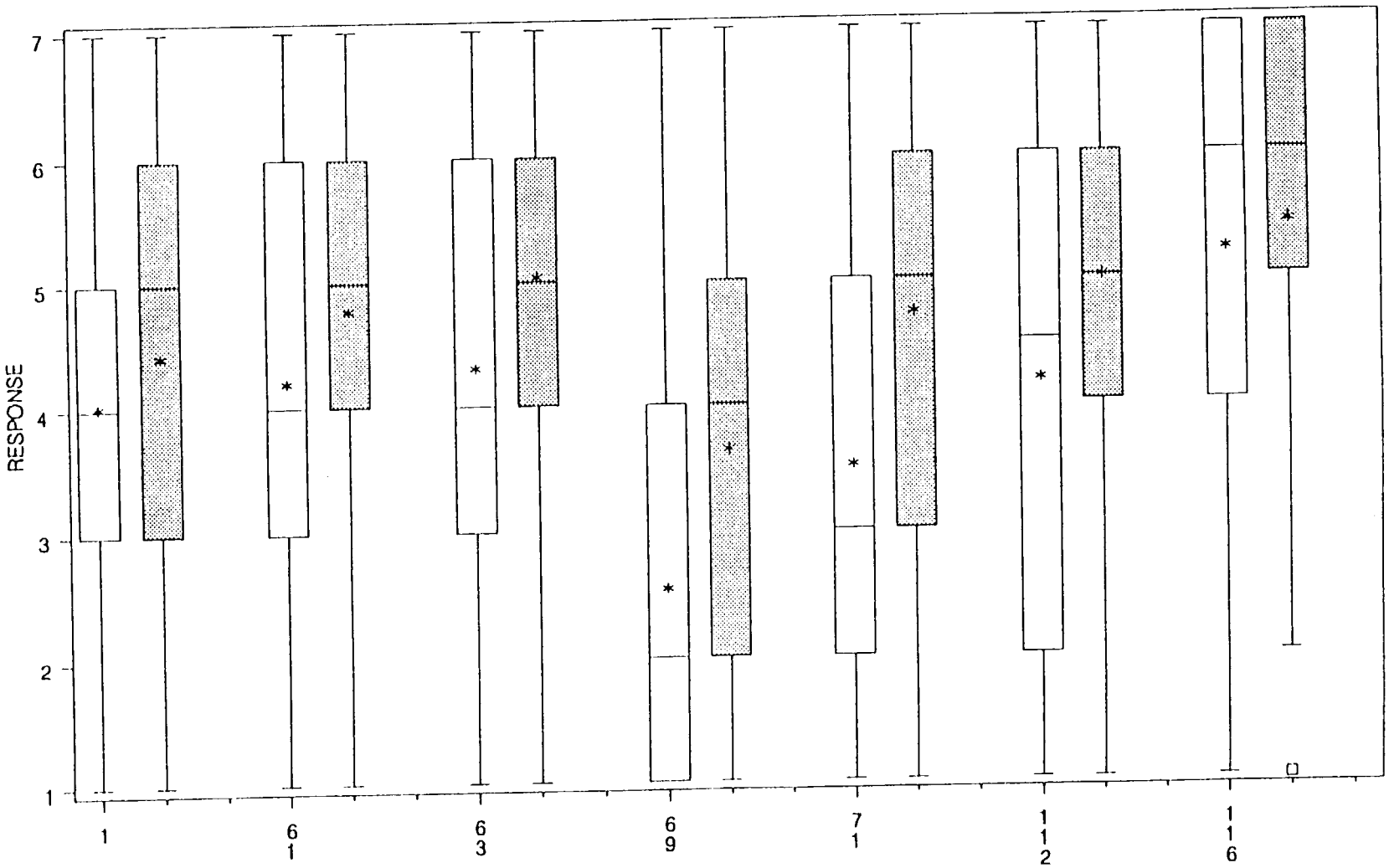
Trust/Morale

Mean scores for 7 out of 8 trust/morale items were higher for the second administration. One trust/morale item was lower.

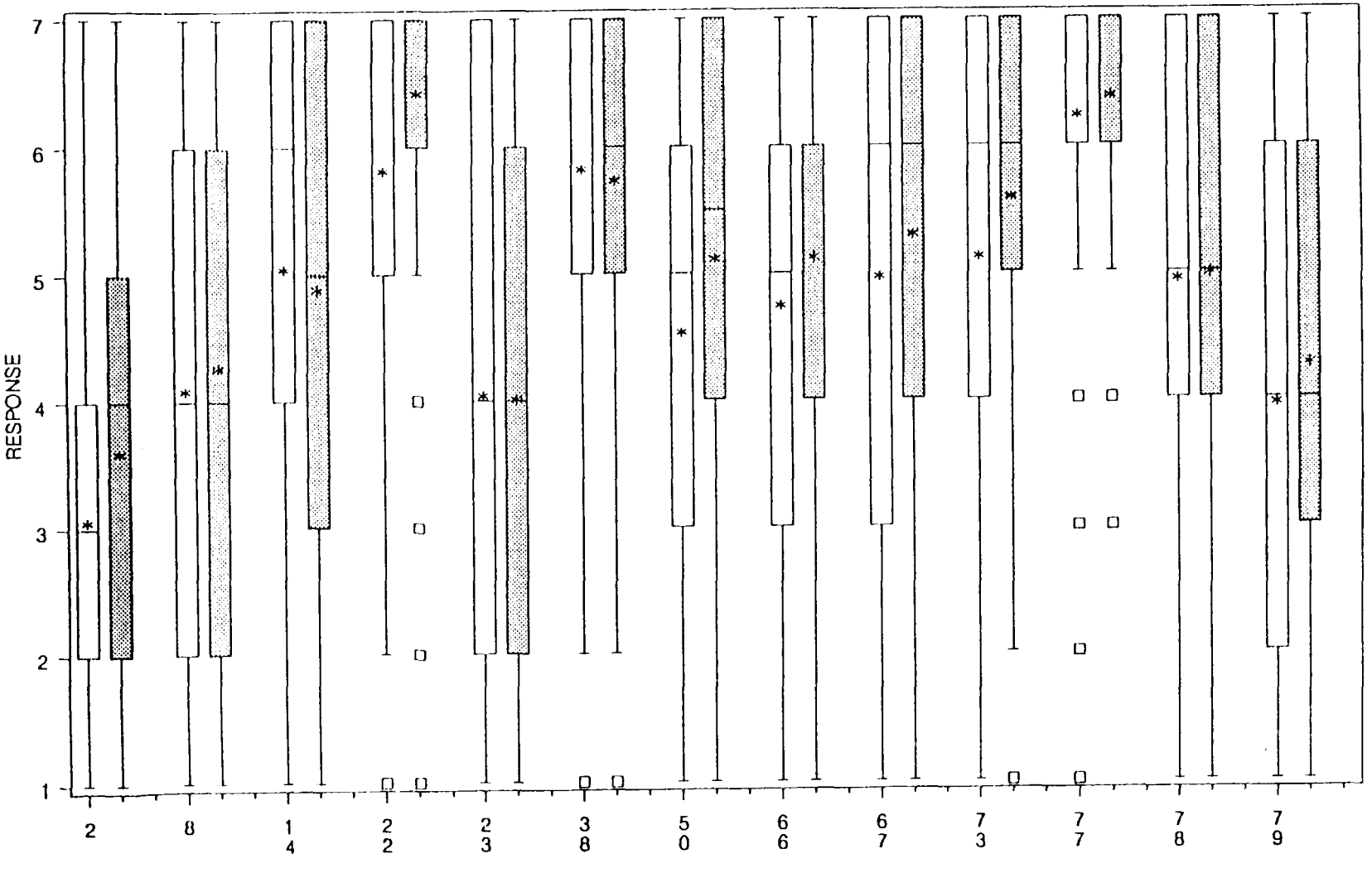
Building 771 – Attitude and Safety Requirements



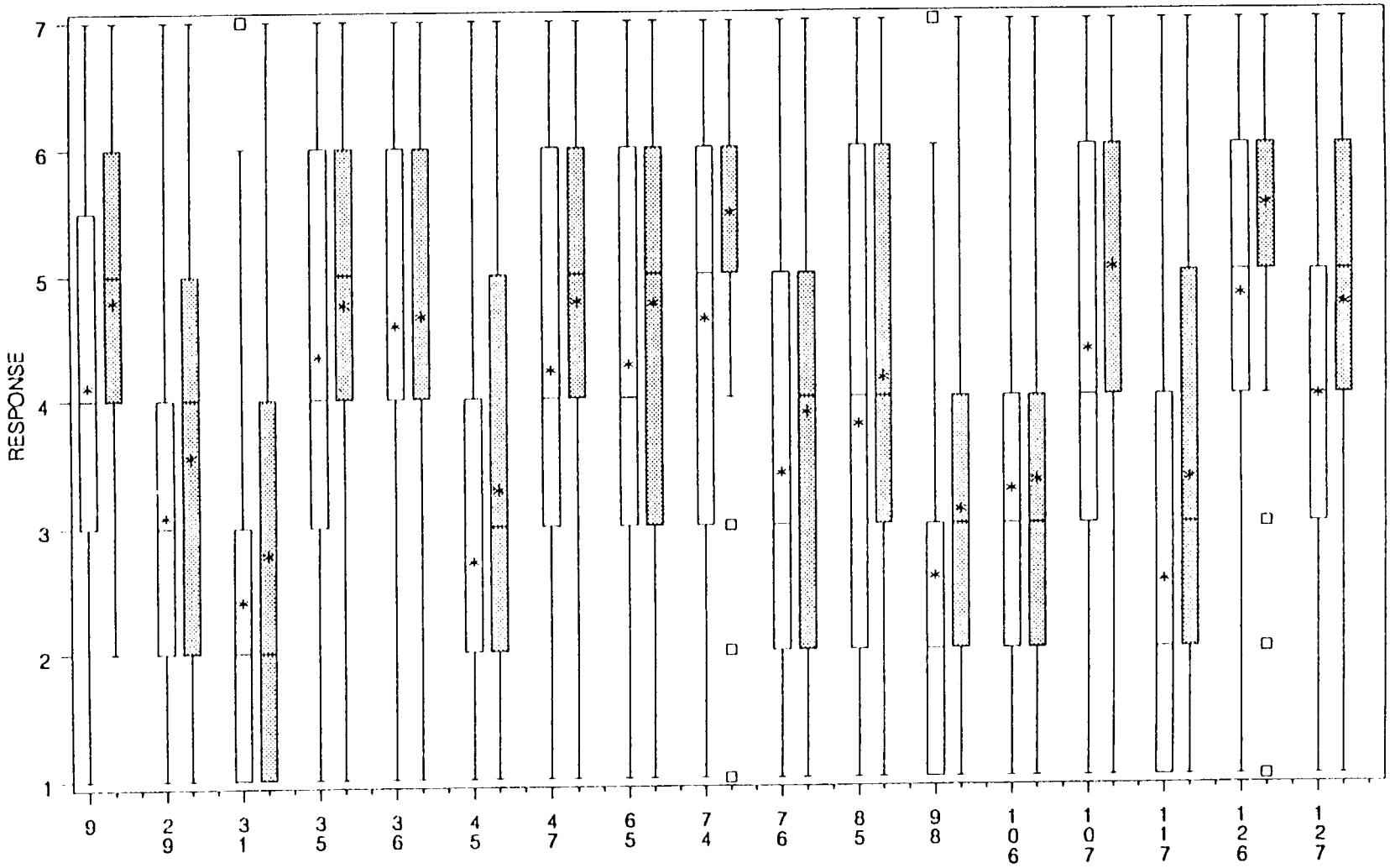
Building 771 – Communication



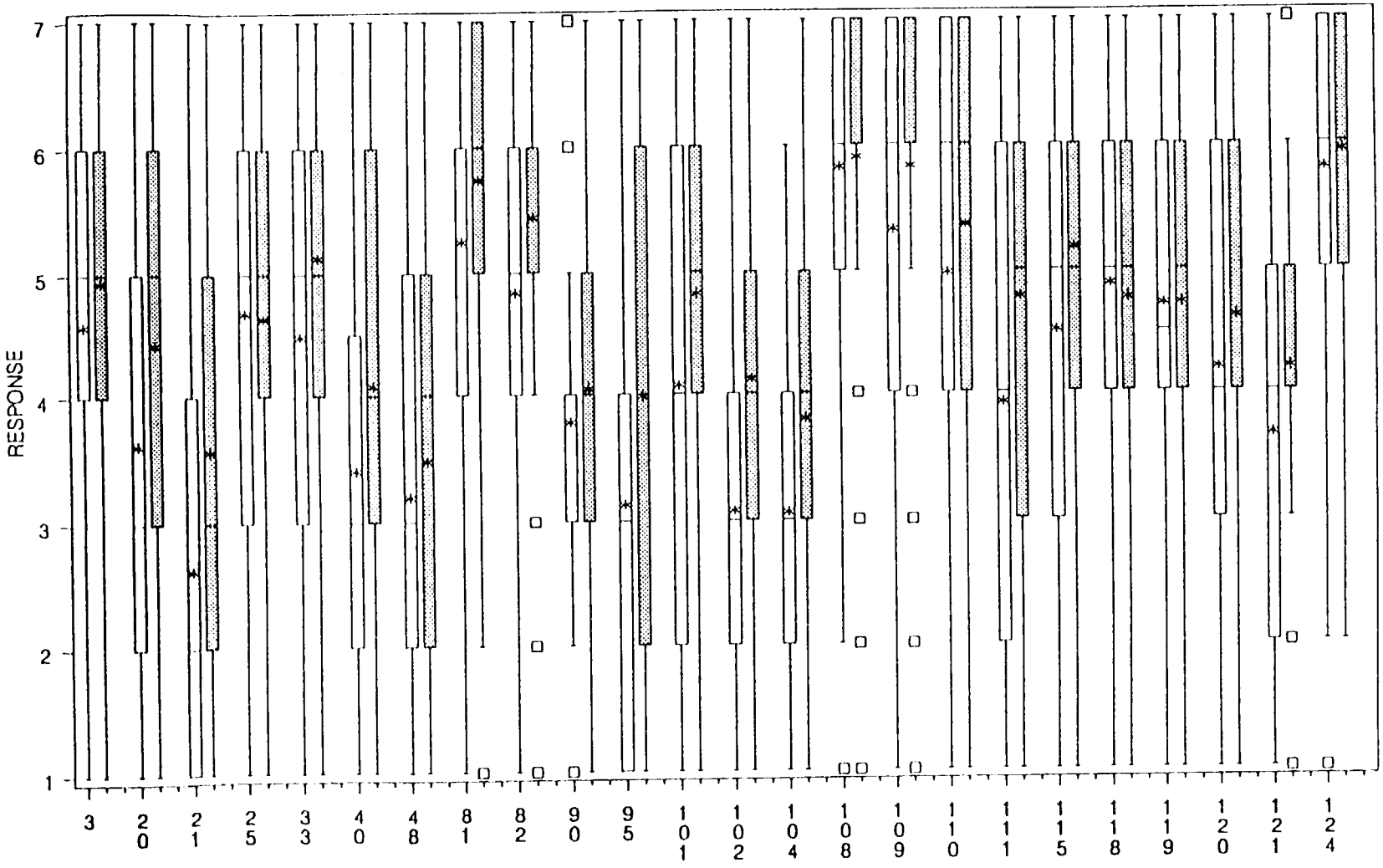
Building 771 – Competence



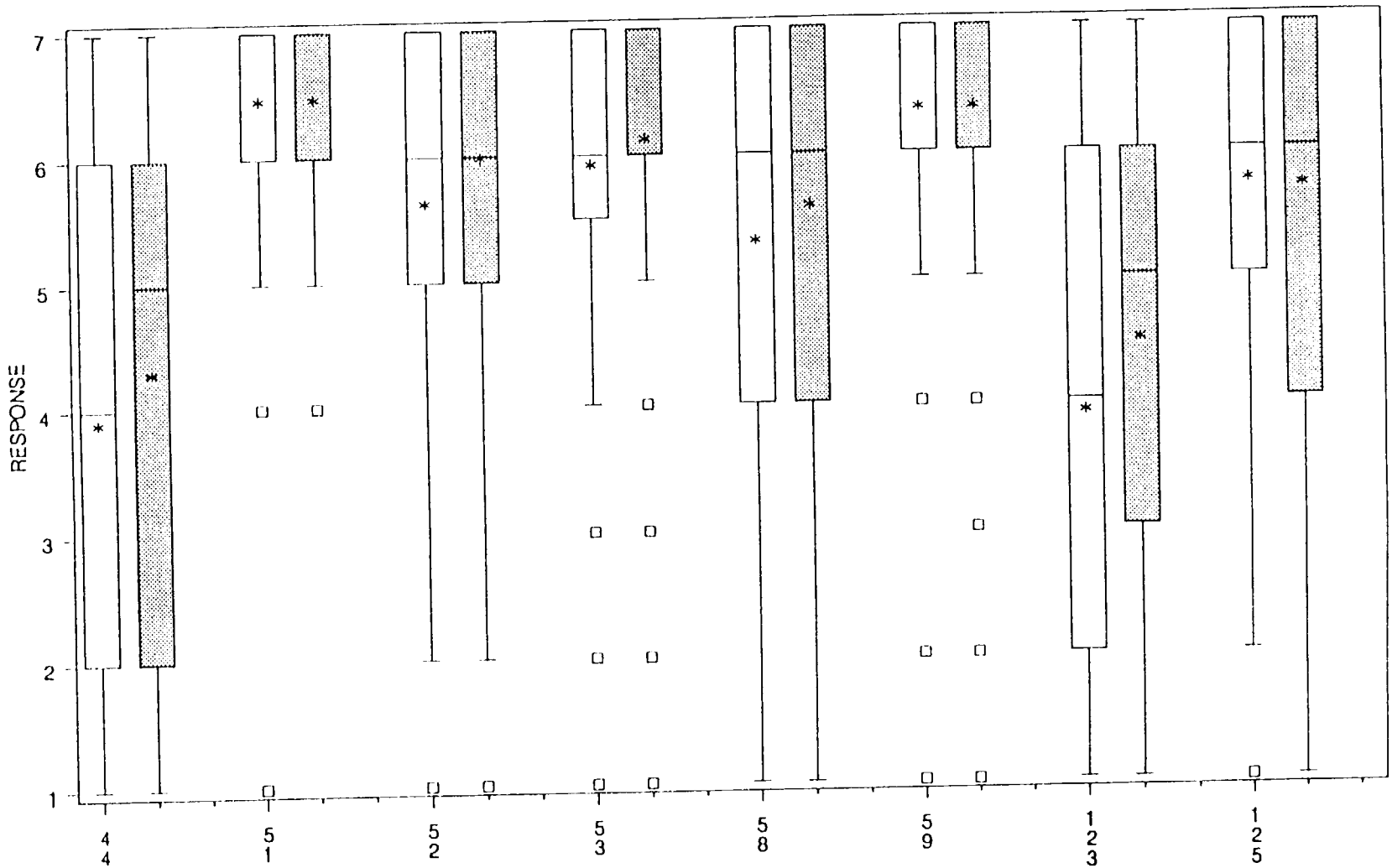
Building 771 – Infrastructure



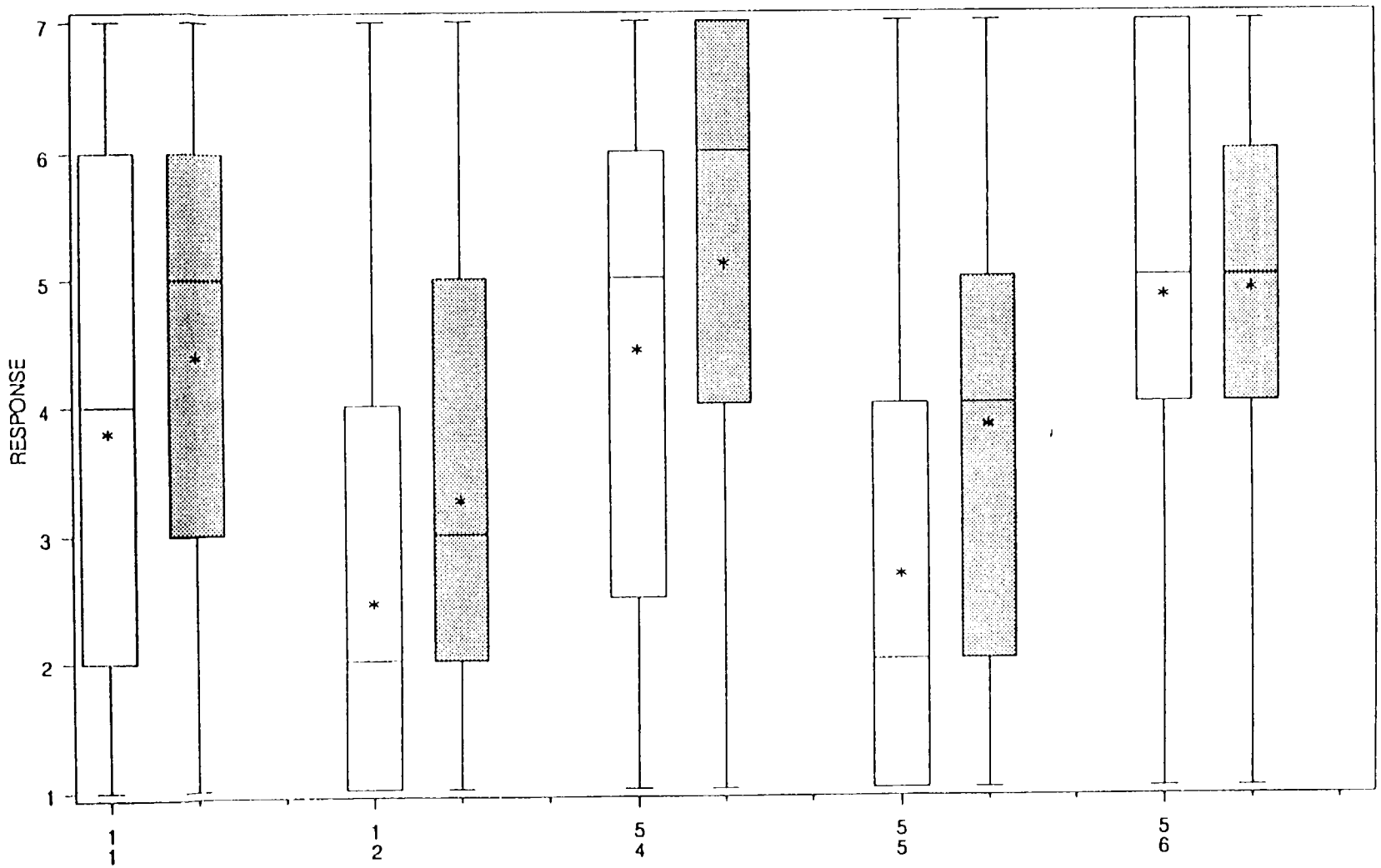
Building 771 – Management/Leadership



Building 771 – Personal Involvement

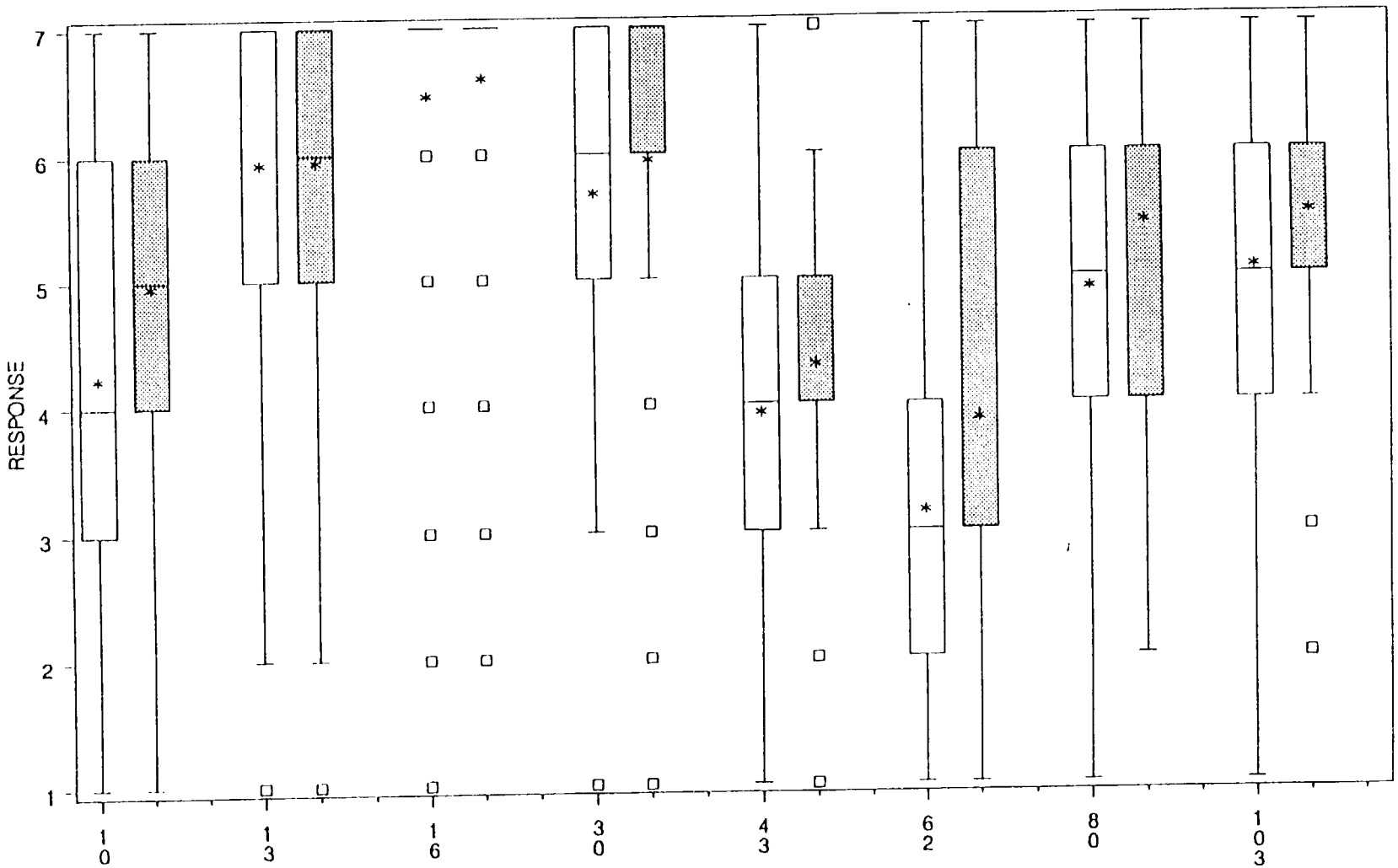


Building 771 – Rewards/Discipline

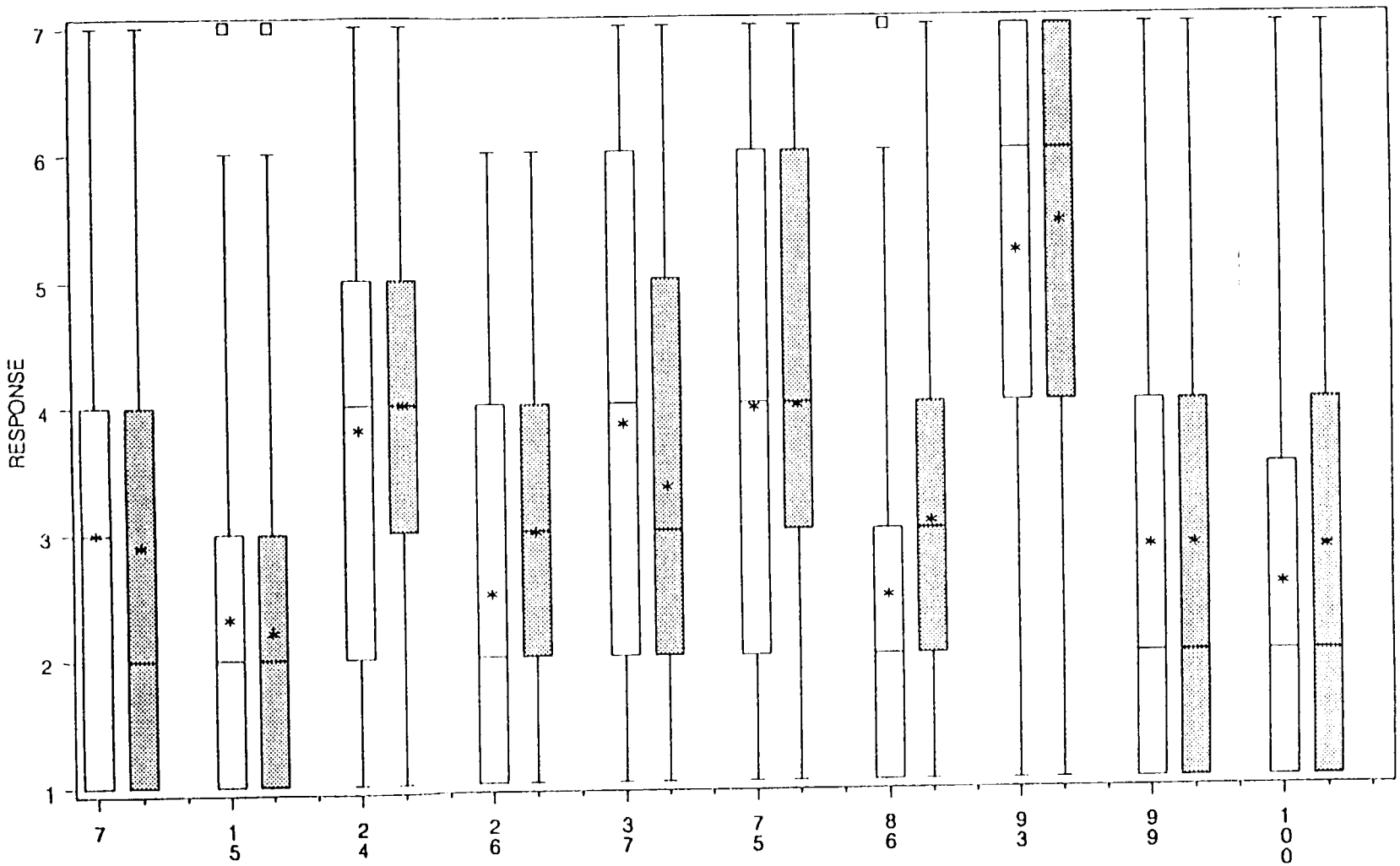


Box Fill: Empty = First Survey Shaded = Second Survey

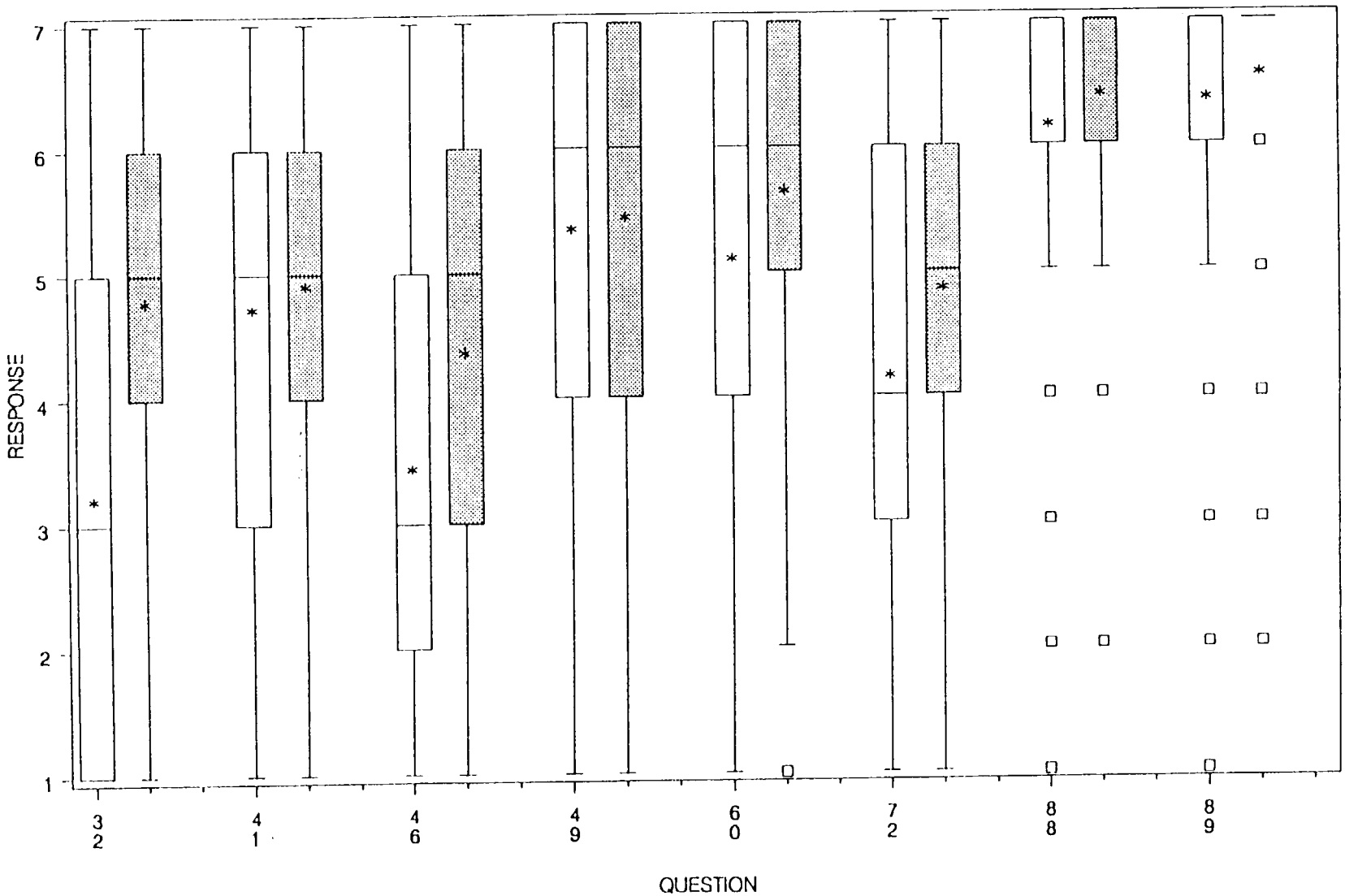
Building 771 – Regard For Procedure



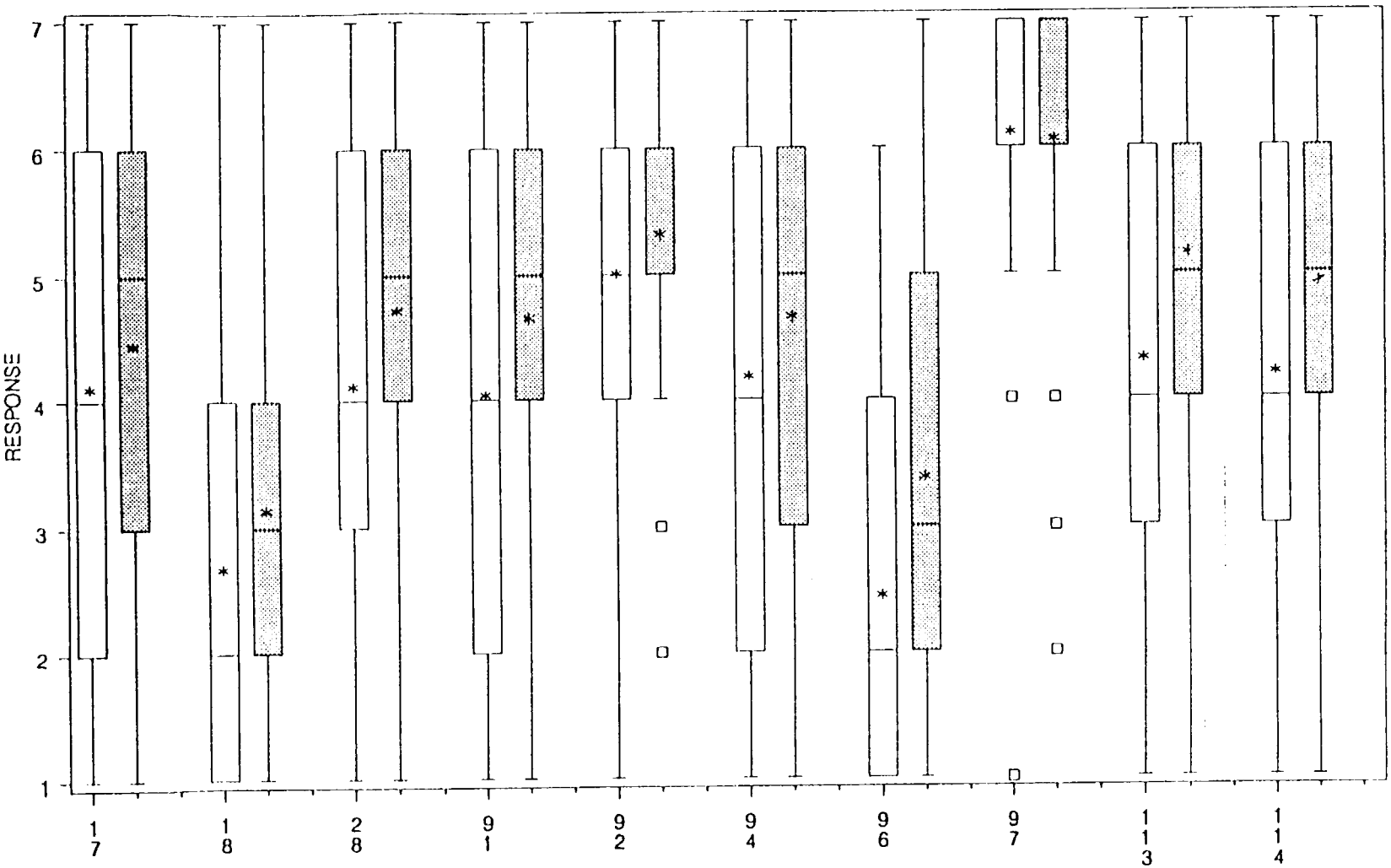
Building 771 – Stress



Building 771 – Training



Building 771 – Trust/Morale



Question Means By Building

Question	Building 559 N	Building 559 Mean	Building 559 Median	Building 707 N	Building 707 Mean	Building 707 Median	Building 771 First Survey N	Building 771 First Survey Mean	Building 771 First Survey Median	Building 771 Second Survey N	Building 771 Second Survey Mean	Building 771 Second Survey Median	Question Text
1	66	4.55	4.5	196	5.31	6.0	133	4.02	4.0	141	4.42	5.0	If a procedure related to my work changes, I know about it.
2	65	3.58	4.0	194	3.89	4.0	133	3.06	3.0	141	3.60	4.0	People who write the procedures that I use understand my tasks.
3	66	5.27	6.0	195	5.45	6.0	133	4.58	5.0	141	4.94	5.0	Procedural violations are dealt with promptly.
4 R	65	3.02	2.0	198	2.79	2.0	133	3.92	4.0	141	3.34	3.0	Procedures are designed only to make management feel good.
5	66	5.61	6.0	199	5.84	6.0	134	5.29	6.0	142	5.71	6.0	Procedures are necessary to get work done safely.
6 R	65	3.66	4.0	198	3.83	4.0	132	4.39	5.0	140	3.86	4.0	Most of the things that I do could be done without the required paper work
7 R	66	4.77	5.0	200	4.32	4.0	134	4.99	5.0	141	5.10	6.0	I am worried about losing my job.
8 R	65	3.88	4.0	196	3.27	3.0	133	3.92	4.0	140	3.74	4.0	Some workers in my work group don't meet the qualification requirements for their jobs.
9	65	4.92	5.0	189	5.15	6.0	132	4.11	4.0	140	4.79	5.0	The procedure for pre-ev briefings is adequate.
10	65	5.14	5.0	190	5.25	6.0	132	4.23	4.0	138	4.96	5.0	The pre-ev procedure is followed.
11	66	4.36	5.0	200	4.82	5.0	133	3.80	4.0	141	4.39	5.0	My immediate supervisor praises or rewards me when I do a good job
12	65	4.28	5.0	193	4.03	4.0	135	2.46	2.0	140	3.26	3.0	Discipline in Building XXX is consistent. (Everyone gets the same treatment.)
13 R	65	2.95	2.0	191	2.16	2.0	130	2.07	1.0	139	2.06	2.0	If a procedure is technically incorrect, we correct it on the spot and keep working.
14 R	64	3.45	4.0	191	3.28	3.0	128	2.95	2.0	138	3.12	3.0	If a procedure is incorrect due to a typo, we correct it on the spot and keep working.
15 R	66	4.95	5.0	200	4.82	5.0	135	5.67	6.0	142	5.78	6.0	People's stress level has increased the likelihood of accidents in the workplace.
16 R	66	2.11	1.0	197	1.62	1.0	133	1.53	1.0	142	1.39	1.0	Getting extra work done outside of procedures, when procedures are required, is OK.
17	66	4.53	5.0	198	4.43	5.0	133	4.11	4.0	141	4.45	5.0	If I accidently screw up on the job, my immediate supervisor will still support me.
18	65	3.77	4.0	199	3.57	4.0	131	2.68	2.0	139	3.14	3.0	If I accidently screw up on the job, senior management will still support me
19 R	66	1.33	1.0	198	1.28	1.0	134	1.37	1.0	142	1.27	1.0	I would overlook safe practices in order to meet schedule.
20	66	3.94	4.0	200	4.32	5.0	134	3.62	3.0	142	4.42	5.0	My immediate supervisor is aware of how much stress his or her workers feel
21	66	3.21	3.0	198	3.66	4.0	134	2.62	2.0	141	3.57	3.0	The other managers in my management chain are aware of how much stress my work group feels.
22 R	62	2.15	1.0	192	2.09	1.0	130	2.10	1.0	139	1.58	1.0	A criticality is more likely when a solid versus a solution is involved
23	66	3.23	2.0	200	4.80	6.0	132	4.04	4.0	142	4.01	4.0	My immediate supervisor is capable of performing my job.
24 R	66	3.76	4.0	200	3.87	4.0	133	4.19	4.0	142	4.00	4.0	My supervisor places a lot of pressure on my work group to meet schedule
25	66	4.48	5.0	199	4.59	5.0	132	4.68	5.0	142	4.63	5.0	My immediate supervisor is aware of when he or she pressures my work group to meet schedule.
26 R	65	4.45	4.0	199	4.58	5.0	133	5.50	6.0	142	5.01	5.0	The other managers in my management chain place a lot of pressure on my work group to meet schedule.
27	66	6.76	7.0	199	6.82	7.0	134	6.81	7.0	142	6.88	7.0	I think that criticality safety limits are necessary.
28	65	4.91	5.0	192	4.65	5.0	133	4.11	4.0	140	4.72	5.0	Criticality Safety Engineers think that an operator's input is important
29	66	4.53	5.0	196	4.11	4.0	133	3.09	3.0	140	3.56	4.0	When something is unsafe, it gets fixed in a satisfactory manner.
30	63	5.98	7.0	185	5.68	6.0	128	5.68	6.0	139	5.95	6.0	In the past year, known criticality safety infractions in Building XXX have been reported.

Question Means By Building

Question	Building 559 N	Building 559 Mean	Building 559 Median	Building 707 N	Building 707 Mean	Building 707 Median	Building 771 First Survey N	Building 771 First Survey Mean	Building 771 First Survey Median	Building 771 Second Survey N	Building 771 Second Survey Mean	Building 771 Second Survey Median	Question Text
31 R	62	3.13	2.5	189	4.20	4.0	132	5.59	6.0	141	5.23	6.0	Building XXX has many unresolved safety issues.
32	64	3.55	4.0	196	4.12	4.0	129	3.22	3.0	141	4.78	5.0	I understand the Unresolved Safety Question Determination (USQD) process
33	66	5.30	5.5	194	5.30	6.0	130	4.48	5.0	141	5.13	5.0	Procedural violations are dealt with promptly.
34	66	4.68	5.0	198	4.76	5.0	133	3.65	4.0	142	4.34	4.0	I agree with the way that we implement safety requirements.
35 R	62	2.26	2.0	179	2.80	2.0	126	3.66	4.0	133	3.24	3.0	In Building XXX, tanks, valves, or piping that should be under Lock Out/Tag (LO/TO) are not.
36 R	62	2.23	2.0	178	2.89	2.0	125	3.41	4.0	132	3.33	4.0	Some electrical systems that should be under LO/TO are not.
37 R	66	2.27	2.0	197	3.22	2.0	133	4.16	4.0	141	4.65	5.0	I am concerned about a criticality occurring in Building XXX.
38	66	6.08	7.0	199	6.17	7.0	133	5.82	7.0	142	5.73	6.0	A criticality infraction is always dangerous.
39	66	6.88	7.0	200	6.84	7.0	133	6.81	7.0	142	6.88	7.0	Safety is important to me.
40	65	4.29	5.0	194	4.41	5.0	132	3.41	3.0	141	4.09	4.0	Supervisory responsibilities are delegated only to qualified personnel
41	66	5.12	6.0	194	5.60	6.0	129	4.72	5.0	141	4.91	5.0	Workers in my work group only perform their jobs when their training is ...
42 R	65	4.03	4.0	193	3.59	4.0	129	4.24	4.0	141	3.35	3.0	I trust my process knowledge more than procedures.
43	58	4.36	4.0	171	4.06	4.0	124	3.93	4.0	134	4.31	4.0	Technical Information Packages (TIPs) are accurate.
44	65	4.69	5.0	193	4.38	5.0	128	3.90	4.0	140	4.29	5.0	I have input to the procedures that I use.
45	66	3.59	3.0	195	3.23	3.0	133	2.71	2.0	141	3.29	3.0	People who develop procedures know the way the job should be done.
46	64	5.08	5.0	192	4.74	5.0	132	3.45	3.0	139	4.36	5.0	Safety training in Building XXX covers the right material.
47	65	5.95	6.0	190	5.36	6.0	131	4.22	4.0	141	4.78	5.0	Criticality safety infractions are resolved promptly.
48	66	3.85	4.0	191	4.22	5.0	130	3.20	3.0	140	3.48	4.0	My immediate supervisor takes the time to inspect workplace conditions before job is performed.
49	66	6.14	7.0	196	6.15	6.0	130	5.35	6.0	141	5.45	6.0	My job requires that I understand Operational Safety Requirements (OSRs)
50	65	4.55	5.0	196	5.10	6.0	128	4.53	5.0	142	5.11	5.5	I know what the Safety Review Board is.
51	66	6.30	7.0	198	6.31	7.0	131	6.47	7.0	142	6.47	7.0	If a co-worker did something unsafe, I would say something to him or her
52	66	5.38	6.0	195	5.83	6.0	132	5.63	6.0	140	5.99	6.0	If a co-worker did something unsafe, I would shut down the job
53	66	5.98	6.0	200	6.07	6.0	132	5.92	6.0	142	6.13	7.0	If I did something wrong, I would report it.
54 R	65	2.65	2.0	198	2.67	2.0	132	3.57	3.0	141	2.89	2.0	I would be disciplined if I refused to work an unsafe job.
55	62	3.65	4.0	189	3.73	4.0	130	2.68	2.0	140	3.03	4.0	Safe practices are rewarded in Building XXX.
56	63	4.81	5.0	189	4.53	5.0	131	4.85	5.0	139	4.90	5.0	Unsafe practices are punished in Building XXX.
57 R	66	3.48	4.0	194	3.29	3.0	130	3.94	4.0	141	3.22	3.0	I have seen people working without the required safety equipment.
58 R	66	2.18	2.0	195	2.24	2.0	130	2.69	2.0	141	2.42	2.0	I have worked an unsafe job.
59	66	6.45	7.0	199	6.33	7.0	132	6.35	7.0	142	6.35	7.0	I would report an unsafe job.
60	66	5.62	6.0	196	5.89	6.0	129	5.11	6.0	140	5.65	6.0	I know the purpose of the XXX Criticality Safety Operating Manual (CSOM)

Question Means By Building

Question	Building 559 N	Building 559 Mean	Building 559 Median	Building 707 N	Building 707 Mean	Building 707 Median	Building 771 First Survey N	Building 771 First Survey Mean	Building 771 First Survey Median	Building 771 Second Survey N	Building 771 Second Survey Mean	Building 771 Second Survey Median	Question Text
61	63	5.35	6.0	193	5.27	5.0	125	4.20	4.0	138	4.78	5.0	The building CSOM is readable. (I can understand it.)
62 R	66	3.76	4.0	197	4.29	5.0	131	4.85	5.0	142	4.13	5.0	Procedures slow down real work.
63	66	4.64	5.0	193	4.97	5.0	131	4.31	4.0	140	5.04	5.0	I am informed of new safety practices in Building XXX.
64	66	6.18	6.5	200	6.25	7.0	132	6.30	7.0	142	6.29	7.0	Safety training is important to me.
65 R	64	3.41	3.0	199	2.82	2.0	132	3.73	4.0	141	3.23	3.0	My safety training gets postponed.
66	66	5.18	6.0	199	5.41	6.0	128	4.74	5.0	141	5.12	6.0	Safety requirements are understood by everyone in my work group.
67 R	61	4.77	6.0	183	3.29	2.0	127	3.03	2.0	140	2.70	2.0	Solutions found in Building XXX cannot go critical in a 4 liter container.
68	66	5.76	6.0	200	5.75	6.0	130	5.02	6.0	142	5.56	6.0	My immediate supervisor really cares about my safety and the safety of my co-workers.
69	66	4.39	4.0	195	3.82	4.0	130	2.55	2.0	141	3.64	4.0	Different organizations in Building XXX communicate well with one another.
70	66	6.02	6.0	197	5.77	6.0	131	5.63	6.0	141	5.77	6.0	When supervision is not present, personnel still work safely.
71	65	5.08	6.0	195	5.05	6.0	128	3.51	3.0	141	4.72	5.0	The lessons learned from readiness reviews conducted in Buildings 559 and 707 have been formally shared with me.
72	63	4.67	5.0	198	4.81	5.0	129	4.16	4.0	141	4.86	5.0	I can remember my lessons learned training.
73	65	5.65	6.0	200	5.89	6.0	130	5.12	6.0	141	5.59	6.0	My immediate supervisor has the knowledge and skills needed to work safely.
74	65	5.49	6.0	200	5.65	6.0	130	4.64	5.0	141	5.48	6.0	My immediate supervisor has the resources needed to work safely.
75 R	66	3.50	3.0	199	3.29	3.0	131	4.04	4.0	142	4.02	4.0	I am overworked.
76	66	4.88	5.0	195	4.57	5.0	131	3.41	3.0	140	3.88	4.0	When something is unsafe, it gets fixed in a satisfactory manner.
77	66	6.21	6.0	199	6.18	6.0	131	6.23	7.0	142	6.38	7.0	I know what to do during emergencies.
78	65	5.12	6.0	198	5.15	6.0	131	4.94	5.0	142	4.99	5.0	I have a lot of building experience.
79	66	4.67	5.0	199	5.40	6.0	129	3.95	4.0	141	4.26	4.0	My immediate supervisor has a lot of building experience.
80	65	5.86	6.0	187	5.74	6.0	128	4.90	5.0	140	5.42	6.0	Before work starts, criticality safety postings are understood by the people who use them.
81	66	5.91	6.0	199	5.85	6.0	129	5.25	6.0	141	5.74	6.0	My immediate supervisor emphasizes safety.
82	66	5.62	6.0	200	5.61	6.0	129	4.84	5.0	142	5.44	6.0	The other managers in my management chain emphasize safety.
83	66	5.94	6.0	199	5.81	6.0	130	5.67	6.0	142	5.85	6.0	Workers in my work group emphasize safety.
84	66	5.52	6.0	190	5.18	5.0	129	4.59	5.0	139	4.93	5.0	To ensure safety, when equipment is broken, it is repaired before continuing the job.
85	62	6.06	6.0	190	5.19	6.0	126	3.79	4.0	134	4.15	4.0	Valves, piping, and tanks are consistently identified (labeled) throughout Building XXX.
86 R	65	4.23	4.0	200	4.46	5.0	129	5.53	6.0	142	4.94	5.0	I find it impossible to keep up with all the rules around here.
87	64	5.13	6.0	192	4.91	5.0	127	4.06	4.0	137	4.71	5.0	Before I begin work in my work group, procedures are adequately walked down.
88	66	6.52	7.0	198	6.37	7.0	129	6.16	7.0	140	6.40	7.0	Building Conduct of Operations says that safety violations must be reported.
89	66	6.55	7.0	198	6.59	7.0	132	6.36	7.0	141	6.56	7.0	Anyone can stop work if he or she thinks that the job is unsafe.
90 R	60	2.78	2.0	183	3.37	4.0	126	4.22	4.0	132	3.95	4.0	People have voluntarily left this building over safety concerns.

Question Means By Building

Question	Building 559 N	Building 559 Mean	Building 559 Median	Building 707 N	Building 707 Mean	Building 707 Median	Building 771 First Survey N	Building 771 First Survey Mean	Building 771 First Survey Median	Building 771 Second Survey N	Building 771 Second Survey Mean	Building 771 Second Survey Median	Question Text
91	66	5.45	6.0	189	5.38	6.0	129	4.04	4.0	139	4.65	5.0	I am proud of how Building XXX operates.
92	66	5.86	6.0	192	5.61	6.0	129	5.01	5.0	140	5.31	6.0	Work is performed safely in Building XXX.
93 R	66	2.32	1.5	194	2.08	2.0	131	2.80	2.0	140	2.57	2.0	I feel pressured not to report minor injuries because it would mess up safet statistics for the building.
94	65	5.06	6.0	199	5.03	6.0	131	4.18	4.0	141	4.66	5.0	I feel valued by my immediate supervisor.
95	66	4.82	5.0	196	4.72	5.0	129	3.13	3.0	138	3.98	4.0	My Director values his or her workers in Building XXX.
96	64	3.31	3.0	195	3.54	3.0	129	2.45	2.0	137	3.39	3.0	The EG&G Rocky Flats President values workers in Building XXX.
97	66	6.15	6.0	199	5.93	6.0	131	6.11	6.0	142	6.06	6.0	Workers in my work group care about the quality of their work.
98 R	64	3.52	4.0	195	4.46	5.0	130	5.42	6.0	138	4.88	5.0	Some safety problems aren't fixed because management doesn't follow through
99 R	66	5.11	6.0	200	4.58	5.0	131	5.15	6.0	142	5.15	6.0	The potential layoffs have me concerned about losing my job.
100 R	66	5.23	6.0	200	4.86	5.0	132	5.47	6.0	142	5.18	6.0	When the Site Operating Contract changes hands, I'm worried that I may lose job.
101	64	4.61	5.0	199	4.97	5.0	130	4.07	4.0	141	4.82	5.0	My immediate supervisor leads by example.
102	65	4.28	4.0	198	4.48	5.0	129	3.08	3.0	140	4.11	4.0	The other managers in my management chain lead by example.
103	65	5.86	6.0	188	5.66	6.0	127	5.06	5.0	139	5.49	6.0	Proper authorization is obtained before fixing safety problems
104	60	3.88	4.0	188	4.03	4.0	127	3.06	3.0	137	3.80	4.0	The New Directions Program implemented in June has improved safety.
105	66	6.27	7.0	200	6.22	7.0	132	6.08	7.0	142	6.38	7.0	Doing work safely is more important than finishing on schedule.
106 R	65	3.69	3.0	188	3.94	4.0	129	4.73	5.0	137	4.66	5.0	I have observed electrical, chemical, or radiation hazards in Building XXX
107 R	66	2.71	2.0	194	2.85	2.0	128	3.63	4.0	140	2.97	2.0	Training takes a back seat to schedule in Building XXX.
108 R	65	2.25	2.0	196	1.94	1.5	131	2.18	2.0	141	2.10	1.0	My immediate supervisor allows work to be done outside of procedure
109 R	64	2.30	2.0	194	2.09	2.0	130	2.68	2.0	140	2.17	2.0	The other managers in my management chain allow work to be done outside of procedure.
110 R	65	2.23	2.0	199	2.60	2.0	130	3.02	2.0	142	2.64	2.0	My immediate supervisor says one thing but expects something else
111 R	65	2.85	2.0	195	2.99	3.0	130	4.08	4.0	141	3.22	3.0	The other managers in my management chain say one thing but expect something else.
112	66	5.21	6.0	199	5.31	6.0	130	4.18	4.5	142	5.00	5.0	If I have a question, I can get clear answers from my supervisor.
113	65	5.37	6.0	190	5.24	5.0	130	4.32	4.0	140	5.16	5.0	We are making progress in resolving minor safety problems in Building XXX
114	65	5.51	6.0	191	5.24	5.0	130	4.20	4.0	140	4.92	5.0	We are making progress in resolving major safety problems in Building XXX.
115	66	5.33	6.0	196	5.46	6.0	129	4.50	5.0	142	5.18	5.0	My immediate supervisor emphasizes finding solutions to safety problems
116	66	5.59	6.0	199	5.59	6.0	130	5.21	6.0	142	5.42	6.0	I know what my immediate supervisor expects of me.
117 R	66	4.18	4.5	197	4.34	5.0	130	5.46	6.0	142	4.65	5.0	We spend so much time on paper work that we can't do the work that really addresses safety.
118	66	5.05	5.0	200	4.86	5.0	129	4.88	5.0	142	4.77	5.0	My immediate supervisor values facts over personal opinions.
119	65	4.62	4.0	194	4.83	5.0	128	4.72	4.5	142	4.73	5.0	The other managers in my management chain value facts over personal opinions
120	65	5.12	5.0	196	4.84	5.0	127	4.19	4.0	142	4.61	4.0	My immediate supervisor gives new programs enough time to work before changi or dropping them.

Question Means By Building

Question	Building 559 N	Building 559 Mean	Building 559 Median	Building 707 N	Building 707 Mean	Building 707 Median	Building 771 First Survey N	Building 771 First Survey Mean	Building 771 First Survey Median	Building 771 Second Survey N	Building 771 Second Survey Mean	Building 771 Second Survey Median	Question Text
121	64	4.72	5.0	190	4.58	5.0	128	3.66	4.0	142	4.19	4.0	The other managers in my management chain give new programs enough time to work before changing or dropping them.
122	65	6.35	7.0	200	6.36	7.0	129	6.43	7.0	142	6.44	7.0	Safety training is important to me.
123	66	4.80	5.0	194	4.63	5.0	128	3.91	4.0	141	4.48	5.0	I have input to the procedures that I use.
124	66	6.03	6.5	195	6.06	6.0	130	5.80	6.0	140	5.94	6.0	When my immediate supervisor is aware that a job is unsafe, he/she shuts it down.
125	64	5.98	6.0	185	5.79	6.0	125	5.74	6.0	135	5.70	6.0	When I considered a job unsafe in Building XXX, I helped to shut it down.
126	65	5.31	6.0	192	5.48	6.0	128	4.81	5.0	142	5.52	6.0	We have a safety program in place (not just posters).
127	66	4.94	5.0	197	4.89	5.0	130	3.99	4.0	141	4.73	5.0	Non-nuclear safety gets the attention it deserves.
128	.	.	.	.	.	.	.	.	.	137	4.80	5.0	My immediate supervisor has been more actively promoting safety since the last safety culture survey.
129	.	.	.	.	.	.	.	.	.	138	4.65	5.0	The other managers in my management chain have been more actively promoting safety since the last safety culture survey.
130	.	.	.	.	.	.	.	.	.	139	5.00	5.0	I have received encouragement from my work group to perform my job safely since the last safety culture survey.
131	.	.	.	.	.	.	.	.	.	139	5.28	5.0	Since the last safety culture survey, my immediate supervisor has demonstrated that he or she cares about the safety of workers in my work group.
132	.	.	.	.	.	.	.	.	.	138	4.79	5.0	Since the last safety culture survey, other managers in my management chain have demonstrated that they care about the safety of Building XXX personnel.
133 R	.	.	.	.	.	.	.	.	.	139	2.91	2.0	My safety training has been postponed during the last five months.
134 R	.	.	.	.	.	.	.	.	.	140	3.39	4.0	Since the last safety culture survey, people have failed to obtain required authorization before doing work.
135 R	.	.	.	.	.	.	.	.	.	140	2.88	2.0	I have seen people working in unsafe conditions since the last safety culture survey.
136	.	.	.	.	.	.	.	.	.	139	4.98	5.0	I am more aware of doing my job safely since the last safety culture survey.
137	.	.	.	.	.	.	.	.	.	140	4.91	5.0	Since the last safety culture survey, the information shared in safety meetings has been valuable to me.
138	.	.	.	.	.	.	.	.	.	138	4.97	5.0	In general, safety in Building 771 has improved since the last safety culture survey.
139	.	.	.	.	.	.	.	.	.	139	4.42	4.0	There has been more communication among different organizations in Building XXX since the last safety culture survey.
140	.	.	.	.	.	.	.	.	.	138	3.59	4.0	Rewards and discipline have been even-handed since the last safety culture survey.
141	.	.	.	.	.	.	.	.	.	139	3.55	4.0	During the last 5 months, maintenance of back area systems has improved.

Building 771 Open-Ended Question Responses

142. Describe your immediate supervisor's committment to safety.

1650 • Emphasis during staff meetings, routing of safety related vending.

1651 • Very important more than getting work done

1652 • Which one. Generally an even split

1655 • Bldg managers are trying to do work safely; with too few resources pressure from upper management to meet schedules causes stress fatigue and therefore, unsafe conditions

1660 • The commitment to safety by my supervisor is result oriented and not process oriented.

1661 • Total committment

1671 • Excellent but he must avoid the work area because of previous radiation exposure

1673 • Above average

1674 • Safety first

1676 • My supervisors is committed to safety

1680 • Excellent

1681 • Emphasize to not do work if cannot be done safely.

1682 • He seems very committed

1684 • If you can get the job done safely - nice but get the job done. He has no involvement in the work and doesn't want any. Solve your own problems is his unstated creed.

1686 • Working safely is the first priority of any task.

1687 • Some of them need to be committed.

1690 • CYA

1691 • Safety first

1692 • Always committed to performing work in a safe manner.

1694 • Cheaper, faster, better

1696 • He cares about his personnel & how they feel about safety what needs fixing & where we are on previous problems.

1703 • Adequate

1704 • Since he came on board, has not discussed safety with me or in any meeting I've attended

1707 • has concern for our safety

1708 • immediate sup. is very committed to safety.

1709 • It is strong in 774

1711 • He is committed to safety

1712 • My supervisor has a lot of Bldg knowledge and that's important in regard to safety and she shows the interest of my group safety but she is being shipped out the new boss doesn't have a clue.

1713 • He allows me to make decisions(s) on what I feel about the situation than try to help me out on what to do, need, or if it should be shut down.

1718 • I think its very important to him.

1720 • Very little, we have had one safety meeting during this time frame.

1723 • Ensure safety is evaluated prior to doing routine & non-routine jobs. If we can do something to make thins in our control more safe- do it!

1724 • Work safe or don't do the job

1725 • Good

1727 • Total committment

1728 • Very committed

1729 • Their are rules that are important to safety and if you break them you can be fired.

1731 • Concerned - Proactive

1732 • Ensures completion (s) of safety awareness/ classes

1735 • He is the new OM. I would say he is committed to the max to doing the business safely.

1737 • Will not tolerate unsafe conditions. Does his best with what he has to get jobs done.

1739 • Very committed, discuses at all hands, lessons learned

1741 • He considers (s) safety a must.

1742 • I believe he is very dedicated to safety in 771

1744 • As OM I feel that the message of safety is strong. I also believe that personnel are able to shutdown work if unsafe and that they know it. My director is committed to safety.

1745 • A lot of talk but don't miss a commitment

1747 • Good

1748 • He or she does what his or her supervisor tells them to do.

1749 • minimal to moderate

1751 • Totally committed

1752 • He lives by it.

1753 • Safety takes a backseat to the almighty schedule!

1760 • Direct/forthright- safety is really #1 ; harps on this regularly

1761 • Fully committed

1762 • Says the right words does not understand the technical issues.

1763 • Really believes it

1764 • Wants safe work

1765 • My supervisor appears committed to the safety of all of the group employees. Safety is always first.

1768 • Safety first, but don't ignore the schedule.

1769 • Very committed. Has presented talks at all hands on actions taken as a result of last survey.

1774 • They will obey the rules but they feel like I do - that many safety rules are either unnecessary or hindering

1775 • Moderate - would indicate he wants employees to work safely but would probably no back-up anyone taking a stand in stopping a job or refusing to do a job.

1778 • Good

1779 • "We need you to do the work"

1780 • None

1783 • I feel that he thinks its important but is to busy to insure it is taking place

1784 • I have (5) and they are all scared witless that they won't have a job soon. The feeling transfers & I'm insure about what reprisals may occur.

1787 • Better than average

1788 • Resistance to change, not willing to cooperate

1789 • Safety first

1791 • She is in Bldg. 060, she encourages safe work practices

1792 • Bow's to the other groups demands

1795 • He will stop, listen to me, and make notification of unsafe conditions/problems before resuming operations

1797 • Safety comes first, the job second

1798 • Very committed

1799 • he takes safety very serious

1800 • Do it safe!

1802 • Fair

1804 • I have a new manager - no safety meetings have taken place

1805 • Does

1806 • The supervisor is concerned with safety

1807 • I feel immediate supervisor's are committed to safety, but the plant supervision as a whole sometimes hinders this committment due to changes/Coop and lack of money.

1809 • good

1810 • good

1814 • Committment important to supervisor

1816 • He is concerned with safety and expects me as a foreman to mirror and uphold his concerns

1820 • Good

1821 • Good

1876 • Safety is very important to him. Rules should not be ignored in an effort to complete work.

143. Describe the commitment to safety of other managers in your management chain.

1650 • Appears to be increased as evidenced by decisions to delay process restart until all preliminary actions are done.

1651 • Not aware of any commitment except to schedule

1652 • Basically mgmt just pays lip service. A true safety culture takes time to implement. Mgmt here and outside (commercially) just want results. They are willing to play the probabilities that nothing will go wrong.

1655 • Commitment appears verbal only, outside of 771 up the chain. Little regard for people whether it's safety or human courtesy.

1660 • As stated above and further they show no commitment to have a daily ongoing program to improve safety in the work place.

1661 • Not all management is committed

1663 • I feel managers are more worried(s) about more petty things than safety.

1671 • Excellent

1673 • Average

1674 • Its OK to violate procedures but safety is important.

1680 • Excellent

1681 • Don't really know. don't usually see them or hear from them

1684 • same

1686 • Other managers only provide an oversight position

1687 • I feel safety is sufficient - some areas are too much. Except nuclear(s)

1690 • I am unclear what is meant(s) by "other managers" We have only had two safety (s) meetings in 6 mo. in my MTCE group.

1691 • Safety first

1692 • I think they are committed but do not have much input on their views.

1694 • cheaper, faster, better

1696 • They emphasize in safety meetings their commitment to safety

1703 • adequate

1704 • I feel that safety may be an issue but only to the extent that it is a work stopper. Schedule is still the most important aspect for managers.

1708 • procedural compliance is important

1709 • Safety issues are properly addressed

1711 • Politically safety is #1 but in reality it is not #1. a lot of safety item still need to be fixed - some are 3 yrs old - a lot are 12 months old - bottom line No Money

1712 • They don't have clue they all have the attitude, I'm on the outside looking in. Don't want to get involved

1718 • It's important

1720 • All hands training Discussions on safety issues.

1723 • In some cases - their personnel involvement may or may not be visible - I've seen some mgmt. get their hands dirty, or take time out of their schedule, to spread sand/salt on icy walkways I've seen others slip & slide through some areas without doing anything.

1725 • good

1727 • A real willingness to improve is evident

1728 • very good

1729 • everybody wants everyone to be safe.

1731 • concerned Proactive

1732 • same as above

1735 • Follow procedures, question procedure problems, & resolve issues, set the example, insure their employees work safely.

1737 • Good

1739 • I feel this is progressing in the directions this needs to be. Overall safety was improved.

1741 • They consider (s) safety a must.

1742 • I think that the managers believe in safety but they don't always understand that conduct of operations is also safety.

1743 • Stress procedural compliance and stop work authority

1744 • I don't believe any manage thinks safety is an afterthought. I do believe that we make it make it very difficult to do common sense at the scene safety decisions.

1745 • Same as above

1747 • Fair

1749 • minimal to moderate

1751 • Reasonable committed

1753 • I believe our director is very safety conscious but it does not filter down to the rest. They set a schedule, do not ask for input by the workers & expect these to be adhered to when not (the schedules can't be met) the worker looks bad, not the manager who set the unrealistic schedule.

1760 • Doing it correctly meeting all personal safety requirements is of top importance.

1761 • good

1762 • they say the right words, want the job done, and shoot the messenger (s)

1763 • Still feel pressures to meet schedule

1764 • some

1765 • Same as item#142., I believe

1768 • Safety first

1769 • Very committed. Better communication at morning staff and at critiques

1774 • I really don't know - They "talk a good game"

1775 • Less than adequate - more of a facade than reality

1778 • Fair

1779 • We can go over on expired training and still let you work

1780 • I don't know we never see them

1783 • I also feel they want it that way yet when they are being pressured they tend to be both patient and tolerant of it.

1784 • I don't know. They posture and pose and generally "Lord it over" the working class. I feel we have too many "chiefs" and not enough "Indians."

1787 • The only commitment Bldg. 771 top management and mentors have is pushing the ORR, the tank draining, and trying to take credit for the good things. Personnel always blamed for the bad things. It must have something to do with the money EG&G wants to walk out the door with.

1788 • Some are great - others do what's required

1789 • Safety first

1791 • Encourage safety, they have little to do with 771

1792 • Just a word

1795 • See 142 above, they stand behind my immediate supervisor's actions

1797 • Other than to save his butt I do not think he cares about us

1798 • All managers with whom I interact consider safety the #1 priority

1799 • The same as my supervisor's

1800 • Do It Safe

1802 • fair

1805 • Do but don't

1806 • serious

1807 • I do not know much about the managers except they do not interact with us

1809 • good

1816 • I believe they feel a commitment to safety but they are mostly to far removed from OPS to effectively promote safety on the job

1820 • good

1821 • OK

144. Describe anything that you consider to be unsafe in Building 771.

1650 • Continued storage of solutions in tanks

1651 • Job uncertainty, stress cause unsafe work habits 771 management needs to rely on planning rather than reaction to events. A PMP program needs to be fully utilized.

1652 • 1. The HVAC system. Instead of really solving the problem it's easier to just discuss it in an E.O.E. 2. On rooms with high DAC count what happens to people in the corridors w/no face masks on?

1655 • HVAC, fire, emergency & electrical systems amount of haz. mtrls stored for years without reassessing changes and -- Bldg. conditions & piping/tanks have degraded so that safe storage/transfer is potentially unsafe

1660 • Fissile materials in tanks and piping systems

1661 • Storage of pyrophoric (sic) material

1663 • Not knowing the real potential of radiation

1671 • 771 is old! It would not (now) meet its original specifications, and it was not designed for the present conditions or rules. Also--- how much repair can we justify on a Building we are going to tear down??

1673 • Poor coordination between groups

1674 • Certain items in the vaults tanks

1676 • mentors

1680 • Airlock doors not functioning in RCA

1681 • Solutions/Maintenance

1682 • I have only been in the Bldg a short time therefore I haven't had time to really notice.

1683 • The hurry up and get it done attitude from supervision

1684 • Lighting in back areas Occasional supply problems with respirators, clothing, towels and water (showering etc.)

1686 • The concern for solution in tanks and lines that hold radioactive solutions. I feel this was due to the improper shut down in 1989.

1687 • Inefficiency (s) of getting jobs done associated with critical systems.

1690 • Access to routinely accessed equipment i.e. SAAMS, air heads, crit heads. Ice/drainage (i.e. badge board & trailer are lot) Hand rails & friction tape should be installed ESP. 774 cat walks/steps

1692 • The fact that solutions have been setting in pipes and tanks for to long and need to be taken care of as soon as possible.

1694 • The low priority the Buildings ventilation systems get.

1696 • Preoccupation w/ the restructuring & layoffs (bldg. 774)

1703 • The mentor program in 771 is a joke!!! When confronted with a conflict between procedures and group interpretation vs. training directive they blow it off - saying "I know this must be frustrated by this" They do nothing to resolve or correct conflict.

1705 • fire doors

1711 • Several fire related items Liquid in tanks; Piping close to failure; tanks close to failure- Too much paper work causes item not to be repaired in a timely manner

1712 • No Rashing Ring inspection PU solution pressurized drums (100)

1713 • door that don't open added management control, that make job take long than they should so much for ALARA

1718 • Lock outs on all tanks and piping. If the pipe or tank ruptured how could you fix it fast. Lockout tag out takes time.

1720 • Boxes stacked in offices & on top of cabinets - broken chairs, we are not able to replace these chairs.

1723 • The amount of care given to VSS systems isn't as good as it should be. Too many comp. measures in place written repairs would be more beneficial in the long run.

1724 • Where I work, all things are safe

1725 • the tanks.

1728 • Continuing amount of stress More saftey (sic) less money and manpower.

1729 • A lot of our fire systems don't work.

1731 • Stress in the bldg & site

1732 • Leaving tanks with fissile solution sit while political games are being played

1735 • Potential for major radioactive material tank leak/spill. and the probability of not being able to clean it up in a short amount of time.

1737 • Building employees are unsure of their employment status. Nobody knows who is in charge, or who makes decisions. People are angry. Some employees are getting an attitude. I'm concerned about sabotage.

1739 • Currently due to past bumping and layoff's untrained personnel.

1741 • Solution in tanks needs to be procedurally and safely & properly emptied & stabilized.

1742 • Plutonium in the ducts, Plutonium solutions in pipes and tanks, some types of SNM that may not be packaged properly.

1743 • Putting band aids on leaks instead of fixing them. Pre-evs need to be better.

1744 • The biggest issue is existing risks that continue to get worse because of our inability to get "paper" in order. Re OSR/authorizations.

1747 • The Building

1748 • Tanks, piping, relief valves, flanges, valves

1749 • 1) Very poorly lit work areas esp. in/around equip on 2nd floor. 2) Fans w/belts broken, but left running till all belts break. 3) Stand-by equip never gets repaired - some have no stand-by 4) Too many work stoppage's, stand-downs, etc. when equip (above) is broke!

1751 • Some attitudes

1752 • Need money to upgrade or fix outstanding commitments listed on PATS

1755 • It's more safe in regards to attitude, but issues that need fixed get a "Band-Aid" fix rather than getting fixed. A fire panel in trailer 771K has been broken since Christmas. It is still not fixed.

1760 • Berm by back hall Rm 149 safety door impeded and berm is also tripping hazard.

1761 • None. Today's balance is right

1762 • chemical mgmt

1763 • The degraded containment functions at the Buildings.

1764 • Deficiencies in fire doors, escape lighting, etc.

1765 • The age and condition of gloveboxes and process tanks pose a safety threat for a contamination release in the Building.

1768 • cooling water leaks water on the floor

1769 • Lack of safe Qual program - Contamination allowed to stay in place

1774 • I don't feel unsafe in build 771 not there are not hazards

1775 • combo! Many don't work! Bldg. HVAC -suspect system configuration is not as designed. Leaded gloves -Very old! No justification for use beyond expiration Chemicals- Still many areas with chemicals not on CCS Waste- uncharacterized (sic) materials.

1777 • Annex fire door

1779 • Maintainance (sic) attitude Contractor's doing what ever they want

1780 • All the taped up contaminated leaks, no Rashing Ring inspections, Lack of equipment to do my job.

1783 • The automatic door in the area have been broken for over 2 years and not fixed this sends a statement to personnel the Buildings does not care also house cleaning needs attention.

1784 • The leaks. areas are dirty. The floors have dust, dirt & trash all over. The very air itself is unhealthy.

1786 • Valves that leak, should be LO/Tad or lines blanked off. Personnel are being directed to work double shifts -too many hours people are tired, overworked, worried about job security. Personnel in the Building are knowledgeable, aware of safety, cognizant of procedures/regulations. The bldg has been overrun with so-called experts who seem to create more problems than solve them. The mentors seem to be running the Building -not the Building manager (Ops Mgr.). Upper management seems to be more concerned with getting tanks drained than ensuring the safety of personnel, and ensuring that procedures are accurate.

1787 • DOE & upper management refuse to spend money to fix broken equipment, upgrades, etc. There are too few people performing too much work. The training & testing is a farce. You need a year (at least) to prepare for an effective ORR, and you need workers, not watchers.

1788 • Hard to get RCT support. Elimination of half-mask respirators. Too hard and long to get procedures changed. Inconsistencies between shift managers

1789 • Management's attempt to robotize workers.

1791 • Core training is often put off so that some employees are taking their retraining (1 or 2 years) after the appropriate time.

1792 • The one or so band aids that are wrapped around leaking valves & flanges & etc. and trying to release RLA areas to uncontrolled area's that should never be released.

1795 • Rad Contam. Control - too many areas of un-posted, unsurveyed contamination (mainly fixed) need persistent containment.

1797 • worn skid pads in the main corridors.

1798 • The condition of much of the equipment has degenerated from disuse & lack of maintenance since the 1989 shutdown. Lack of knowledge of conditions in the MAA is potentially unsafe.

1799 • The stress level, they just keep pushing the ORR on employees. Safety is number 2, schedule is still #1 to management. All anyone in management cares about in 771 is tank draining!

1802 • Some RAD concerns (contamination)

1804 • chemicals in RCA

1805 • Oldness

1806 • Pressure relief valves

1807 • Doors are broken, lights still out of service. This Building is not in the porper(sic) money mode. We're told no money to fix things.

1809 • Tension

1814 • Slow response to repair of lighting, replacing bulbs in RCA, slow repair of leaks.

1816 • The push to complete an ORR combined with very intensive training could easily lead to errors resulting in safety concerns.

1821 • Exit door and fire door

1838 • Nothing gets fixed- Man hours are wasted on programs such as Fire Watch instead of fixing the equipment.

1839 • The criticality infractions regarding most of the tanks in the RCA People's concern for paperwork over safely doing their jobs.

1876 • Redundancy of paper work and controls makes people ignore items in an effort to get work done. Example after seeing 15 warning signs on a door you tend to ignore some.

145. What positive things do you see in regard to safety in Building 771?

1650 • Increased emphasis from bldg mgmt on FSAR/OSR issues.

1651 • Attitude and awareness of the need for safety. Desire to fix things when broke and unsafe

1652 • Management is really trying to instill a safety culture, if the union people would quit fighting it.

1655 • Bldg personnel are trying to juggle all requirements and commitments while still doing work safely- awareness is improved.

1660 • The all hands meeting held daily is a good improvement toward making people aware of safety and the conditions of the Building.

1661 • Oversight

1671 • Commitment by all personnel to safety! Good work ethic: People care about doing the job right.

1673 • Safe procedures & practices reduce stress

1674 • Very little

1680 • people are more aware

1681 • Housekeeping

1682 • A lot of concern and caring for safety.

1684 • Since it's the "hot" Building, you get more reaction if you bring a problem to light.

1686 • Procedures and conduct of Operations

1687 • What is getting done?

1690 • Lots of attention to crit safety

1692 • Safety being number one!

1694 • Adhering to procedural compliance

1696 • Cleanest bldg I've worked in & when suprv. asks for some thing to be done it gets done. (774)

1704 • The employees do care & want to be safe.

1705 • somewhat improved awareness

1711 • The workers are dedicated to safety and work as a team.

1712 • The Bldg managers are trying.

1713 • Hensley's gone

1718 • We are constantly reminded about it.

1720 • Cleaning common areas. Repair of locker rooms. Fire system repairs.

1723 • Increased awareness

1724 • Commitment to safety

1725 • IWCP

1727 • Actual corrective actions are being taken

1729 • Managers try to correct problems when they come up. Craftpersons know how to protect themselves and people talk about safety a lot.

1731 • People are more willing to question procedures, directives

1732 • Increased awareness

1735 • People working together, to get through the ORR, Management cares what happens in 771. Doing what it takes to change the Safety culture in 771 by majority of employees.

1737 • Pre Evs are getting better. Training is better

1739 • Positive OPS manager towards safety. This includes the assistant OPS Manager

1741 • A better safety attitude

1742 • The Operation Managers committment to safety. The new company (KH) management that has an understanding of Plutonium and a Pu handling Building.

1743 • personnel are asking questions when they see something that doesn't look right.

1744 • Operations continue to improve in 771. The vast majority of personnel have embraced higher standards.

1747 • The Building may be one of the last ones to shut down.

1748 • We talk a lot about safety and that all we do about it we don't repair

1749 • Everyone becoming more aware, (but no work getting done on equip.)

1751 • Everyone is apparently concerned with safety.

1752 • This bldg functions as both a family & team Depending on one other to stay safe.

1753 • People are aware of working more safely, but management fails to listen to concerns.

1760 • Continuing emphasis: continuing lecture service which promote awareness of all facets of worker and nuclear safety

1761 • Attentive to trng and lessons learned

1762 • The performance level workers, 1st line supervisors, and managers in B. 771 all really care about safety and about doing a good job. (Note: I am not assigned to B771)

1763 • More safety training

1765 • Daily safety training to all-Hands of the Building which allows for everyone to make better decisions during Building emergency responses!

1769 • Improved commitments by upper mgmt.

1774 • For the personnel that do any work they are aware of & comply with all necessary safety measures.

1775 • Daily All-Hands meetings. High employee safety awareness Attention to housekeeping

1778 • Better communication

1781 • Everybody is aware what can happen to you if you lie about a situation

1783 • Most of the people are in support of a safety culture.

1784 • There is more lip service regarding safety because people are afraid of losing their jobs. Safety is like "Mom" & apple-pie" It can't be refuted.

1786 • Personnel awareness has been heightened somewhat, since the last safety survey, although personnel have to firth with management to make procedural changes, deeming procedures more accurate- and safe.

1787 • The people who were here before the overpaid, clerical-type-working mentors ALWAYS cared about safety. The mentors and performance assurance types are just trying to make themselves look good.

1788 • All-hands meetings very informative

1789 • LO/TO procedures

1791 • Core Training attendance has improved

1792 • Nothing Damned the torpedoes full speed ahead. (tank draining at all costs)

1795 • The job will only get done when it is ready

1797 • we have the authority to shut down a job at any time if we think it is unsafe.

1798 • The culture is changing from one of "Get the job done" to one of "Get the job done but do it safely"

1799 • We don't have all hands training on Friday

1802 • Informed meetings

1804 • With layoffs coming I haven't seen a positive regard to safety

1805 • People

1807 • We still have hourly people to keep management from ignoring safety concerns. Otherwise we would be in real saftey (sic) problems. I don't know what should be LO/TO!

1809 • Everything

1816 • A growing vivity (sic) and anticipation of being able to actually return to a position where work will again be permitted.

1821 • It's getting better

1839 • People who make honest mistakes coming forward with their mistakes, in an attempt to make it safer for other, so the other people don't make the same mistake.

1876 • Don't know I don't believe the Building is that unsafe.

146. Describe any changes in safety practices that have occurred since the last safety culture survey.

1650 • See item 145

1651 • More safety training

1652 • Personnel seem more aware

1655 • More occurrences have been reported to related safety concerns have been discussed/addressed we can still improve with sensible goals and mgmt support in terms of resources and proper priority setting.

1660 • Conduct of operations caused major changes in Building 771

1661 • OSR review/JCO/Oversight

1671 • Daily all-hands training/Lessons learned/ plan of the day meetings These are very positive!

1673 • More Awareness

1674 • More paperwork & training that does not pertain to my job

1686 • Awareness, better walkdowns and pre evolutions

1687 • Dan Branch flapping his lips.

1690 • Improved electrical safety practices, sidewalk through portal 3 has improved

1692 • Safety has always been important, seems to have improved, but always room for improvement.

1696 • More awareness of how things can happen to surprise you if you're not on your toes

1703 • There is a lot of talk about safety. However due to budget constraints only the most visiable (sic) safety issues are addressed

1707 • Things are brought up in Pre-Ev

1709 • It has improved

1711 • More training that does not deal with my specific job or other workers specific jobs: more paper work to correct ones job, less money to correct problems fewer workers to do the work

1712 • The rules keep changing

1713 • EG&G rush to get it done is over

1718 • I'm not sure upper mgmt deals with safety right. they react differently each time we have a problem

1720 • More All-Hands training

1723 • Discipline for violations- sometimes it appears to be to satisfy political agendas.

1724 • The area I work in is much cleaner than it used to be.

1725 • More aware

1727 • Emphasis on criticality safety and awareness

1728 • Better LO/TO

1731 • People are more aware better informed.

1732 • same as above

1735 • Better awareness of overall safety requirements The desire to work together to get the work done

1737 • People attempt to know more about what they're doing before they do it.

1739 • Building training. Good all Hands Briefings Knowledgeable mentors i.e. Dan Branch etc.

1741 • Improved awareness

1742 • I believe the Building is getting better at practicing safety but they are not quite there yet, given the B774 electrical incident that happened recently.

1744 • Criticality awareness is much better. Understanding of chain of command is better. Union relations have improved. i.e. the attitude toward operations & safety is better. The "give a shit" attitude transfers to performance.

1749 • More meetings, less work done on equip

1751 • Emphasis on safety is stronger. Some safety concerns go unresolved ex. Fire protection impairme

1755 • More people who have no knowledge of the workings of this Building (771) have input that is followed, rather than asking the ones who do know. Communication has never improved - that is our main problem!

1760 • Extensive lecturing on nuclear and occupational safety. Own mgt shutting down jobs.

1762 • The training and emphasis on safety has been increased. The reception, it training by Performanc level personnel has greatly improved in the last several months.

1764 • Haven't noticed any

1765 • Unknown as I do not know when a previous culture (safety) survey was conducted.

1769 • Rewards for safe behavior Performance indicators posted Goals established.

1774 • None of any significance

1781 • Supervisors are having more meetings about jobs that they place you on

1783 • We spend a great deal of time talking about it.

1784 • Why bother? Our opinions don't count any way. It generates more paperwork to justify some salaried flunkies position. They don't go in the RCA's to risk their very lives or health.

1787 • None. Scott Sax is doing just like B. Hensley, if it makes you look bad, do not report it. Scott sax is knowledgeable and basically appears to be a puppet for Dan Branch. B. Hensley at least cared abo people. (Note at bottom of page: This Building does not now, and never has, needed the nebulo help of mentors, performance Assurance or training. This Building needs workers at all levels.

1788 • Heavy emphasis of communication to shift manager

1792 • In the name of safety we are releasing areas that should never be released.

1795 • More training (especially crit. safety related) has helped.

1797 • If anything they are going over board

1798 • I was not here at the last survey

1799 • We have 3 more mentors in our bldg. 5 more training people but hardly any new employees that can help get real work done.

1802 • More aware of safety practices

1804 • I believe awareness is up in 771 there is still some people that care

1805 • People more scared to work not cause of safety but repercussions from screw-ups.

1807 • Why do we waste money on these surveys when we don't have money to fix things.

1809 • This has always been the safest place I have ever worked!! 100% work free accidents is an imposs

1816 • A growing awareness of safety

1821 • Being more up front

Attachment 4
DOE/RFFO Plan of Action
Operational Readiness Review
Draining of Tanks T-83, T-84 and T-85
Building 771

United States Government | Department of Energy

memorandum

Rocky Flats Field Office

DATE: JUN 29 1995

REPLY TO ATTN OF: LST:GWS:09703

SUBJECT: Approval of DOE Plan of Action (Revision 1) for Tank Draining Operational Readiness Review

TO: Distribution

The purpose of this memorandum is to document approval of DOE's Plan of Action, Operational Readiness Review, Draining of Tanks T-83, T-84 and T-85, Building 771, Revision 1, dated June 30, 1995. The revised Plan of Action incorporates clarification changes relating to programmatic adequacy to support the safe draining of tanks in Building 771. The attached DOE Plan of Action (Revision 1) is approved.

Mark N. Silverman
Manager

Attachment: DOE - Plan of Action, Operational Readiness Review, Draining of Tanks T-83, T-84 and T-85, Building 771 (Revision 1, dtd. June 30 1995)

Distribution:

cc w/ Attachment:
M. Williams, EH-10
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S. Sax, EG&G
D. Branch, EG&G

Errata Sheet

Changes to RFFO Plan of Action, Rev. 0

1. *The following changes are editorial additions and deletions that specifically articulate the applicability of the statement to the draining of Tanks T-83, T-84 & T-85 and from 'EG&G' to the 'contractor'.*
   - CR #1, second paragraph, delete first sentence "In the past.....instructions." At end of second sentence delete "TIPs will no longer be used". Third sentence add "needed by the 3-tank draining operation."
   - CR #12, Prereq 12.1, 12.3, 12.5 & 12.10, CR # 16. Prerequisite 16.2 & 16.3, CR #17, Prerequisite 17.1, add clarification statement of applicability to tanks T-83, T-84 & T-85.
   - Through out the POA where appropriate, 'EG&G' has been changed to 'the contractor'.

2. *The following changes identify programmatic elements that are considered adequate to support the tank draining preparations and execution. These areas (at the site level) have been subjected to previous ORRs, are periodically reviewed by DOE / RFFO as a function of routine oversight and are implemented to a satisfactory level in Building 771 to support the tank draining activities. Specific focus of the ORR (and this POA) is not directed on these areas because they were not related to the root causes of the tank draining incident and significant deficiencies and inadequacies were not identified during the review of the incident.*
   - Section 1, paragraph 2, first sentence - Delete "and additional support activities"
   - Section 7, following end of original paragraph, - add " Support activities that are performed.....resolved through the DOE RFFO oversight organization."
   - CR #7, second paragraph, change the third sentence to read "The following Orders have specific application to tank draining in Building 771." Delete the fourth and fifth sentences and add in their place "With the exceptions of DOE Order 5480.19.....is defined and evaluated."
   - Add the Prerequisite 7.1, "Documentation exists that DOE Orders that .....have been appropriately dispositioned."

3. *The following changes explain the rationale being applied to the safety controls being implemented for Hazard Category 2 concentrations of liquids in tanks and validating these controls on Hazard Category 3 tanks.*
   - Section 5, following end of original paragraph, add two sentences "Controls that are being implemented.....subsequent draining of Hazard Category 2 tanks."

4. *The following change clarifies the purpose of prerequisite completion verification.*
   - Section 2, last paragraph, end of first sentence, add "and to verify that the existing process ..... adequate for draining additional tanks."
   - Section 8, second paragraph last sentence changed to read "RFFO will verify that all prerequisites have been completed, and then the DOE ORR will review and validate the readiness to safely drain tanks in Building 771."

5. *The following change corrects the estimated time for the DOE ORR review.*
   - Section 9, second paragraph first sentence, change 'three' to 'four' working days.

U. S. Department of Energy
Rocky Flats Field Office
Golden, Colorado

PLAN OF ACTION

FOR THE

OPERATIONAL READINESS REVIEW FOR

BUILDING 771

DRAINING OF TANKS T-83, T-84, AND T-85

REVISION 1

June 30, 1995

APPROVED:

Mark N. Silverman
Manager, Rocky Flats Field Office

CONCURRENCES:

R. Bostic, Liquid Stabilization Team — Date: 6/27/95

FOR R. Bostic
T. Melberg, Residue Waste Management Division — Date: 6/27/95

David A Brockman
D. Brockman, Environment, Safety & Health — Date: 6/28/95

Dave W Sargent
D. Sargent, Standards, Performance & Assurance — Date: 6/28/95

L. Smith, Operations & Waste Management — Date: 6-28-95

TABLE OF CONTENTS

1.0 INTRODUCTION AND STRATEGY

The tank draining activities in Building 771 are being restarted after an unplanned shutdown resulting from operations performed outside the approved safety basis. By accomplishing the prerequisites defined in their Plan of Action, the contractor will ensure worker, public, and environmental safety during the conduct of tank draining activities. The Department of Energy Rocky Flats Field Office (RFFO) will verify, through an Operational Readiness Review (ORR), that those prerequisites have been accomplished satisfactorily. This Plan of Action has been created in accordance with DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*, and is based on information in EG&G Rocky Flats' March 27, 1995, Plan of Action.

The scope of this Plan of Action is limited to draining of tanks T-83, T-84, T-85 to four-liter bottles in Building 771. The approach applied to this restart is based on validating the adequacy of existing programmatic preparations for a tank draining operation. Each tank draining will be a unique, one-time operation; preparations will be graded. Although each tank draining is unique, consistent rigor will be applied in the review of procedures, training, equipment operability, and authorization basis adequacy. The principles and Core Requirements of DOE Order 5480.31 will be applied to demonstrate adequacy of preparations.

Draining tanks to four-liter bottles is the first step toward achieving the goal of eliminating actinide solutions held up or stored after the curtailment of operations in December 1989. The elimination of these liquids in tanks is one of Rocky Flats Environmental Technology Site's (the Site) priority risk reduction activities due to safety concerns associated with continued storage of plutonium nitrate solutions in process tanks not designed for long-term storage. Safety concerns were first raised in 1991 by EG&G and Los Alamos technical personnel, and restated in 1993 after further evaluation by Los Alamos. More recently, these same concerns have been recognized by the Defense Nuclear Facilities Safety Board (DNFSB) in its Recommendation 94-1; and the DOE Plutonium Working Group. All groups concurred with the conclusion of the 1993 Los Alamos report, that "continued storage of the plutonium solution degrades safety and is not advisable." The primary concern is continuing degradation of tanks, resulting in an increasing rate of hazardous and radiologically contaminated leaks.

The contractor's restart strategy is to significantly improve the performance of the Core Team of employees who will conduct the tank draining evolution. Performance will be achieved through clearly defined Core Team performance expectations; focused Core Team training; practice and demonstration through dry runs; increased management oversight; and additional elements identified in the Root Cause Analysis as they relate to the three tanks.

In order to improve performance, the contractor has made significant changes to the strategy that will be implemented for draining tanks T-83, T-84, and T-85. These enhancements are detailed in the contractor's Plan of Action and are included in this Plan of Action as points for verification by RFFO.

2.0 PROCESS RE-START

Tank draining to bottles in Building 771 was shut down on October 7, 1994, by EG&G Management after it was revealed that an unauthorized draining of a Building 771 process line occurred on September 29, 1994. The incident followed the authorized draining of Tank D-467 to four-liter bottles in Glovebox 42. The unauthorized activity was not reported until the night of October 6, 1994. This type of shutdown is categorized in DOE Order 5480.31 as an unplanned shutdown due to activities outside the approved safety basis.

The investigation of the incident resulting in the shutdown revealed that the fundamental or summary cause of the incident was a failure of personnel to fully accept and implement the concepts of DOE Order 5480.19, *Conduct of Operations*.

Additional root causes were

- 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;
- Barriers and controls which would have deterred an unauthorized solution transfer were less than adequate.

Contributing causes were

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

This Plan of Action has been written to enable DOE-RFFO to verify that the contractor has completed the corrective actions for the causes related to tanks T-83, T-84, and T-85 and verify that the process for tank draining operations is adequate for draining additional tanks. Once that verification (the ORR) is complete, RFFO will authorize the draining of tanks T-83, T-84, and T-85. RFFO will monitor the draining operation in accordance with existing RFFO oversight programs, and, after the draining is successfully completed, will evaluate its preparation and performance. This evaluation will identify weaknesses and specific corrections to ensure that the minimum criteria are maintained for subsequent draining operations. An Assessment Report will be provided to RFFO with lessons learned and a request to perform subsequent tank draining activities with similar demonstrated controls in place. RFFO will review the Assessment Report and, after resolution of any additional related concerns, will approve draining of the twelve remaining tanks (Hazard Category 2 or less).

3.0 FACILITY DEFINITION AND BACKGROUND

Responsible Contractor: Management and Operations Contractor, EG&G Rocky Flats, Inc. until July 1, 1995. After that date, the Integrating Contractor will be Kaiser-Hill.

Building 771 is a nuclear material processing building constructed in 1951. Plutonium processing began in May 1953 with Building 771's original mission of processing fissile (actinide) materials and solutions to recover Special Nuclear Materials above their economic discard limits. Appendix 1 shows Building 771's location.

When plutonium operations were curtailed at Rocky Flats in December 1989, approximately 9,000 liters of plutonium and uranium solutions were not processed. These materials were left in place in Building 771 to await resumption of plutonium recovery operations. In 1993, Building 771 was identified as a surplus facility scheduled for decontamination and decommissioning. Safety and environmental concerns related to prolonged solution storage in old, non-Resource Conservation and Recovery Act-permitted tank systems have been documented by EG&G, Los Alamos National Laboratory personnel, and the Defense Nuclear Facilities Safety Board (DNFSB) in its Recommendation 94-1. Removal of solutions to eliminate these concerns is a high priority, and draining tanks to bottles is required in order to remove actinide solutions currently stored in tanks.

The initial draining of tanks to bottles in Building 771 was authorized after an internal EG&G Readiness Evaluation was conducted in accordance with ADM 10.01, addressing the Core Requirements of DOE Order 5480.31. On May 31, 1994, DOE/RFFO granted approval to drain Tank 454 to bottles in Glovebox 42 (DOE/RFFO Memorandum LRT:GWS:05954).

The approval stated that EG&G was considered the approval authority for future tank draining activities, notifying RFFO in writing prior to performing each activity. EG&G successfully drained tanks 454, 467, 1001, and 1002 before tank draining activities were shut down as a result of operations outside the approved safety basis.

4.0. PROCESS DESCRIPTION

The following Table provides specific data for the three tanks included in the scope of this ORR:

Tank #	Room	Volume	Total grams Actinide
T-83	180K	29 L	18 gm Pu
T-84	180K	49 L	28 gm Pu
T-85	180K	56 L	42 gm Pu

The objective of draining these three tanks to bottles is to remove the solutions for characterization and processing to a more stable form for storage or waste disposal. Solutions will be moved from the tanks into bottles in the adjacent glovebox K20 using vacuum transfer. Before the transfer is made, piping systems used for the transfer will be integrity tested. The tank will then be sparged for thirty minutes to ensure adequate mixing, and three bottles will be filled and sampled from each tank to confirm actinide concentration. Once laboratory analysis confirms the actinide concentration is within the expected range, the remaining solution in the tank will be removed and placed into four-liter bottles. Vacuum will be drawn on the tank for at least an additional thirty minutes to ensure that as much of the solution has been removed as possible.

Tank draining activities will be performed Monday through Friday during day shift only. An evolution to drain one tank is expected to take two day shifts. The first shift will sparge the tank, draw the three bottles for sampling, and return the vacuum system to a safe, locked-out configuration. The samples will be analyzed by the Analytical Laboratories to confirm the actinide concentration. The second day shift will complete the draining of the tank. Draining of tanks T-83, T-84, and T-85 is expected to be accomplished in less than thirty days from authorization to proceed.

5.0 HAZARD CATEGORY

Integrated Safety Assessments (ISAs) of the proposed tank draining activities were completed in July 1994. Draining tanks T-83, T-84, and T-85 was determined to be Hazard Category 3[6], assuming the plutonium content to be as indicated in the table above. (The Hazard Category basis is included in the ISA for Transition Activity 8.) However, because Building 771 is categorized as a Hazard Category 2 building, and because the potential exists for tanks to contain plutonium concentrations higher than previous sample data indicates, tank draining is considered a Hazard Category 2 process, in line with the Building's Hazard Category.

The controls that are being implemented for draining these Building 771 tanks are graded to ensure that Hazard Category 2 concentrations of fissile liquids are managed with adequate safety. The application of these controls to tanks T-83, T-84, T-85 is consistent with the graded restart philosophy that will be applied to subsequent draining of Hazard Category 2 tanks.

6.0 REPAIRS AND MODIFICATIONS

No significant repairs or facility modifications affecting tank draining have been made since the shutdown of tank draining to bottles in Building 771.

7.0 OPERATIONAL READINESS REVIEW SCOPE

This Operational Readiness Review will verify that the contractor has completed the described prerequisite actions and that those actions provide an adequate basis for the Manager, DOE-RFFO, to authorize draining of tanks T-83, T-84 and T-85 under increased management supervision and oversight.

Support activities that are performed in conjunction with the tank draining operation are listed below and are not within the principal focus of this review.

- Laboratory Operations
- Radiological Operations
- Industrial Hygiene and Occupational Safety
- Training (except requirements specific to the Core Team)
- Maintenance & Engineering (except for direct support in tank draining such as joint tightening during integrity testing and JCO approvals)
- Nuclear & Criticality Safety (except the JCOs and Crit-limits that support the tanks being drained)

These activities are reviewed routinely by DOE RFFO as a function of periodic oversight and the adequacies of these programs have been demonstrated (at the site level) through previous ORRs. Reviews of the tank draining incident did not identify specific deficiencies or inadequacies in these areas that contributed to the incident. While an adjunctive review of these activities may be considered for the ORR, weaknesses and deficiencies found will be evaluated for significance to the safety of tank draining activities and programmatic adequacy will be resolved through the DOE RFFO oversight organization.

8.0 OPERATIONAL READINESS REVIEW PREREQUISITES AND CORE REQUIREMENTS

The breadth of the Operational Readiness Review is reflected in the prerequisites, based on the graded approach defined in DOE Order 5480.31. The ORR Team will use its discretion when findings and deficiencies are identified that will expand the scope of this POA. The ORR will validate the existing preparation process, emphasizing adequate preparations and focusing on the following factors:

- adequacy of the safety basis for the tank draining evolution;
- adequacy of the procedures and Nuclear Material Safety Limits (NMSLs) used to drain tanks T-83, T-84, and T-85;
- adequacy of the knowledge and training of the Core Team: and
- adequacy of supervision and oversight during tank draining.

The following presentation of prerequisites is based on the Core Requirements, stated verbatim from DOE Order 5480.31. Throughout this Plan of Action, the term *Core Team* refers to the listing of personnel defined in response to Core Requirement 13. RFFO will verify that all prerequisites have been completed, and then the DOE ORR will review and validate the readiness to safely drain tanks in Building 771.

CORE REQUIREMENT 1

There are adequate and correct procedures and safety limits for operating the process systems and utility systems.

All activities for draining tanks T-83, T-84, and T-85 will be conducted using procedures developed in accordance with Plant Procedures Groups. Methods to verify that utility systems needed by the 3-tank draining operation meet the requirement defined in the Justification for Continued Operations (JCO) are addressed in Core Requirement 5.

PREREQUISITES:

1.1 The following procedures and IWCP standard work package for transferring liquids from tanks T-83, T-84, and T-85 to four-liter bottles are available and approved in accordance with current site level procedures:
- 4-Q62-TD-006, Draining Tanks T-83, T-84, and T-85, Building 771
- 4-C35-CO-1035, H-4 Nash Vacuum Pump System, Line 5A
- 4-DO2-CO-1131, Solution Bottle Handling Building 771
- 4-61000-CO-1036, Glovebox Maintenance Building 771
- SWP-771-94007-00, Troubleshoot and Identify Deficiencies (standard IWCP work package)

1.2 Administrative controls are in place to ensure that only current, approved procedures are used by personnel conducting the activities.

1.3 Procedural steps credited by the criticality safety evaluation are identified as such, in a manner consistent with currently approved methods.

1.4 Tank draining procedures have been reviewed by senior staff designated by the Director, Waste Stabilization, including an observation of a dry run of the procedure. Completion of this management review will be documented by a sign-off on a prerequisite sheet.

1.5 Procedures require independent oversight of tank draining activities and physical barriers (such as lockout/tagout of valves required for criticality control) where required in order to ensure safety.

1.6 Appropriate Resource Conservation and Recovery Act (RCRA) compliance directions are identified in the procedures.

1.7 Procedures 4-Q62-TD-006 and 4-C35-CO-1035 contain a one-line schematic drawing that defines the process and boundaries.

CORE REQUIREMENT 2

Training and qualification programs for operations and operations support personnel have been established, documented, and implemented (the training and qualification program encompasses the range of duties and activities required to be performed).

The operations and operations support personnel classifications considered essential for safe draining of tanks T-83, T-84, and T-85 (that is, the Core Team specified in Core Requirement 13) and assurance of adequate response to credible abnormal events are the following: Process Specialist and Process Specialist Technical Supervisor (foremen); Shift Technical Advisor; Shift Manager; and Building Criticality Engineer.

PREREQUISITES:

2.1 Process Specialist and Technical Supervisor training to perform tank draining is developed from a Job Task Analysis in compliance with the Training User's Manual.

2.2 Qualification Standard Packages (QSP) are available to demonstrate that the Process Specialist and Technical Supervisor are qualified; if QSPs are not available, documentation exists to show each position's training requirements and how those requirements were determined.

2.3 Shift Technical Advisor and Shift Manager training is implemented as described in the Qualification Standard Package (QSP) in accordance with the Training User's Manual.

2.4 Qualification Standard Packages (QSP) are available to demonstrate that the Shift Technical Advisor and Shift Manager are qualified; if QSPs are not available, documentation exists to show each position's training requirements and how those requirements were determined.

2.5 The qualification of the Criticality Engineer assigned to support draining of tanks T-83, T-84, and T-85 has been documented.

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 ORR will verify that personnel on the Core Team are trained to the operating and criticality safety requirements of tank draining.

PREREQUISITES:

3.1 The personnel assigned to support draining of tanks T-83, T-84, and T-85 are current on training required for unescorted access into the Material Access Area (MAA).

3.2 The Support Criticality Engineer and Shift Technical Advisor designated on the Core Team demonstrate a detailed understanding of the Criticality Safety Evaluation on which the NMSLs for draining tanks T-83, T-84, and T-85 are based.

3.3 Personnel on the Core Team are knowledgeable about the tank draining procedures and have demonstrated their ability to draw a one-line diagram from memory; and are able to describe the process and equipment used for draining tanks T-83, T-84, and T-85.

3.4 Building 771 management has conducted a criticality safety briefing relating to the unauthorized draining incident in Building 771. The members of the Core Team have attended this briefing. (The criticality safety training program in Building 771 is further addressed under Core Requirement 8.)

3.5 Dry runs of procedures related to the draining of tanks T-83, T-84, and T-85 have been conducted with the designated Core Team. Dry runs included a demonstration of responses to abnormal conditions and upsets. Personnel demonstrated a knowledge of and commitment to Conduct of Operations during the dry runs.

3.6 Core Team personnel understand the assumptions of the criticality safety evaluation, barriers credited by the NMSL, and credible upset conditions with criticality safety implications during the draining of tanks T-83, T-84, and T-85.

CORE REQUIREMENT 4

Facility safety documentation is in place that describes the "Safety Envelope" of the facility. The Safety documentation should characterize the hazards/risks associated with the facility and should identify mitigating measures (systems, procedures, administrative controls, etc.) that protect workers and the public from those hazards/risks. Safety systems and systems essential to worker and public safety are defined and a system to maintain control over the design and modification of facilities and safety-related utility systems is established.

The RFFO ORR will focus on the safety documentation related to Criticality Safety.

PREREQUISITES:

4.1 An approved Justification for Continued Operations defining the authorization basis for the draining of tanks T-83, T-84, and T-85 is available with supporting documentation.

4.2 Approved Criticality Evaluations for the draining of tanks T-83, T-84, and T-85 are available and applicable NMSLs are posted. NMSLs are double contingent with appropriate emphasis on physical controls where applicable.

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 instruments which monitor limiting conditions of operation or that satisfy Technical Safety Requirements. All systems are currently operable and in a satisfactory condition.

The verification of prerequisite(s) in this Core Requirement will be based on requirements defined by the Justification for Continued Operations (JCO).

PREREQUISITE:

5.1 The Shift Manager has an effective process for confirming Building status with the requirements of the Justification for Continued Operations identified as part of Core Requirement 4.

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.

The ORR will verify that the Site Commitment Management Program (SCMP) and the associated database, Plant Action Tracking System (PATS), provide a Site-level process to identify, evaluate, and resolve deficiencies identified by oversight groups, review teams, and audit groups; and that this system is implemented in Building 771. Draining tanks T-83, T-84, and T-85 does not rely solely on this system to identify deficiencies. In addition to these two systems, Core Requirements 1, 3, 5, and 8 also define pre-operational requirements to evaluate the status of equipment, personnel, and procedures just prior to performing tank draining.

PREREQUISITES:

6.1 Issues related to the draining of tanks have been identified and tracked through the Site Commitment Management Program.

6.2 Deficiencies identified in Occurrence Reports and Criticality Safety Infractions, but not yet identified in the Site Commitment Management Program, have been reviewed for applicability to draining of tanks T-83, T-84, and T-85 and have been dispositioned.

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.

The Order Compliance review system is implemented at the Site level. The Standards Organization within Performance Assurance is responsible for coordinating the line management review of DOE Orders, assigning responsibility, determining compliance with Order requirements, preparing Compliance Schedule Approvals and Short Term Compliance Schedules, and advising the DOE of non-compliances and planned compensatory actions. The following Orders have specific application to tank draining in Building 771. With the exceptions of DOE Orders 5480.19, 5480.22, 5480.23 and 5480.24, no specific inadequacies were identified in activity and programmatic reviews that resulted from the tank draining shutdown. The necessary and sufficient implementation of Conduct of Operations (5480.19), Technical Safety (5480.22), Nuclear Safety (5480.23) and Criticality Safety (5480.24) for Building 771 tank draining activities is defined and evaluated.

4330.4B	Maintenance Management Program
5000.3B	Occurrence Reporting and Processing of Operations Information

(continued)

5400.1	General Environmental Protection Program
5400.2A	Environmental Compliance Issue Coordination
5400.3	Hazardous and Radioactive Mixed Waste Program
5400.5	Radiation Protection of the Public and the Environment
5440.1E	National Environmental Policy Act Compliance Program
5480.4	Environmental Protection, Safety and Health Protection Standards
5480.7A	Fire Protection
5480.8A	Contractor Occupational Medical Program
5480.10	Contractor Industrial Hygiene Program
5480.11	Radiation Protection for Occupational Workers
5480.19	Conduct of Operations
5480.1B	Environment, Safety and Health Program for DOE Operations
5480.20	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities
5480.21	Unreviewed Safety Questions
5480.22	Technical Safety Requirements
5480.23	Nuclear Safety Requirements
5480.24	Nuclear Criticality Safety
5480.31	Startup and Restart of Nuclear Facilities
5481.1B	Safety Analysis and Review
5482.1B	Environment, Safety and Health Appraisal Program
5483.1A	Occupational Safety & Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities
5500.3A	Planning and Preparedness for Operational Emergencies
5700.6C	Quality Assurance
5820.2A	Radioactive Waste Management

Defense Nuclear Facilities Safety Board Recommendation 90-2:

This Recommendation requires DOE to "identify the Orders, Standards and other safety requirements applicable at defense nuclear facilities; to assess the adequacy of such requirements; and to determine the status of compliance with such requirements at defense nuclear facilities."

The Site has previously responded to the DNFSB Recommendation 90-2 at the site level for the Resumption of Building 559 and Thermal Stabilization activities in Building 707. The Site identified safety-related Orders and conducted compliance assessments. Identified deficiencies were either corrected or plans for compliance were developed and committed to in Compliance Schedule Approvals.

PREREQUISITE:

7.1 Documentation exists that DOE Orders that specifically apply to tank draining activities have been reviewed, and any deficiencies that apply to tank draining have been appropriately dispositioned.

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 (e.g., training, maintenance, waste management , environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, criticality safety, and engineering) are adequate for operations;

Site level management programs have been validated through previous ORRs, and are expected to perform as previously demonstrated. Support functions needed to respond to criticality events and hazardous spills will be tested as part of the drill program (Core Requirement 9.) The RFFO ORR will verify that the Criticality Safety Program is implemented to support draining of tanks T-83, T-84, and T-85, and will verify an acceptable level of compliance with the Radiation Protection and Industrial Hygiene and Safety requirements. It will also verify that Radiation Protection has reviewed tank draining procedures and that sufficient approved RCRA storage space is available for bottles resulting from draining tanks T-83, T-84, and T-85. Core Team members are current on Criticality Safety and Radiation Protection training, verified under Core Requirement 3, training for unescorted access.

The Building Criticality Engineer is identified on the Core Team, and verification of adequate training and qualifications for that Criticality Engineer has been accomplished under Core Requirements 2 and 3.

PREREQUISITES:

8.1 Procedure NSM 3.12 has been used to verify that proper NMSLs for the next tank draining evolution have been posted.

8.2 Radiation Protection has reviewed tank draining procedures.

8.3 An acceptable level of compliance with the Radiation Protection and Industrial Hygiene and Safety requirements exists in Building 771.

8.4 Storage space approved for Resource Conservation and Recovery Act regulated bottles is available.

8.5 Recent reorganization and budget actions have been reviewed to assure that no programmatic degradation has occurred in Building 771 support for tank draining activities.

8.6 Procedures for draining tanks T-83, T-84, and T-85 to bottles have been through the ALARA Review process where required.

8.7 Procedures are in place to implement the Radiological Protection and Health Physics, and Industrial Safety and Hygiene Programs as they pertain to tank draining activities. Compliance with these procedures has been demonstrated.

8.8 A Building Criticality Engineer is stationed in Building 771 during all tank draining evaluations.

CORE REQUIREMENT 9

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

The drills program for activities associated with draining tanks T-83, T-84, and T-85 will be focused on drills associated with criticality accidents and spills that could result from the activities. These are identified, credible, postulated accidents.

PREREQUISITES:

9.1 Building 771 Operations has satisfactorily completed criticality and spills drills in accordance with the Building Emergency Plan and site standards, and has dispositioned any deficiencies affecting the ability to drain tanks T-83, T-84, and T-85 .

9.2 Core Team personnel participated in these drills.

9.3 Records of completed drills are available in Building 771 in accordance with governing procedures.

CORE REQUIREMENT 10

An adequate startup or restart test 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 operators.

The purpose of Core Requirement 10 is to permit a graded approach for a new process or an existing process that has not been used for an extensive time. Neither of these conditions applies to draining of the three subject tanks, since the process was conducted successfully until September 1994. Dry runs (Core Requirement 3) will provide assurance of personnel and procedures readiness. Pipe integrity tests are included in the procedures as appropriate to provide confidence in piping just prior to the planned draining. The contractor identified a single prerequisite, and RFFO has added no others.

PREREQUISITE:

10.1 Pipe integrity tests are included in the procedure for draining tanks T-83, T-84, and T-85.

CORE REQUIREMENT 11

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

Senior Contractor Waste Stabilization management has interviewed all personnel on the Core Team and observed and evaluated the dry runs (Core Requirement 3). In addition, management has verified through the drill program (Core Requirement 9) that personnel understand their responsibilities during off-normal conditions.

PREREQUISITES:

11.1 The Core Team has been briefed on the organization structure and has been informed of the reporting expectations that might occur during the process of draining tanks T-83, T-84, and T-85.

11.2 The Director, Waste Stabilization has interviewed the Core Team, Production Manager, and Operations Manager. The Director has a high level of confidence that the personnel interviewed understand their roles, responsibilities, and expected interfaces. He is confident that the Core Team understands the concepts of Conduct of Operations (Core Requirement 12) and the expected safety culture (Core Requirement 14).

11.3 The Director, Waste Stabilization, has established requirements for the minimum level of supervision of tank draining operations based on potential hazards. These guidelines have been observed during the draining of tanks T-83, T-84, and T-85 and have been incorporated into the procedure.

11.4 An Operations Order exists that defines requirements, roles, responsibilities, and required knowledge and experience of the Senior Management Oversight Team.

11.5 The Senior Management Oversight Team, the Operations Manager, and the Production Manager demonstrate their understanding of the tank draining evaluations and can draw the one-line schematic.

CORE REQUIREMENT 12

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

A major focus of this Plan of Action and ORR will be how well the Core Team demonstrates an acceptance of Conduct of Operations concepts. The following Conduct of Operations Manual elements pertain to tank draining and will be verified before the three tanks are drained. Those verified under a different Core Requirement (noted) will not be verified here.

Procedures (verified under Core Requirement 1)
Qualification Program (verified under Core Requirement 2)
Drills (verified under Core Requirement 9)
Lockout/Tagout
Status Board
Component Labeling
Logs
Operator Aids
Pre-evolution Briefs
Plan of the Day
Shift/Standing/Operations Orders

PREREQUISITES:

12.1 Lockout/Tagout: Valves necessary for criticality control for the draining of tanks T-83, T-84, and T-85 are being controlled in accordance with the current Lockout/Tagout procedure.

12.2 Status Board: Dry runs demonstrate that the Status Board is used appropriately to indicate status of the tank draining activities and the equipment needed to comply with the JCO for draining tanks T-83, T-84, and T-85.

12.3 Component Labeling: Tank draining hardware defined in the procedures for tanks T-83, T-84, T-85 identified under Core Requirement 1 is labeled in accordance with site standards.

12.4 Logs: Dry runs indicate that the logs associated with draining of tanks T-83, T-84, and T-85 are defined and implemented consistent with the governing procedures.

12.5 Operator Aids: Operator Aids used for draining of tanks T-83, T-84, and T-85 are consistent with the Conduct of Operations procedure.

12.6 Pre-evolution Briefs: Dry runs demonstrate that pre-evolution briefs are conducted for draining of tanks T-83, T-84, and T-85 consistent with the governing procedures.

12.7 Plan of the Day: Dry runs demonstrate that Building 771 Operations uses the established Plan of the Day procedures. Tank draining activities will be identified and approved on the Plan of the Day by the Operations Manager or designee.

12.8 Shift/Standing/Operations Orders: Shift/Standing/Operations Orders are on file and controlled for activities that support the draining of tanks T-83, T-84, and T-85 to bottles.

12.9 A survey of Building 771 personnel has been completed to determine the extent and nature of differences of opinion, practices, attitudes, and behavior regarding Conduct of Operations. The survey has been evaluated, and actions relating to human factors that have the potential to impact the draining of tanks T-83, T-84, and T-85 have been implemented in Building 771.

12.10 A process is established to define the steps involved in getting approval for and actually manipulating valves associated with tank systems applicable to tanks T-83, T-84, T-85 that potentially contain fissile liquids.

CORE REQUIREMENT 13

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

The RFFO ORR will verify that identified Core Team personnel are sufficient to support the draining of the three tanks.

PREREQUISITES:

13.1 Numbers of personnel who must be assigned to the Core Team have been established for the personnel categories identified under Core Requirement 2.

13.2 Qualified Core Team personnel have been identified by position and name.

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, through their actions, demonstrate a high priority commitment to comply with these requirements.

The lack of a "Safety First" culture within Building 771 Production Operations contributed to the incident resulting in the shutdown of tank draining activities. A major emphasis of this Plan of Action will be to verify that a Core Team and management are in place who understand, accept, and promote Conduct of Operations. The Director, Waste Stabilization conducted interviews to verify this understanding and acceptance under Core Requirement 11; the actual practice of this expected culture has been demonstrated through dry runs and drills conducted under Core Requirements 3 and 9. Increased management presence during the draining of tanks T-83, T-84, and T-85 will reinforce expected performance (Core Requirement 11). The contractor identified no further prerequisites, and RFFO has added none.

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.

The safety basis for draining tanks T-83, T-84, and T-85 to bottles has been fully described in the Justification for Continued Operations (JCO) and supporting safety analyses (Core Requirement 4). The facility condition required by the JCO will be verified as a pre-operational activity (Core Requirement 5). The contractor identified no further prerequisites, and RFFO has added none.

CORE REQUIREMENT 16

The technical and managerial qualifications of those personnel at the field organization and at Headquarters who have been assigned responsibilities for providing direction and guidance to the contractor, including the Facility Representatives, are adequate. (DOE ORR only)

This ORR will verify that personnel providing oversight to the contractor during tank draining activities are trained and qualified. In addition, Building 771 Facility Representatives have been trained and are qualified according to an established program.

PREREQUISITES:

16.1 An adequate training program for the Rocky Flats Field Office (RFFO) Facility Representatives has been established. The scope and content of the program are consistent with the guidelines given in DOE Standard 1063, *Establishing and Maintaining a Facility Representative Program at DOE Nuclear Facilities.*

16.2 The Facility Representative(s) who participates in this tank draining activity is qualified.

16.3 Documentation exists to demonstrate that personnel assigned responsibilities for oversight of tank-to-bottle draining of tanks T-83, T-84, and T-85 have training and qualifications that are maintained current.

CORE REQUIREMENT 17

The results of the responsible contractor Operational Readiness Review are adequate to verify the readiness of hardware, personnel, and management programs for operations. (DOE ORR only)

The scope and depth of the contractor ORR were adequate to determine the Liquid Stabilization program's ability to drain tanks T-83, T-84, and T-85.

PREREQUISITES:

17.1 Issues to be resolved prior to the start of draining tanks T-83, T-84, and T-85 have been properly identified and corrective actions have been completed and verified.

17.2 The Contractor's ORR final report includes findings and recommendations, and implementation plans for resolving any post-start findings. The rationale for those post-start findings can be verified.

CORE REQUIREMENT 18

Modifications to the facility have been reviewed for potential impacts on procedures and training and qualification. Procedures have been revised to reflect these modifications and training has been performed to these revised procedures.

The procedures developed for draining tanks T-83, T-84, and T-85 to bottles have been verified to be consistent with the existing process equipment configuration as part of the procedure development process (Core Requirement 1). Consistency will be verified again during the dry runs of the evolution (Core Requirement 3). Training will be developed based on these verified procedures. Each tank draining evolution is a one-time event that will occur shortly after verification of the procedure. No modifications to process equipment will be allowed prior to execution of the tank draining evolution. The contractor identified no further prerequisites, and RFFO has added none.

CORE REQUIREMENT 19

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

Personnel responsible for facility operations are the Core Team and their line management, up to and including the Operations Manager, as shown on the Contractor's organizational chart. Verification that the Core Team has undergone a formal qualification process was performed under Core Requirements 2 and 3, and was further demonstrated through dry runs of the draining activity and drills under Core Requirements 3, 9, and 11.

PREREQUISITE:

19.1 The Director, Waste Stabilization has interviewed the Production Manager and Operations Manager regarding their management and technical responsibilities related to draining the three tanks.

19.2 The Senior Management Oversight Team members' knowledge relating to the draining of the three tanks has been assessed.

CORE REQUIREMENT 20

Operations Office oversight programs such as Occurrence Reporting, Facility Representatives, Corrective Action [illegible] Programs [illegible].

A process has been implemented to identify and evaluate compliance issues associated with the Category [illegible] Orders and the applicable DNFSB Recommendations. A program is in place to identify and take action on both deficiencies and recommendations made by [illegible] official review teams, DOE and contractor audit organizations, and individuals. The Facility Representatives program will be evaluated under Core Requirement 16.

PREREQUISITE:

20.1 A system utilized by RFFO for identifying, reviewing, and cataloguing deficiencies and recommendations is established and adequately implemented.

9.0 THE OPERATIONAL READINESS REVIEW

Readiness to Proceed Memorandum

At the end of the contractor's ORR, all pre-start findings will be resolved, and open post-start findings will have a schedule for completion. The contractor's final report will be forwarded to the Approval Authority. The head of the contractor organization will determine that the [illegible] ORR was satisfactory and that the contractor is prepared for the DOE-RFFO ORR. This determination will be documented in a Readiness to Proceed Memorandum to the Manager, DOE Rocky Flats Field Office. At this time, RFFO Operations and Waste Management [illegible] verify that the contractor's preparations have been completed and that [illegible] is ready to [illegible] operations. [illegible] will issue a report confirming that all preparations are complete, including tracking and/or resolution of external oversight issues and deficiencies, and recommending that the Manager, RFFO initiate the DOE-RFFO ORR.

The DOE-RFFO ORR will start approximately one week following receipt of the contractor's Memorandum and last about four working days. The ORR will be [illegible] schedule [illegible] driven, and the estimated time is subject to change based on safety and other issues that may arise during the review process.

The Operational Readiness Review Team

The ORR Team will be led by W. R. Bennett, RFFO-SSD. RFFO line management will name a multi-disciplined Team; members will be technically qualified, thoroughly familiar with the activity(ies) being reviewed, and experienced and trained in performance [illegible].

Following guidance in DOE-STD-3006-93, *Planning and Conduct of Operational Readiness Reviews*, the Leader and Team will create the ORR Implementation Plan. This Plan will be based on the approved Plan of Action [illegible] [illegible] lessons learned.

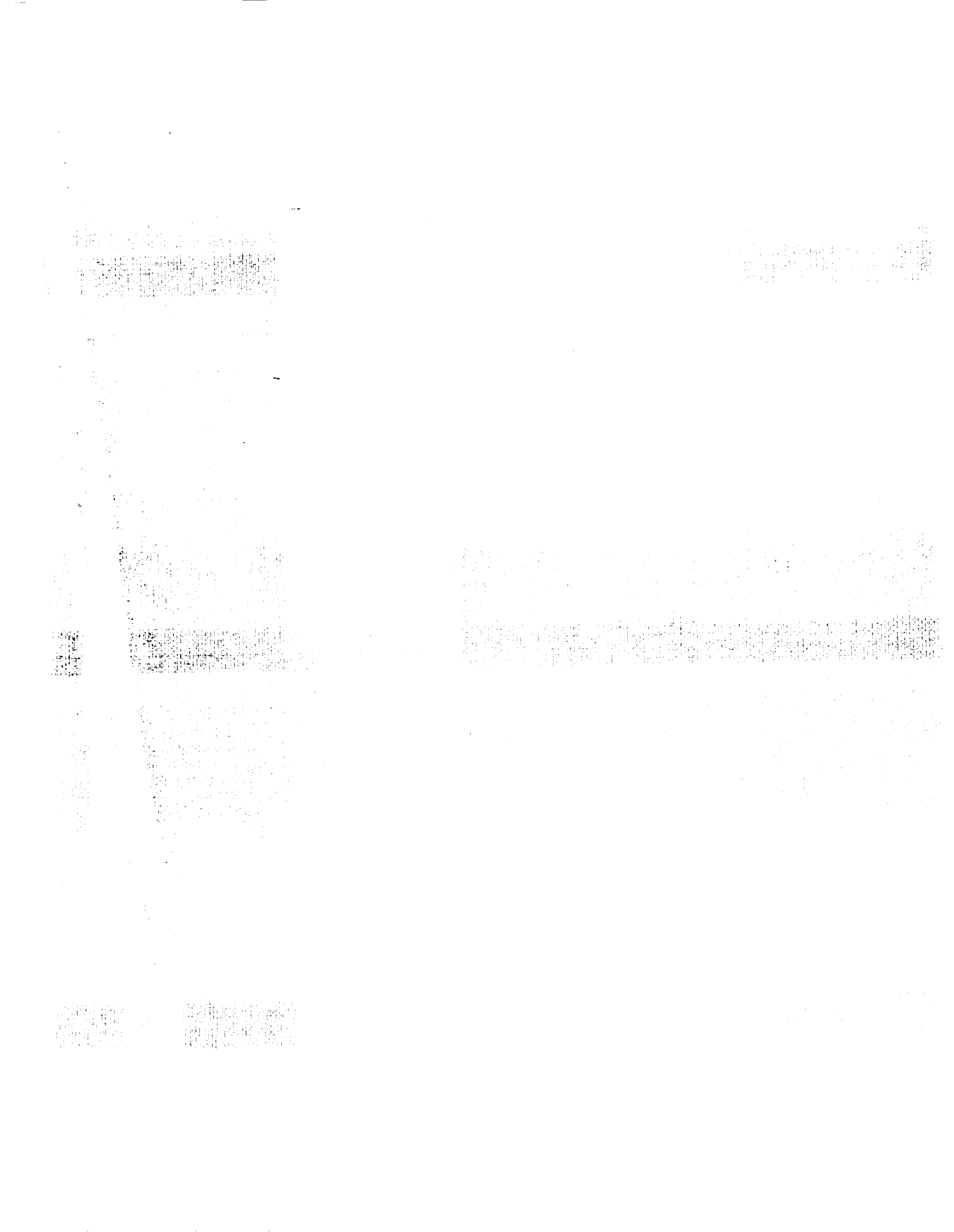
Dispute Resolution Team

A Dispute Resolution Team has been established composed of Leanne W. Smith, Assistant Manager of RFFO Operations and Waste Management; Mark H. Williams, Environment, Safety, and Health (EH); and John A. Ford, DP-33. Environmental, safety, or health concerns that arise during the ORR and that cannot be addressed or resolved by the ORR Team or RFFO management will be escalated to the Dispute Resolution Team in accordance with DOE Order 5480.31.

Restart Authority

The Manager, DOE Rocky Flats Field Office, is responsible for issuing the final approval to restart operations defined in this document's scope.

APPENDIX 1
ROCKY FLATS PLANTSITE



Attachment 5

Rocky Flats Field Office Input to the DNFSB Recommendation 92-5 Annual Report Concerning the Status of Conduct of Operations Implementation and Facility Status

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICER	GEN'L CODE	CURRENT OPERATIONAL STATUS	FUTURE USE PLAN/REMARKS
Plutonium Recovery (Building 371)	EM	B	Shutdown. Storage of Pu and fissile residues.	Possible future uses as a shipment depot for offsite shipments, residue processing, and SNM consolidation.
Waste Treatment (Building 374)	EM	B	Operating - waste water treatment.	Continued operation through D&D of entire site.
Non-nuclear Manufacturing (Building 460)	EM	D	Shutdown for transition, 10/94.	Transferred to EM for economic development and final disposition.
SST Modification Center (Building 440)	EM	D	Shutdown for transition, 10/94.	Transferred to EM for economic development and final disposition.
Manufacturing Building (Building 444)	EM	D	Shutdown for transition, 10/94	Transferred to EM for economic development and final disposition.
Plutonium Analytical Lab (Building 559)	EM	B	Analytic chemistry analysis for waste/residue characterization	Possible future use as a shipment depot for offsite shipments and residue processing
Waste Storage/Staging (Building 664)	EM	B	Packaged waste storage/shipment	Continued operation through D&D of entire site.
Plutonium Manufacturing and Assembly (Building 707)	EM	B	Unrestricted Thermal Stabilization Operations	Possible residue processing (short term operation)
Plutonium Recovery (Building 771)	EM	D	Shutdown for transition. Pu residue, waste storage.	Restart for continued liquid residue processing (short term operation)
Waste Treatment (Building 774)	EM	B	Liquid waste processing for storage/disposal	Continued operation through D&D of entire site.
Plutonium Recovery and Waste Management (Building 776)	EM	B	Waste Management (size reduction, supercompactor). Waste storage.	Waste storage.
Manufacturing (Building 777)	EM	B	Shutdown for transition. Pu and residue storage.	Pu and Residue storage.
Plutonium Development (Building 779)	EM	D	Shutdown for transition. Pu and residue storage.	Restart for residue processing (short term operation)
Material & Process Development Lab (Building 865)	EM	D	Shutdown for transition.	Transferred to EM for economic development and final disposition.
Manufacturing and General Support (Building 881)	EM	C	Analytic chemistry analysis for waste characterization.	Planned for shutdown after consolidation of site laboratories.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICER	GEN'L CODE	CURRENT OPERATIONAL STATUS	FUTURE USE PLAN/REMARKS
Rolling and Forming Facility (Building 883)	EM	D	Shutdown for transition.	Transferred to EM for economic development and final disposition.
Nuclear Safety Facility (Building 886)	EM	D	Shutdown for transition. Waste Storage.	Waste storage prior to transition to D&D.
Product Staging (Building 991)	EM	D	Pu storage, shipment depot	Pu storage and shipment depot prior to transition to D&D.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	DATE OF FULL IMPLEMENTATION OF CONDUCT OF OPERATIONS	WHAT COMPENSATORY MEASURES UNTIL FULL IMPLEMENTATION ACHIEVED/ REMARKS
Plutonium Recovery (Building 371)	EM	September 1995.	All restart operations are being performed in accordance with DOE Order 5480.31, Startup and Restart of Nuclear Facilities. During high hazard operations, such as tank draining in Building 771, RFFO directs the contractor to develop a program plan. This plan specifically addresses Conduct of Operations issues necessary to perform the activity. Facility Representative continue to routinely monitor building operations, however, there is an increased emphasis on implementation of Conduct of Operations as this is the number one priority in the buildings. Additionally, RFFO tasked EG&G to increase the rate and scope of CONOPS implementation. These dates are reflected in this matrix.
Waste Treatment (Building 374)	EM	September 1995.	
Non-nuclear Manufacturing (Building 460)	EM	In compliance based on contractor report. DOE Conduct of Operations Assessment Scheduled for June 1995.	
SST Modification Center (Building 440)	EM	The planned implementation date is being revised do to a change in the mission/scope of the facility. This revised implementation plan will be delivered to DOE June 15, 1995. Presently this building is 87% in compliance.	
Manufacturing Building (Building 444)	EM	In compliance based on contractor report. DOE Conduct of Operations Assessment Scheduled for June 1995.	
Plutonium Analytical Lab (Building 559)	EM	In compliance. DOE Operational Readiness Review was completed January 1992. DOE Conduct of Operations Assessment Scheduled for January 1996.	
Waste Storage/Staging (Building 664)	EM	The planned implementation date is being revised do to a change in the mission/scope of the facility. This revised implementation plan will be delivered to DOE June 15, 1995. Presently this building is 87% in compliance.	

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	DATE OF FULL IMPLEMENTATION OF CONDUCT OF OPERATIONS	WHAT COMPENSATORY MEASURES UNTIL FULL IMPLEMENTATION ACHIEVED/ REMARKS
Plutonium Manufacturing and Assembly (Building 707)	EM	In compliance. DOE Operational Readiness Review was completed January 1993. DOE Conduct of Operations Assessment Scheduled for January 1996.	
Plutonium Recovery (Building 771)	EM	September 1995.	
Waste Treatment (Building 774)	EM	September 1995.	
Plutonium Recovery and Waste Management (Building 776)	EM	September 1995	
Manufacturing (Building 777)	EM	September 1995	
Plutonium Development (Building 779)	EM	October 1995	
Material & Process Development Lab (Building 865)	EM	August 1995	
Manufacturing and General Support (Building 881)	EM	August 1995	
Rolling and Forming Facility (883)	EM	October 1995	
Nuclear Safety Facility (Building 886)	EM	The planned implementation date is being revised do to a change in the mission/scope of the facility.	
Product Staging (Building 991)	EM	In compliance based on contractor report. DOE Conduct of Operations Assessment Scheduled for July 1995.	

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATION PROGRAM
Non-nuclear Manufacturing (Building 460)	EM	•Cold facility. No decontamination required.	•No radiological hazards exist. •All hazardous waste areas are posted.	•The process waste system consists of 5 sump pits, ancillary lines, pumps and 3 tanks. •Air compressor condensate is the only process waste being introduced to the system. •RCRA inspections are being completed every 24 hours. •RCRA closure plan has been submitted to CDPH&E for approval.	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.
SST Modification Center (Building 440)	EM	•Cold facility. No decontamination required.	•No radiological hazards exist. •All hazardous waste areas are posted.	N/A	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATION PROGRAM
Manufacturing Building (Building 444)	EM	•Building has Radiological Buffer Area (RBA). •Decontamination has not commenced in the RBA.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•There is no external process waste being introduced into the process waste system. •Building ground water from within the RBA is periodically pumped into the process waste system from various locations. •A RCRA closure plan is being drafted. •RCRA inspections are being completed every 24 hours and are being maintained by the custodian.	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATION PROGRAM
Plutonium Recovery (Building 771)	EM	•Facility has contamination. •Leaks in process equipment continue to occur. •Decontamination will be required in some areas. •Tanks and process lines will be drained in phase 2 of the Solution Stabilization Program scheduled for FY-96. •Remaining sludge, and duct contamination will be removed during D&D operations. •Solid SNM consolidation will occur in FY-97.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained. •There is plutonium in ducts, glove boxes, and plenums that will require corrective actions to be implemented during D&D operations.	•Phase 2 of the Solution Stabilization Program removes liquids from tanks and pipes to dry out the system, but this does not take the tanks to closure. •The sludge will be removed during D&D operations. •RCRA and state inspections of tanks are being conducted within the required periodicity. •A consolidated master list of tanks is maintained.	•Utilities upgrades continue in the facility. •Drawings are accurate for the vital safety systems, and are controlled through Document Control program. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two Training & Qualification Coordinators exist in the facility. •Training & Qualification Records are maintained in the plant database. •The list of qualified personnel is posted.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATION PROGRAM
Plutonium Development (Building 779)	EM	•Building has Radiological Buffer Area (RBA). •Decontamination has not commenced in the RBA. •Decontamination will be conducted under the NCPP cooperative Agreement.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•Process waste systems exists in this facility. •RCRA closure plan (94-00-7759) is in progress. •There is no external process waste being introduced into process waste system. •Building ground water from within the RBA is periodically pumped into the process waste system from various locations.	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.
Material & Process Development, Building 865	EM	•Building has Radiological Buffer Area (RBA). •Decontamination has not commenced in the RBA. •Beryllium contaminated areas exist.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•There is no external process waste being introduced into the process waste system. •A RCRA closure plan is being drafted. •RCRA inspections are being completed every 24 hours and are being maintained by the custodian.	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATION PROGRAM
Manufacturing and General Support, Building 881	EM	•Facility has contamination •Rad Con implementation scoping survey in progress •Decontamination is being performed as problem areas are identified	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained.	•The Process Waste System consists of 7 tanks located in Building 887 and their associated ancillary equipment. •Waste input results from General Lab processes. •RCRA inspections performed every 24 hours. •Tanks in the process of being moved from Interim Status to 90 day area.	•All electrical, plumbing, floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.
Rolling and Forming Facility (Building 883)	EM	•Building has Radiological Buffer Area (RBA). •Decontamination has not commenced in the RBA. •Decontamination will be conducted under the NCPP cooperative agreement.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•Three process waste systems exist in this facility: A, B, and nitric waste systems. •RCRA closure plan for A series tanks has been forwarded to DOE for approval. •RCRA closure plan for B series tanks is currently under contractor for review. •RCRA closure plan for nitric systems is being drafted.	•All electrical, plumbing (including process waste lines), floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	•Two training and qualification coordinators exist for this facility. •Training and qualification records are maintained in a database. •A list of all qualified personnel is distributed monthly and used to verify qualifications prior to starting work.

SITE/FACILITY	RESPONSIBLE SECRETARIAL OFFICE	APPLICABILITY/IMPLEMENTATION OF SPECIFIC ASPECTS OF CONDUCT OF OPERATIONS PROGRAMS FOR STANDBY FACILITIES LISTED IN THE IMPLEMENTATION PLAN				
		DECONTAMINATED	STABILIZED	TANK DISPOSITION/ MAINTENANCE	CONFIGURATION AND PROCESS DESCRIPTION	TRAINING AND QUALIFICATIO PROGRAM
Building 886	EM	•The facility has low levels of contamination. •Some decontamination will be required. •A Basis for Interim Operation (BIO) is being prepared, to authorize the decontamination of the facility.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•The Solution Stabilization Program removes the HEUN from the system to dry out the tanks and pipes •Sludge remaining in the tanks will be removed during D&D operations.	•Utilities systems are in a suspect condition. •No prints or documents exist. •No FSAR exists. •A Basis for Interim Operation (BIO) is being prepared to allow activities to proceed in the facility.	•Personnel assi to Building 886 from Building and have gener Training & Qualifications plutonium area •No Qualificati Training Progr exist.
Product Staging (Building 991)	EM	•Cold facility. No decontamination required.	•All radiological areas are posted including areas requiring specific PPE. •All hazardous waste areas are posted. •Radiological records and logs are maintained .	•No tanks are potentially contaminated with radiological or hazardous material.	•All electrical, plumbing (including process waste lines), floor plan, etc. drawings are maintained by contractor document control. •Walk downs are performed and documented on all systems prior to authorizing activities.	All personnel a fully trained an qualified.