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Technical Safety Appraisal of Building 776/777 Rocky Flats Plant

March 1988

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U.S. Department of Energy Environment, Safety, and Health

Office of Nuclear Safety
Washington, D.C. 20545

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March 1988

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TECHNICAL SAFETY APPRAISAL

BUILDINGS 776/777, ROCKY FLATS PLANT

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TABLE OF CONTENTS

INTRODUCTION	1
SUMMARY	3
MAJOR PROBLEM AREAS	4
APPENDIX A - Report of the Technical Appraisal Team	
APPENDIX B - Interim Response to the Technical Safety Appraisal	

INTRODUCTION

This report presents the results of one in a series of Technical Safety Appraisals being conducted of the Department of Energy's nuclear operations by the Assistant Secretary for Environment, Safety, and Health's Office of Nuclear Safety. Technical Safety Appraisals are one of the initiatives to enhance the Department's environment, safety and health program announced by Secretary of Energy, John S. Herrington, on September 18, 1985.

This Technical Safety Appraisal of Buildings 776/777 at the Rocky Flats Plant in central Colorado was conducted between January 11 and February 12, 1988.

These buildings, which abut one another, are major components of the production complex on the plant site. They have been in operation since 1957. The facility provides direct support to the nuclear weapons production processes in Building 707 in the areas of metallurgical operations, machining, assembling, and inspection. In addition to this weapons production support, there are five other major categories of operations in the facility: site-return processing, waste processing operations, research and development, special projects, and support groups, such as Radiation Monitoring, Process Materials Control and Maintenance.

The principal hazards presented by operations in this facility are a fire, the neutron and photon radiation fields to which workers are exposed during direct and near-proximity handling of plutonium and uranium, and the consequences of injection, ingestion, and inhalation which could result from the dispersal of these materials.

The approach used in Technical Safety Appraisals is to assemble a team of experts led by a senior staff member from the DOE Headquarters Office of Nuclear Safety, and have them gather information over the course of about 4 weeks on all areas of safety at a specific facility through first-hand observations of: operational practices; maintenance practices; selected drills on abnormal conditions; and the condition of hardware. They also obtain information from reviews of safety policies, operating records, and selected procedures, and from discussions with appropriate personnel. The team's evaluation was guided by a set of pre-established Performance Objectives with supporting criteria. The results of the team's efforts is documented in a report addressed to the Office of Nuclear Safety containing their findings and concerns. This report is attached as Appendix A.

In some cases, a specific aspect of the facility's operation (an operating practice or administrative approach) was considered by the appraisal team to be an exceptionally good way of accomplishing a Performance Objective or

some part of it. These "Noteworthy Practices" identified by the appraisal team are addressed in Section III of Appendix A. Other DOE facilities are encouraged to adopt the Noteworthy Practices identified when they are applicable to their operations.

This report has been transmitted to the Headquarters Office of Defense Programs and to the DOE Contracting Officer in the Albuquerque Operations Office for action to correct the deficiencies identified.

EXECUTIVE SUMMARY

Buildings 776/777 at the Rocky Flats Plant are major components of the production complex at the plant site. They have been in operation since 1957. The operations taking place in the buildings are nuclear weapons production support, processing of weapons assemblies returned from Pantex, waste processing, research and development in support of production, special projects, and those generated by support groups, such as maintenance.

This appraisal was conducted by a team of outside experts led by a senior staff member of the DOE's Office of Nuclear Safety in January-February 1988. A considerable number of deficiencies were found by the team (Appendix A) that require the attention of the contractor. In evaluating these deficiencies for commonalities, the Office of the Assistant Secretary for Environment, Safety and Health (EH) has identified four major areas of concern: management attention to safety, quality assurance, and the radiological protection and fire protection programs. These are addressed in summary fashion in the next section of this report.

The appraisal team identified nine deficiencies that it believed required prompt attention. DOE management for EH, the program office (Defense Programs, and the field office analyzed the information provided by the appraisal team and instituted compensatory measures for closer monitoring of contractor activities by knowledgeable DOE staff and staff from other sites. Concurrently, the contractor was requested to address both short-term and long-term remedial measures to correct the identified issues as well as the underlying problems. The contractor has provided his action plan, which is included as Appendix B to this report. This plan was under evaluation by EH and the DOE program office at the time this report was prepared.

In addressing the major areas of concern identified above, as well as the specific deficiencies identified by the appraisal team, the contractor and the field office are cautioned to search for the root causes for the problems and to direct corrective actions to those root causes rather than solely to the symptoms to assure the sustainability of the improvements being made. The results of prior TSAs led DOE to conclude that previous corrective actions were not sufficient in that a large number of the individual findings are recurrent. Pending completion of remedial actions over the next few months, enhanced DOE oversight of the contractor is warranted.

MAJOR PROBLEM AREAS

The appraisal team report (Appendix A) identified a number of deficiencies which must be corrected as part of the effort to assure adequate safety at the facility. These deficiencies were identified during a limited period on-site (i.e., a sampling process) and, therefore, are not likely to fully reflect the underlying problem (root cause). The identification of specific deficiencies should be considered as only the first step in a process that must lead to the identification of true root causes and corrective actions that adequately address those root causes. Therefore, solely resolving these concerns and the findings they are based upon, cannot be viewed by the contractor or the DOE Field Office as an acceptable corrective action. The individual findings must be promptly resolved; however, in order to prevent recurrence and to address the underlying issues, a comprehensive remedial action program that addresses the management and programmatic aspects must be implemented.

Our evaluation of the appraisal team report has resulted in the identification of four critically important areas that the contractor must address in his corrective actions. These are discussed in the following paragraphs:

Management Attention. A good share of the deficiencies found by the appraisal team indicates a breakdown in the classical management responsibilities to organize, direct, plan, and assess the safety of the activities. Deficiencies observed include the diffusion of responsibility for safety between line and staff organizations, the mismatch of authority and responsibility for safety, poor communication of safety and health matters up and down the organizational structure, the omission of significant activities and disciplines from the independent safety review process, and the failure of the triennial review system to detect the deficiencies in the independent review process. The preemption of management's involvement in the independent safety review process by the line directive authority exercised by the safety committees, and the large number of repeat concerns from previous technical safety appraisals of Rocky Flats facilities found in this appraisal (39) raises questions regarding management's full commitment to, and/or involvement with, safety.

The pervasive inadequacies in radiological protection, fire protection, and maintenance are indicative of management inattention. This is further evidenced by the appraisal team's categorizing of 41 concerns as involving failure to comply with some aspect of DOE mandatory requirements.

Radiological Protection. The pervasiveness of the deficiencies in the radiological protection program are symptomatic of a program that has not had adequate management attention. Some of these deficiencies reflect inadequate resources while others deal with the quality of the procedures, their enforcement by management, and a general lack of management involvement. For example, radiation monitoring is adversely affected by poor quality instrumentation, inadequate calibration techniques, and improper use of equipment. The radiological health quality assurance

program is ineffective as evidenced by some of the preceding concerns, failure to comply with DOE-prescribed standards, and deficiencies in maintaining exposure records and tracking bioassay samples. Training is implicated by some of the calibration program deficiencies, by improper use of contamination control equipment, and by the numerous violations of radiological procedures observed by the appraisal team.

Fire Protection. The violation of, and in some cases the lack of, fire separation barriers, compounded by the higher than necessary fire loadings and poor housekeeping represent deficiencies requiring swift corrective action. The inconsistencies found in the fire protection aspects of the actual facility from those described in the Final Safety Analysis Report, the possible need for earthquake bracing for the sprinkler system, the need to upgrade the antiquated fire detection/alarm system, and the need to improve egress route markings all are symptomatic of the need for a thorough review of the fire protection program and timely correction of the above and other identified deficiencies.

Quality Assurance. Although the quality assurance program was not separately reviewed by the appraisal team, many of the findings and concerns reported bear on this subject. In general, the lack of a strong and aggressive QA program means that management has no assurance that the work being performed is being accomplished in accordance with requirements. Evaluation of the team's findings indicates that performance in 12 of the 18 criteria of ANSI/ASME NQA-1 is deficient. Illustrative of this is the lack of a document control system; the lack of a QA manager for the Non-War Reserve program and the otherwise limited resources applied to the quality assurance program; the lack of a receipt inspection program and nonconforming item control program; the handling, storage, and shipping problems identified; the problems observed in calibration and control of radiation instruments in the radiation protection program; calibration problems in other functional areas; and the deficiencies cited in the auditing and corrective actions programs. Recognizing this as just a sampling from an appraisal without a specific QA focus leads us to the conclusion that there is a major quality assurance concern.

In addition to the four major problems identified above, there are the 85 specific concerns supported by numerous findings in the team's report to EH. In this regard, it is of interest to note that there is a need for the contractor to develop a critical self-assessment program to identify weaknesses. It is not desirable to rely on EH appraisals to identify fundamental problems. The following paragraphs identify major topics and associated strengths and weaknesses.

A large number of safety-related problems and issues were found during the appraisal, and this is of concern to both the appraisal team members and EH management. Although management policy statements strongly supported safety, the organizational structure, the diffusion of responsibilities, the lack of correlation between authorities and responsibilities, the deficiencies in the oversight program, limited accountability throughout the

entire organization were all contributing factors to most of the identified safety problems. It was the collective opinion of the appraisal team members (and EH management) that contractor management cannot, at present, assure itself that operations and activities are conducted in accordance with current, appropriate procedures and guidance. In response to this situation, seven concerns addressing organization and administration were identified. They dealt with: (1) the need to reorganize the structure and responsibilities of safety management; (2) the need to improve the performance of all safety-related activities; (3) the need to expand the scope of safety-related management objectives; (4) the need to bring the unusual occurrence reporting policies and procedures into compliance with DOE Orders; (5) the need to implement a site-wide quality assurance program; (6) the need to implement a site-wide document control system; and (7) the need to bring the vital record storage vault system into compliance with DOE Orders.

Although the production work in Bldgs. 776/777 was in general performed in a safe and responsible manner, there was concern regarding non-uniformity and misuse of the lock and tagout procedure, and the lack of attention in keeping the building in a clean and orderly status (spotty housekeeping). To the contractor's credit, the operating staffs exhibited a good attitude toward doing their jobs safely, were well trained, and were dedicated to performing the tasks at hand.

The maintenance program lacked the standard industry control and oversight methods necessary to ensure quality work. Work was not scheduled in detail, so the crafts and support for each job were in turn not coordinated or effectively utilized. Work instructions lacked detail necessary to guide work performance. Independent inspection features needed upgrading throughout the process from receipt of materials and parts through the actual job performance to closeout and turnover. The lack of these controls has yielded a large backlog of work which delayed the services of maintenance. Facility material condition and housekeeping were adversely affected by these items, compounded by the lack of a system to indicate that equipment and material deficiencies had been entered into the job control system.

Training at the Rocky Flats Plant was going through a transition from the existing progression/certification programs to a comprehensive qualification standards training program for fissile material handler job classifications. Five areas of concern were identified, dealing with resource capabilities to implement and maintain the current and planned qualification standards training, the job "bidding" provisions and its impact on maintaining a qualified workforce, supervisor training and certification, a more timely implementation of the new radiation worker training course, and incorporating annual emergency training requirements into the existing program and the forthcoming qualification standard program.

Utility systems associated with Bldgs. 776/777 appeared to be operated and monitored satisfactorily. However, storage of hazardous chemicals in the area that supplies most of the room air needs to be evaluated. Furthermore, removal of some air exhaust ducts in past remodeling efforts had left some rooms without ventilation. Gloveboxes with inert recirculating atmospheres

needed a positive non-mechanical pressure relief device to assure safety. Fissile scrap storage had completely filled assigned space. Plans to process this material needed to be expedited.

Improvement in emergency readiness associated with Bldgs. 776/777 was needed in a number of areas. Based on the exercise conducted for the appraisal, the contractor needed to upgrade its exercises to be challenging and effective learning tools. Documented training of emergency cadre members needed to be provided annually as required by the Rocky Flats Emergency Plan. Improvement items identified by exercise critiques and audits needed to be tracked and corrective actions verified. Backup facilities for the Emergency Operations Center and satellite emergency centers needed to be identified in separate wind directions from their primaries. Classification criteria were inconsistent with DOE requirements and needed to be updated. Finally, a positive control system for personnel accountability was needed, particularly for employees and visitors who had unescorted access and were not assigned to the facility.

Because of the diversity of operations in Bldgs. 776/777, the technical support services were also diverse and involved virtually all of the contractor's organizational units. The technical competence, the policies and procedures, and the quality assurance programs of these organizations were good. To assure the continued effective performance in this area, independent audits of these activities were needed.

Packaging and transportation activities were generally good but lacked procedures and standards in some areas. The system of checks and balances for quality (including use of checklists) was weak, as was the paperwork system for control of drum movements and shipments. Drum identification and drum storage methods were serious problems; hydrogen gas generation in some drums could be a problem.

The elements of control which ensure the safety aspects of security and safeguards issues, were in place and working effectively at the Rocky Flats Plant. The security forces incorporated safety issues into day-to-day activities so they were in place for emergency actions. The security forces demonstrated the ability to perform safely with a good level of professionalism. Provisions for access and egress through security control points during emergencies were established and demonstrated.

Experimental activities in Bldgs. 776/777 were directed toward new processes or improvements to existing processes. The Manufacturing Technology Development (MTD) Department was central to experimental activities designed to support operations, which often culminated in plant tests. The approval sequence for authorizing validation or "run-in" tests carried out in plant facilities was not defined explicitly. Formal approval of all experimental tests performed was lacking.

There were significant deficiencies in the facility safety review system. Updated and enhanced committee charters needed to be issued as soon as possible. They needed to ensure that all aspects of the safety program received independent review and audit. In particular, they needed to cover review of new or modified programs or facilities of safety significance. Management needed to be brought into the process and be the recipient of committee recommendations. An enhanced triennial review that covers all

aspects of the safety program and particularly the management systems was necessary for management to be assured that the safety review system was fully effective and in compliance with safety requirements.

The contractor's nuclear criticality safety program is perhaps one of the most structured, documented, traceable, and auditable programs within the DOE complex. However, the observed collective deficiencies in Bldgs. 776/777 indicate that the program suffered from a transient staff of criticality engineers which affected the quality of the applied criticality safety program. There was a need to implement appropriate measures to meet the staffing requirements for a nuclear criticality safety organization as specified in ANSI/ANS-8.1-1983.

Major deficiencies were found in the radiation protection program. In addition to the general deficiencies discussed earlier, the program, as implemented, did not positively ensure or demonstrate that radioactive contamination was controlled within the process areas. In most cases, radiation monitoring instruments were not calibrated and calibration sources were not traceable to the National Bureau of Standards. More than one "calibration" procedure was in use for the same instrument. Some instruments were "field calibrated" by radiation monitoring personnel to read high. Air monitors in Bldgs. 776/777 were not calibrated. The contamination control program was not enforced by management. Some personnel were observed bypassing contamination survey stations and were not requesting survey by radiation monitors before exiting the building, as required by plant procedures. Alpha contamination survey equipment was not properly used by operating staff and radiation monitoring technicians. Exits from the building were not controlled to ensure that all personnel were surveyed by a qualified radiation monitoring technician prior to departing. Radiation levels were not uniformly posted in the workplace. Survey reports were not given to the supervisor responsible for specific areas for the information of his staff.

The personnel protection programs in Bldgs. 776/777 were consistent in scope with the potential hazards associated with the work. However, a total of eight items were identified in which improvements in existing efforts were required to meet the intent of DOE requirements or accepted good practices. Six were specific items in the industrial hygiene program area, ranging from a need to establish routine monitoring programs to enforcing the quality assurance aspects of the respiratory protection program. A deficiency in the occupational safety and health area involved details of the hoisting/rigging safety program. The lack of a positive safety attitude at all levels within the organization was observed; this was judged to be the most significant concern in the personnel protection area.

Upon reading and analyzing these concerns, there are several additional themes that can be identified. Such analysis represents a diagnosis of the symptoms such that appropriate corrective measures can be instituted to deal with the underlying problems rather than solely address the symptoms. In

this regard, a diagnostic assessment should provide a rationale for making decisions in the future as to where resources need to be applied to preclude a recurrence of these problems.

Based upon the observations by the team on-site, a number of concerns were identified related to fire protection, emergency readiness, and the radiological control program. The concerns about adherence to procedures and calibration of instrumentation were particularly worrisome. As a result, DOE management (including EH, DP, and the Albuquerque Operations Office) initiated compensatory measures for the short term to insure worker protection. These measures included:

- o dispatching a high level management team from AL to Rocky Flats;
- o instituting 24-hour per day surveillance by knowledgeable DOE employees to monitor and ensure compliance with radiological procedures;
- o improving maintenance and oversight of radiological monitoring equipment such that only instrumentation that has been properly calibrated was in use;
- o establishing an outside team of independent specialists to assist in developing an improvement program;
- o providing additional radiological instrumentation on-site for use as backup in the event of equipment failures;
- o providing, on an interim basis, professional health physics support personnel from Los Alamos;
- o dispatching high level managers from ES&H to Rocky Flats to review the appraisal team results and the contractor's interim measures.

These short-term actions resulted in expedited measures that provided assurance that the contamination control program is being properly implemented (including personnel, surface and airborne monitoring) until a comprehensive remedial action program for longer term implementation can be developed. The contractor's plan has been received and is included as Appendix B. DOE is reviewing the adequacy of this plan and DOE-ES&H will follow up with DOE-AL on this matter separately.

APPENDIX A

TECHNICAL SAFETY APPRAISAL

BUILDINGS 776/777

ROCKY FLATS PLANT

Report of the Appraisal Team

March 1988

TABLE OF CONTENTS

I.	INTRODUCTION.	I-1
II.	FINDINGS	II-1
	A. Organization and Administration	II-3
	B. Operations	II-21
	C. Maintenance	II-35
	D. Training and Certification	II-53
	E. Auxiliary Systems	II-69
	F. Emergency Readiness	II-83
	G. Technical Support	II-93
	H. Security/Safety Interface	II-115
	I. Experimental Activities	II-123
	J. Facility Safety Review	II-129
	K. Nuclear Criticality Safety	II-137
	L. Radiological Protection	II-147
	M. Personnel Protection	II-179
	N. Fire Protection	II-189
III.	NOTEWORTHY PRACTICES	III-1
APPENDIX A:	Team Composition	A-1
APPENDIX B:	Biographical Sketches of Team Members	B-1
APPENDIX C:	List of Concerns.	C-1
APPENDIX D-1	System for Rating Concerns	D-1-1
APPENDIX D-2	Ratings of Concerns Contained in this Report	D-2-1

ABBREVIATIONS

The following abbreviations are used in this report without definition:

ANSI	American National Standards Institute
DOE	U. S. Department of Energy
DOE/AL	DOE's Albuquerque Operations Office
HS&E	Rockwell International's Health, Safety and Environment Directorate
RFP	Rocky Flats Plant
RI	Rockwell International, the operating contractor for RFP

I. INTRODUCTION

This report presents the results of a Technical Safety Appraisal of Buildings 776/777 at the Rocky Flats Plant conducted by an appraisal team assembled by the Department's Office of Nuclear Safety. The appraisal was conducted during on-site visits January 11-15 and February 1-12, 1988. Appendix A identifies the team members and their assigned areas. Appendix B provides a short biographical sketch of each member.

This Technical Safety Appraisal addresses all operations associated with Buildings 776/777. This building is a major component of the production complex on the plantsite. It has been in operation since 1957. The facility provides direct support to the nuclear weapons production processes in Building 707 in the areas of metallurgical operations, machining, assembling, and inspection. In addition to this weapons production support, there are five other major categories of operations in the facility: site-return processing, waste processing operations, research and development, special projects, and support groups such as Radiation Monitoring, Process Materials Control and Maintenance.

The principal hazards presented by operations in this facility are a fire, the neutron and photon radiation fields to which workers are exposed during direct and near-proximity handling of plutonium and uranium, and the consequences of injection, ingestion, and inhalation which could result from the dispersal of these materials.

Being an operational safety evaluation of an operating facility, this appraisal accepts as a given that the facility and its equipment have been appropriately designed, constructed, and tested. It also accepts as a given that the current safety analysis report adequately evaluates the risks presented by the operation. This appraisal does address, however, whether the facility and its current operations are consistent with those described in the safety analysis report and particularly whether the current operations are being conducted within the bounds of the operational safety requirements established for the operation.

The team's efforts were guided by a set of preestablished Performance Objectives with supporting criteria. This report contains the more significant findings and impressions obtained relative to each Performance Objective. The concerns identified by the appraisal team are located under the Performance Objective felt to be the most relevant to the concern. In many cases, findings supporting the concern can also be found under other Performance Objectives. When this is the case, cross-references have been provided. A listing of all concerns expressed in this report can be found as Appendix C.

A concern addresses a situation that the team member felt either: 1) reflected less than full compliance with a DOE safety and health requirement or mandatory safety and health standard; 2) threatened to compromise safe operation; or 3) if improved, would substantially enhance the excellence of

that particular operation even though that operation was judged to have a currently acceptable margin of safety. Because of this last class of concerns addressing the excellence of the operation, this report contains more concerns than it would if it were the result of a strictly compliance-oriented appraisal. To help the reader, the concerns have been classified in accordance with the guidance found in Appendix D-1. The results are summarized in Appendix D-2.

In some cases, a specific aspect of the facility's operation (an operating practice or administrative approach) was considered to be an exceptionally good way of accomplishing a Performance Objective or some part of it. These "Noteworthy Practices" are addressed in Section III under the subject area to which they pertain. Other DOE facilities are being encouraged to adopt the Noteworthy Practices identified when they are applicable to their operations.

This appraisal is a snapshot in time of the operation being reviewed. As a result, improvements to safety that were planned, or even underway but not completed, will still be identified as concerns if the appraiser felt their successful completion was of sufficient importance to be a concern if they should not be completed.

To assure the correctness and appropriateness of the report's contents, the team took a number of steps: the team's technical advisor and team leader provided extensive written comments on draft versions of the report; the team divided into four review groups to provide detailed critiques to other review group members; each team member validated his findings and concerns with contractor management counterparts; special working groups were assembled to address specific hard-to-treat problems; and, as a last step, the full team spent an entire day addressing the report's clarity and consistency.

The findings and concerns developed by the appraisal team were shared with the managements of Rockwell International (RI), the Albuquerque Operations Office, and the Rocky Flats Area Office (RFAO) in exit meetings held on February 12, 1988. This final report has been validated for factual accuracy with RI and RFAO.

The appraisal team wishes to express its appreciation for the excellent cooperation exhibited by all levels of Rockwell International's management and staff, and for the hospitality and support of the DOE's Rocky Flats Area Office.

II. FINDINGS

All of the Performance Objectives which were applicable to this appraisal are discussed in this section. The findings which follow the statement of each Performance Objective address the more pertinent facts obtained and conclusions drawn: from observing routine operations, emergency exercises, and the physical condition of the facilities; talking with Rockwell International management, technical, and craft personnel; and reviewing policy statements, records, procedures, and documents.

Eighty-five areas of concern are identified in this report, the correction of which would improve the safety of the operations in this facility. Each concern has been rated as to its seriousness in accordance with the system described in Appendix D-1. The results are summarized in Appendix D-2. The findings that serve as the basis for a concern can be found immediately preceding the concern and are identified by the use of an (*). To understand the full intent of any concern, it is necessary to read its basis. However, resolution of the individual concerns will not be sufficient to prevent their recurrence. The underlying issues also need to be sought out and addressed.

The program activities evaluated were found to be conducted in accordance with acceptable operating procedures. However the activities supporting these operations are of significant safety concern. Instances were found where compliance with some aspect of a DOE-mandated requirement is deficient or could be improved, or where a greater level of safety needed to be attained through strict adherence to existing procedures. Other instances were identified where procedural improvements were required, particularly in the calibration of instrumentation.

Of the 85 concerns in this report, 39 address problems that were found by one or both of the earlier Technical Safety Appraisals of Rocky Flats Plant facilities. The appraisal team realized that most of its negative findings are only symptomatic of underlying causal factors. It has made an effort, drawing upon the extensive relevant experience of its members, to identify the underlying causal factors in developing its statements of concern. However, the team recognizes that this effort is at best imperfect because of the time it could devote to the problem and its relative unfamiliarity with the intricacies of the contractor's overall operation. Therefore, the appraisal team believes the contractor needs to treat the findings, and even the statements of concern, as symptomatic of some set of deeper root causes, and to search out and correct those root causes so that there will be reasonable assurance that improvements in the safety of the operation will be sustainable.

Nine of the concerns contained in this report were judged to be of Category II seriousness (see Appendix D-1); i.e., they address hazards of sufficient significance to warrant expedited attention by the contractor. Five of these, all of which deal with the contractor's contamination control program, were being addressed by the contractor while the appraisal team was still in the field. The problems addressed by these five are the need for development of realistic radiological operating rules, the effective enforcement of those rules, and the calibration of radiological instrumentation used for contamination control.

The remaining four concerns requiring expedited attention deal with improved air monitoring capability for airborne alpha contamination, a system to assure that exit routes are marked appropriately and are maintained current, a system which will permit accounting for all casual occupants in the buildings in the event of an evacuation, and establishing and maintaining the integrity of fire barriers within the buildings.

The appraisal team has identified pervasive management conditions which it feels may have contributed to a good number of the deficiencies found. These conditions include: the diffusion of responsibility for safety between line and staff organizations, frequently without concurrent authority, resources, and oversight; and the dominance of programmatic performance goals in management motivation.

A listing of the total set of developed by the Appraisal Team can be found in Appendix C without their supporting findings.

A. ORGANIZATION AND ADMINISTRATION

There are a number of positive safety activities underway at the Rocky Flats Plant (RFP). Senior management is clearly interested in promoting safety and numerous organizational elements have instituted policies, procedures, and directives related to conducting operations safely. Similarly, there are numerous and varied internal audits, reviews, evaluations and monitoring of safety-related activities. Considerable data is collected and analyzed, looking for trends and indicators which can be used by management to identify incipient safety-related problems. There have been items of significant safety improvement, but as will be shown in this report, significant problems remain.

There is a surprising lack of centralized control of safety and quality assurance at the RFP. Although the contractor has been managing the site for over 13 years, there is no centralized procedures and document control; and the management system cannot readily identify which procedures and directives are current and which are obsolete and should be removed from the hands of the employees. Quality control and assurance is decentralized and frequently not used in the Non-War Reserve program area. Management cannot assure itself that operations and activities are being conducted in accordance with current and appropriate procedures and guidance.

Because of the use of special committees, task forces and ad hoc assignments to resolve problems, and because of the extensive delegation of responsibility for safety and safety oversight items to many organizational elements, it is difficult to determine who has responsibility, resources and authority for a specific safety function. As problems have been responded to with these ad hoc or team approaches, managers are assigned staff responsibilities in addition to their normal line responsibilities. In the safety area this appears to have caused management to lose control of routine activities as they gain control of special problem areas.

The result has been a diffusion of responsibility and authority, confusing and inadequate guidance to the workforce, inadequate supervision and independent oversight. This has caused a decrease in the interest, awareness and control of safety at the management and the worker level, as is evidenced by the many safety infractions and questions associated with safe operations and identified in the body of this report.

This section of the report identifies concerns related to the need to: clarify safety responsibility; develop an RFP-wide document management system; analyze the safety-related management direction, staffing and resource needs and improve performance; expand and strengthen the use of safety-related managerial objectives; bring unusual occurrence and vital record storage vaults into compliance with DOE orders; and implement a quality assurance program for all Non-War Reserve programs and activities.

OA.1 FACILITY ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Management should organize and administer the operation to provide for effective implementation of facility activities relating to safety and health.

FINDINGS:

- o Employees performing the work have the primary responsibility to conduct it safely. This view is reflected in Standards of Conduct and the RFP Policy Manual, and it was also supported by the statements of the RI President and the various individual managers interviewed during this safety review.
- o The organizational structure documented in the RFP Organization Manual is clear, and there is a Health, Safety and Environmental organizational unit. The Director, HS&E, has direct access to the President, RI.
- * However, there are examples that the responsibilities and authorities of managers are not always clearly defined and that tasks assigned are not always consistent with the individual's basic duties. There were instances where safety has been assigned specific line responsibilities, also, staff and programmatic responsibilities for safety-related activities have been dispersed into some line organizations responsible for production and operations.
- * The managerial authority and responsibility for safe operations and for the oversight of those operations is not clearly articulated in all applicable RI policies and procedures. The assignment of responsibility to perform important activities is sometimes based upon unapproved documents; there are conflicting assignments of line and staff authority; responsibility is assigned without corresponding authority; safety plans committing line management actions have been submitted without line management concurrence; and those in support positions are assigned responsibility to direct work but they do not prepare performance appraisals of the individuals assigned by them to do the work.
- * Several examples of the above-discussed items include:
 - The FY88 Management Objective #3, which requires an aggressive program to reduce radiation exposure and contamination events refers, for details, to an unapproved document, the Enhanced Radiation Control Plan. Since the plan is undergoing revision, it is still not available.
 - "Lead responsibility" for Objective #3 is assigned to a staff (or support) organization, HS&E, which does not have direct responsibility for the management of the staff that conducts operations, nor does it contribute to the employee

performance evaluations of those that conduct the operations.

- "Secondary responsibility" for Objective #3 is assigned to line organizations without defining what this secondary responsibility means.
 - The Building Managers, as the representative of the HS&E office, submit action plans for the line divisions to accomplish without obtaining the review and concurrence of the operating line management responsible for the work.
 - The safety committees are chartered as management advisory committees, but they also direct and approve actual work items in addition to reviewing work in their areas of assigned responsibilities.
 - The HS&E Director appoints Building Managers based on recommendations from the appropriate General Staff member (RFPM ONM 7-304). Thus the Director, HS&E, becomes responsible for production, quality, maintenance and security, in addition to safety because the Building Manager is responsible for those items. HS&E does not contribute to the performance evaluation of the individuals assigned as Building Managers, even though HS&E appoints them, and by implication, is responsible for replacing them.
 - The Building Manager position is not defined in the hierarchical listing of management structure given in the RFP Policy Manual.
- * Additional findings supporting the Concern below can be found in Section TS.7 and RP.1.

CONCERN:
(OA.1-1)

Many persons charged with oversight responsibilities also have programmatic responsibility for the actions they oversee; and persons with programmatic responsibility for the safety do not always have the authority and resources to carry out these responsibilities.

FINDINGS:

- * The RI safety-related policies, procedures and directives can be, and are, issued by organizations other than HS&E. There is no RFP-wide documentation which describes the hierarchy of RI management directives and which identifies the currently applicable directives. Examples of these items include:
- Policies, procedures and directives for the RI safety and programmatic responsibilities for controlling hazardous and mixed wastes (which are generated in Bldgs. 776/777, among other places) are found in the HS&E Manual, the On-site Transportation Manual, the RFP Policies Manual, the Control

and Countermeasures document, the Best Management Practices Plan, the Waste Management Manual, and the directives being published by the RFP organizational unit identified as the "RCRA/CERCLA Program Office."

- RI policy RFP MAT 19-004, Management of Hazardous and Mixed Waste Materials, directs "...any other department required by virtue of their expertise, shall be responsible for developing and implementing the necessary policies and procedures needed to manage hazardous and mixed waste materials..."
- RI internal audits and this appraisal have found that some of the available documentation is current, some is outdated, and some is in draft form. There is no formal plan in place to consolidate the policies, procedures and directives which the RI internal audits had identified as being current, outdated or in draft form.
- HS&E responsibilities have been found in RI policies in the HS&E Manual, and in the RFP Policy Manual under the Material Section; the Plant, Laboratories, Building and Land Section; and the Medicine, Health and Safety Section.

CONCERN: The above matter is addressed by Concern OA.6-1.

FINDINGS: * The responsibilities and authorities of each manager and employee is defined by policies, by job descriptions, by assigned goals and objectives and by whatever other documented and undocumented means that each supervisor determines is appropriate. Although each document taken by itself is clear, as noted previously, sometimes the assignments conflict with one another. Because there is no master document control list and hierarchial listing, there is no sure way to determine all of the responsibilities and authorities of the managers and employees involved in safety-related activities without reading every procedure, policy and directive issued by RI.

CONCERN: The above matter is addressed by Concerns OA.1-1 and OA.6-1.

FINDINGS: * The appraisal team identified numerous instances where safety-related activities and requirements were not being accomplished. Examples include:

- Maintenance work has been delayed because radiological monitor support for the job was not available (Section MA-6).

- Safety-related work was not given the high priority required by the RI procedures (Section OA.4).
 - Fissile Material Handlers will not complete key qualification training until 1992 (Section TC.1).
 - Procedures or checklists for how to safely combine various chemicals in collection drums for ultimate waste processing were not available (Section AX.1).
 - The Final Safety Analysis Report for Bldgs. 776/777 does not refer to important physical conditions that impact the building safety status (Section AX.7).
 - Building and individual managers tolerate repetitive violations of building radiation and contamination control requirements and good radiation protection practices (Section RP.1).
- * There were many other specific instances observed during this appraisal where important, safety-related activities and requirements were not being accomplished. Virtually every section of the appraisal found significant issues or problems. For details see Sections: OP.3 (lockout and tagging program); OP.4 (personnel safety and housekeeping); MA.6 (timely conduct of safety-related maintenance); TC.1 (qualification standards training); TC.4 (radiation worker training); AX.1 (operator procedures); AX.2 (hazardous and mixed waste storage); AX.4 (ventilation air); AX.7 (engineered safety systems); ER.1 (emergency response deficiencies); ER.3 (emergency response training); ER.4 (backup emergency facilities); ER.5 (emergency procedures); ER.6 (personnel accountability); TS.1 (project audits); TS.7 (transportation safety); SS.3 (emergency evacuation); EA.2 (review of experiments); FR.1 (safety committees); FR.2 (safety committee reviews); FR.4 (annual audits); FR.5 (triennial appraisal); CS.1 (criticality safety); CS.3 (criticality safety qualifications); RP.1 (radiological protection requirements); RP.2 (radiological reviews); RP.3 (radiological protection); RP.4 (radiological procedures); RP.5 (dosimetry); RP.6 (alpha monitoring); RP.7 (bioassay management); RP.8 (calibration); RP.10 (air monitoring); RP.11 (contamination control); RP.12 (ALARA); RP.13 (exposure records); PP.2 (respiratory protection); PP.3 (hazards rating); PP.4 (staff duties); PP.5 (exposure records); PP.7 (occupational safety); FP.1 (emergency exits); FP.2 (fire sprinklers); and FP.5 (fire risks).
- * Additional findings supporting the Concern below can be found in Section OA.4 and TS.7.

CONCERN:
(OA.1-2)

There is no management system which assures the continuously effective performance of all safety-related activities.

OA.2 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Facility management objectives should ensure commitment to safe operation, including enforcement of work practices and procedures.

- FINDINGS:**
- o On paper, facility management objectives state a strong commitment to safe operations. RI policies indicate a strong commitment to enforcement of safe work practices and procedures. For example, the Standards of Conduct and Plant Rules clearly identify a commitment to safety and the intent to enforce safe practices.
 - o The RI President has issued 14 company objectives for FY88. Two of these apply to HS&E. The Director, Safety, Security and Safeguards, has expanded the two safety objectives assigned to his directorship to include 23 specific goals for FY88. Ten of these deal primarily with safety. They are a quote or paraphrase of the RFP Cost Plus Award Goals and Objectives assigned for the first half of FY88.
 - * The next tier management objectives issued by the Director, Safety, Security and Safeguards, and those of the Director, HS&E, contain a mix of measurable and qualitative goals. Examples include: "obtain a 5% reduction in the DOE recordable plant injury rate performance," and "reduce plant statistics for internal and external radiation exposure." The emphasis is on DOE recordable items and not plant safety, and the second item is not quantified so that any reduction could be argued as satisfying the managerial objective.
 - * The Director, HS&E, expanded the goals articulated by his immediate supervisor, the Director, Safety, Security and Safeguards, to include all the safety-related goals provided by DOE in their Cost Plus Award Fee (CPAF) Goals and Objectives.
 - * The RI managerial system recognizes, tracks, and evaluates for senior managerial review the above-discussed safety goals. Managerial goals for safety-related activities set below the Director, HS&E, level are treated as the managerial tool of the manager that sets them. They are not formally recognized in the RI management goals tracking system.

CONCERN:
(OA.2-1)

There are no visibly promoted measurable annual safety-related objectives and managerial follow-up that go beyond those contained in the assigned Cost Plus Award Fee Goals and Objectives.

OA.3 CORPORATE SUPPORT

PERFORMANCE OBJECTIVE: There should be evidence of corporate interest and support for safe operations.

- FINDINGS:**
- o The RI President meets at least once a month with his assigned senior Corporation management. He reported that safety-related items are addressed during these meetings.
 - o The audit finding of the RI office of Audit and Strategic Planning are sent to the Corporation audit office and are discussed further upon the request of the Corporation audit office.
 - o The RI Corporation sponsors a monthly meeting on environmental items (including some safety-related items). RI executives attend this meeting.
 - o The RI Corporation issues Environmental Control Bulletins to all corporate offices, including the RFP. Many of these bulletins have safety-related information. In 1987, they issued 24 bulletins.
 - o Routine RI Corporation audits of RFP do not exist.

OA.4 MANAGEMENT ASSESSMENT

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

- FINDINGS:**
- * There is no single document or manual that comprehensively describes the managerial audit, review, evaluation, and monitoring functions at RFP.
 - * There is no centralized control for assuring that all RI audit, review, evaluation, or monitoring findings are tracked and deficiencies corrected in a timely manner.
 - * At the time of this appraisal, RI management could not identify the total resources allocated to audit, review, evaluation and monitoring, nor could they determine if they are appropriately distributed throughout the organizational structure. A summary of the total audit, review, evaluation and monitoring of safety-related activities was requested but not provided to the appraisal team.
 - * There was evidence that the appropriate offices are not always informed of audit findings and that deficiencies are not corrected expeditiously. For example, in August-September 1986, and again in September-October 1987, an RI audit finding was that many mixed wastes were not in compliance with RCRA requirements. The Resource Conservation and Recovery Act/ Comprehensive Environmental Response Compensation and Liability Act Program Office was unaware of these findings until notified by the appraisal team.
 - * Present resources assigned to conduct independent audits of interest in the safety program are limited. For example, there are five professional safety engineers in the office of HS&E Operations Management, four professional auditors in the Audit and Strategic Planning Office and three professional QA auditors in the Quality Improvement Program Office. A study comparing work load to staffing needs was not available to indicate that an appropriate level of professional staff are available to support the RFP safety audit requirements.
 - * There is a lack of control and oversight such that routine safety-related activities and requirements are not necessarily implemented. Several safety-related examples where management oversight failed to detect problems in routine operations include:
 - Safety-related maintenance items are to be routinely placed in the highest priority. In May of 1986, two work orders were placed to repair air flow across a downdraft table

where air flow is critical to the prevention of inhalation of trichloroethane. The work was rated at low priority and it was not performed for 12 months (and then incorrectly). Also see Section MA.3.

- A utility control room in Bldg. 776 controls the building ventilation air, heat detectors and circulating water. There are no records of instrumentation calibrations of the approximately 160 instruments in this control room.
 - The calibration of monitoring instrumentation and the monitoring of personnel, for alpha contamination, for those persons exiting controlled spaces in Bldgs. 776/777 were not being done on a routine basis.
- * Other sections of this report also deal with audit issues. See sections EA.3; ER.1; FP.5; FR.2; FR.3; FR.4; FR.5; MA.2; PP.2; RP.2; TS.1; and TS.7.

CONCERN: The above matters are addressed by Concern OA.1-2.

- FINDINGS:**
- o There is a system for dissemination of safety information to employees. It includes such items as safety meetings, company news letters, work rules, intraplant TV announcements, and an open door policy that encourages employees to directly contact the RI executive management.
 - o The RFP Master Requirements Index - Management Systems document of November, 1987, identifies that RI policy RFPM MHS 08-110, "Executive Reporting of Accident and Unusual Occurrence," dated November 3, 1986, implements the requirements of DOE 5000.3, "Unusual Occurrences Reporting System" and DOE 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."
 - * RFPM MHS 08-100 does not fully implement the DOE Orders. Deficiencies include:
 - The timeliness requirements of the DOE orders are not identified.
 - Outdated references are used.
 - DOE 5000.3 and 5484.1 are not referenced.
 - DOE requirements on reporting the release of toxic materials; the failure of ventilation systems, fire doors and dampers in radioactive cells; and leaks from pipes, valves, tanks, cells or drums are not addressed.

- Events that result in an estimated loss of property of significant value are not addressed, as required by DOE 5484.1.
- The DOE 5484.1 lost workday reporting requirements or the dollar value criteria for reporting vehicle accidents are not accurately addressed.
- * A sub-tier RI manual, the HS&E Policy Manual, has a policy which refers to DOE 5000.3 and DOE 5484.1. It mostly covers the DOE requirements, but it too has some deficiencies:
 - It specifies that the final report on an unusual occurrence can be issued when corrective actions are initiated or completed. DOE 5000.3 requires corrective action to be completed before a final report can be issued.
 - The policy does not clearly state whether HS&E or the affected line manager will direct the investigation or assign the investigating committee chairman.

CONCERN:
(OA.4-1)

THE RI incident and unusual occurrence evaluation and reporting policies and procedures are not in full compliance with DOE 5000.3, "Unusual Occurrences Reporting System," and DOE 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."

FINDINGS:

- o The RI Quality Assurance (QA) Program has undergone and is undergoing improvement. Based upon applying the War Reserve Quality Manual and a supporting FY87 Quality Program Plan as managerial tools, RI was able to improve its QA performance in the War Reserve program, as evidenced by its Cost Plus Award Fee evaluation in this area rising three levels during one grading period. This approach is now being applied to a Non-War Reserve program.
- * For the Non-War Reserve program, a quality manual has been prepared. A single manager for implementing this QA program has not yet been assigned by the Director, Quality Engineering and Control (the executive with overall responsibility for the program). The responsibility for conducting the audits required by this program has not been assigned. The organizational assignments for the following key program activities identified in the manual have not been made: Control of Processes; Handling, Storage and Shipping; Inspection, Test and Operating Status; Corrective Action; and Quality Assurance Records.
- * Other sections of this appraisal have also identified specific QA problems and issues. For details, see Sections AX.2 (effluent treatment); AX.3 (drum storage); CS.1 (criticality

program); CS.2 (criticality procedures); EA.3 (experiment reviews); FR.4 (annual safety review); MA.3 (maintenance operations); MA.5 (maintenance material); MA.7 (maintenance procedures); PP.2 (chemical control); PP.5 (hygiene procedures); RP.7 (internal dosimetry); RP.8 (calibration); TS.1 (facility modifications); and TS.7 (transportation).

**CONCERN:
(OA.4-2)**

A plant-wide Non-War Reserve quality assurance program bringing together all organizational elements and RI activities of the Non-War Reserve programs does not currently exist.

OA.5 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that positions are filled by highly qualified individuals.

- FINDINGS:
- o RI uses a typical, industrial employee requisition process for hiring new employees.
 - o RI has training and development programs typical of those in use in industrial organizations to help improve the qualifications of its hourly and professional staff.
 - o RI manages its personnel through administrative procedures and controls appropriate for four classifications of employees:
 - Hourly employees
 - Office and clerical employees
 - Salaried/Professional employees
 - Management/Supervisory employees
 - o Job qualification requirements are reviewed, evaluated and revised when deemed necessary.

OA.6 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support facility requirements.

- FINDINGS:
- o RI assembled a task force to develop an organized, documented publications control system. Publication coordinators from most organizational units met on a regularly scheduled basis to coordinate the development of a Plant Publications Administration Manual, issued in November, 1987.
 - * Previous internal RI reviews and audits, as well as external reviews such as prior DOE Technical Safety Appraisals performed at RFP, have documented that an adequate RI document control system was not in place and functioning.
 - * Bldgs. 776/777 "Final Safety Analysis Report," although generally comprehensive, contained errors and omissions that are important to safety considerations. Details are found in Section AX.7.
 - * The Plant Publications Administration Manual provides adequate standards for a plant-wide document control system, but problems remain:
 - The present RI document control system does not meet the intent or requirements of DOE 5700.6B or the ANSI NQA-1-1986 Edition, Quality Assurance Program Requirements for Nuclear Facilities (NQA-1).
 - There is no plant-wide, master publications list identifying current manuals, procedures and directives applicable to the RFP.
 - There is no hierarchical description of the RI managerial documents (policies, procedures, directives, etc.), although Appendix A suggests an incomplete hierarchical listing of documents for major (but not all) organizational elements at RFP. Thus, the order and precedence of guidance, and the relationship of guidance to each other, can not be readily determined and used by the RI staff in executing their assigned duties.
 - Based upon the structure given in Appendix A, several top hierarchical documents, such as a Non-War Reserve Quality Manual and the HS&E Policy Manual have been newly revised. There is no documented plan for reviewing, and updating where necessary, lower tier procedures and directives.
 - Key top hierarchical documents are out of date. For example, the RFP Organization Manual, does not include

position descriptions for the President or for the Director, Safety, Security and Safeguards, nor does it contain a list of current standing management committees.

- * Key responsibilities of the Director, HS&E, (as well as most other key RI organizational offices) are contained in the different policy manuals of many of the RI organizational units. There is no single, documented policy manual source that describes the responsibilities and duties of the key managers at the RFP. RI reported that the Human Resources Office maintains a file of job descriptions for all positions at RFP, including duties and responsibilities.
- * Now that the Plant Publications Administration Manual has been issued, the publication coordinators only meet when they individually feel a need to meet. There is no formal plan or schedule to complete the publications control system, although the individual directing this work effort understands what is required and appears to be fully committed to completing the document control system.

CONCERN:
(OA.6-1)

Rockwell International lacks a complete and effective document control system.

FINDINGS:

- o Three of the five "permanent" classified RI records storage vaults were evaluated. The non-classified records are stored offsite at the Federal Records Service, Denver, CO.
- o RI records storage management has been structured to comply with the DOE 1324 series. DOE 5700.6B now strongly encourages the application of ANSI NQA-1 as a controlling standard for quality assurance records storage.
- * Vital record storage facilities must conform to the requirements of National Fire Protection Association (NFPA).232 (a DOE mandatory standard implemented by RI Policy RFPM MHS 1-001) and the two hour fire rating identified in the preferred standard ANSI NQA-1. See Section FP.4.
- * Inspection of the three vital record vaults disclosed that none of the three met the above stated requirements. Examples of deficiencies noted included: sanitary waste, domestic water, steam, and condensate piping pass through the vault space; electrical conduit not related to the vault pass through the vault space, ventilation ducts that pass through the vault walls do not have fire protection dampers; and a significant fire loading (paper, cloth, plastics) was found in Room 402, Bldg. 777, under the ventilation duct leading into the vault. Records are stored in cardboard boxes on open steel shelving.

- * The DOE 1324 series requires that a primary permanent record be stored separately from a working permanent record. Data retrieval is to be from the working records and the primary records are not to be disturbed except to make new copies of the working records, if necessary. Both primary and working copy records were stored in one of the vaults visited. If RI were to store two complete sets of documents, each in a separate storage facility, that arrangement would reduce their simultaneous exposure to a hazard. Then the facilities would not have to meet these requirements.
- * The RI records storage management official submitted in September, 1986, a request to have the RI Maintenance Department install temperature and humidity controls in the primary records storage vault in Bldg. 777 in order to bring that aspect of the vault into compliance with DOE 1324.1. In preparation for this appraisal, the storage manager inquired into the status of his request. He was advised that the plans and specifications are being reviewed for Davis-Bacon Act requirements. There was no schedule provided as to when the work order would be implemented.
- * Additional findings supporting the Concern below can be found in Sections OA-1 and ER-2.

CONCERN:
(OA.6-2)

The vital records storage vault system is not in full compliance with the DOE Orders, NFPA-232, and NQA-1.

OA.7 FITNESS-FOR-DUTY PROGRAM

PERFORMANCE OBJECTIVE: A facility fitness-for-duty program should identify persons who are unfit for their assigned duties as a result of drug or alcohol use, or other physical or psychological conditions, and remove them from such duty and from access to vital areas of the facility.

- FINDINGS:**
- o On July 3, 1985, RI sent a copy of its fitness-for-duty policy to the union for its information and comment. On August 2, 1985, RI stated that "...we are now ready to implement the program and the unions have been notified." The RI Standards of Conduct identifies the drug and alcohol abuse standards as Items 34, 35 and 36. A brief listing of these rules is contained in the pamphlet Plant Rules, August 1986. A special version is provided to salary employees, and a slightly different version to hourly employees, the differences being that hourly employees are given a point system for each infraction of the rules. One hundred points can lead to dismissal. A single drug abuse violation can result in the assessment of 100 points.
 - o Because the RI policy includes the right to test employees for substance abuse under conditions "...of cause....," RI management believes a number of employees have sought help through the employee medical assistance program (participation in this program is confidential).
 - o RI management and the local union recently went before independent arbitration (Drug and Alcohol Policy Grievance No. 84-1288) in order to resolve whether or not "drug abuse testing for cause" could be imposed. The arbitrator found that RI could institute its proposed policy.
 - o RI has required that all supervisors receive eight modules of industrial relations training. One module of this training covers alcohol and drug abuse. The last training was completed in April 1987, the next training is scheduled for completion by June 1988. At present about 25% of the managers and supervisors have received the latest training module.
 - o RI is scheduling the release of a new drug and alcohol abuse policy, (RFPM MHS 18-305) in order to resolve some issues discussed in their recent arbitration case on the right to conduct drug and alcohol tests for cause (see Grievance No. 84-1288). Notice of this revised policy has been given to the union.

- o It was reported that there will be a notice to supervisors to have them discuss the new policy with their employees (see letter JFM-17(13) draft). Guidance has also been prepared, giving the supervisors an action checklist and information on behavior, symptoms and indicators of substance abuse.
- o RI has not imposed any alcohol and drug abuse requirements on its subcontractors, and RI has not monitored subcontractor performance in those areas. Subcontractors presently constitute a very small percent of the personnel at RFP during a typical workday.

B. OPERATIONS

In general, the production work being performed in Bldgs. 776/777 during the time of this appraisal were being carried out in an overall safe manner. The safety record for 1987 (zero lost workday cases and three OSHA recordable injuries) supports this conclusion.

Throughout the tours and during interviews with the operating staffs, it was determined that the operators exhibited a high level of safety awareness while working in their areas and were skilled at performing those duties in a safe fashion. Supervisors were seen to monitor first-hand many of the operations; this included the emphasis on following procedures and rules, operating as well as safety related.

Procedures and documents governing the behavior of operating personnel were available in the work or nearby office areas. The proper use of operating equipment, operating limit awareness, and worker training all are contributing to the good safety record of the Bldgs. 776/777 operating groups. Movement and control of fissile materials are in compliance with DOE orders.

The facility itself meets the defined Operational Safety Requirements. Plant equipment and status indicating monitors and alarms were seen to be functioning in a satisfactory manner. Most facility work was deemed to be carried out well, except in the use of lockout and tagging procedures, which need to be broadened to control this protective action.

Operating equipment in Bldgs. 776/777 is controlled by local control panels unique to that particular activity. Although some areas exhibit neat and orderly housekeeping, the overall standard of housekeeping was judged inadequate and inconsistent with the housekeeping policy that is defined for this area. Two concerns that appear in other categories in this appraisal report were noted to be appropriate to the Operations section: hoist certification and maintenance support.

The operators in Bldgs. 776/777 are well trained, carry out their work in a professional and conscientious manner and are attentive to the practices which enable doing their job safely. Supervision was noted to be firm in areas of ensuring that proper safety-related information, training, and meetings were available and made use of by the employees. Response to emergency situations were ingrained in the operators' minds based on the appraisers' interviews. However, there were instances noted when health physics rules were violated.

Shift turnovers, although brief and informal seemed to be effective in maintaining the continuity between the exiting and entering work crews and foremen. Throughout the Bldgs. 776/777 area, there was uniformity in alarm indicators and the message(s) that were to be given to the workers in case of an emergency.

OP.1 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable facility operation.

- FINDINGS:**
- o Operations in Bldgs. 776/777 are conducted in accordance with the Production Operations Procedure Manual.
 - o POA-2 (December 1985) of the Production Operations Procedure Manual stipulates that "All Production Operations personnel will carry out their work assignments in a safe manner, taking all precautions to prevent injury both to themselves and to their fellow employees."
 - o On the basis of the industrial safety record compiled by Operations personnel in Bldgs. 776/777 in 1987 (zero Lost Workday Cases, three OSHA Recordable Injuries), the building operations have been conducted in a manner that achieved safe and reliable operation. However, radiation protection is an area in which numerous radiation safety deficiencies were noted. See Section RP.1.
 - o Discussions with a broad cross-section of Bldgs. 776/777 operators in the Operations departments indicated that, on the whole, they are well trained, attentive, and capable. Moreover, they seem to have a good sense of safety awareness.
 - o Direct observations on several different shifts showed that both foremen and operators run the processes from control rooms (or control panels) with skill and confidence.
 - o Access to process areas (including control rooms) is limited by strict security measures to appropriately cleared personnel, whose badges designate their access. In some especially sensitive areas, cipher locks further restrict access.
 - o Discussions with operations supervision at levels from production manager to foreman (plus verification by discussions with operators) indicated that supervision closely monitors operations to ensure that schedules are maintained, that policies and procedures are followed, and that safety rules are enforced. However, other appraisal team members observed violations of radiological protection rules. See Section RP.1.
 - o Direct inspection of shift logs showed that though the entries are cryptic, vital information is recorded for transfer to oncoming shift personnel.

- o Administrative control is imposed by Operational Safety Requirements (OSRs) that form Chapter 7 of the Buildings 776/777 Final Safety Analysis Report (June 1987). Operators monitor those indicators (such as the negative pressure differentials maintained in glove boxes) that assure operation within OSR limits.
- o Operation in the War Reserve (WR) sector is carried out in accordance with the War Reserve Quality Manual (October 1987). In other sectors of facility operation QA plans are in preparation or are already under review.

OP.2 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Operations procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the facility.

- FINDINGS:**
- o The policy on the preparation and use of operating procedures is contained in the Production Operations Procedures Manual. POA-1 (November 1987) of this manual defines requirements and responsibilities pertaining to procedures.
 - o Operating procedures used in Bldgs. 776/777 are prepared by a technical group and implemented by production groups via data sheets and logs and less formal operating documents. Use is made of a revision control system or mandatory internal review system to maintain and verify that required documents stay current.
 - o Virtually all areas visited had vendor manuals as well as OSRs, "M" documents, and the ES&H Policy Manual readily accessible in the work or adjoining office area.
 - o Operating information was observed to be adequate; equipment and tooling unique to the operation being evaluated were readily available.
 - o Bounding of operational variables (example: temperature, configuration, atmosphere, etc.) are identified and support a safe work environment in the operating areas of Bldgs. 776/777.
 - o Practices relevant to the use of procedures as "checklists" varies as a function of the routine or nonroutine nature of the operation and also the complexity of operation being performed.
 - o The use of temporary procedures was not noted in Bldgs. 776/777.
 - o Discussions with the operating personnel indicated that the job break-in was satisfactory. Major changes to processes are discussed with the operators by supervision/engineers and added employee surveillance is given during the initial runs using the new procedures as determined by direct observation and discussions with foremen.

- o Use of trend data in assessing process variable drifts was noted to be logged in some areas with full production flows. Many facilities in Bldgs. 776/777 are used so sporadically that this technique would offer little benefit.
- o Some instances of informal supplemental information posting in the work area (Room 154A, for example) were noted. These postings were not process controlling, were not signed, nor were they dated.
- o A review with the Nuclear Materials Control Staff Accountant verified the adequacy of the records of fissile materials movements within the facility. The records are contained in the computerized Safeguards Accountability Network (SAN). Properly authorized personnel can record movements of fissile materials through the use of their access codes. Others (such as auditors), if so authorized, can access the information in the SAN and can thereby monitor the status of the materials. Instructions on use of the network is documented in the SAN Users Guide (March 1987). The system meets the requirements of audit specified in DOE 5480.5, Section 11.d.

OP.3 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

- FINDINGS:**
- o The policies and procedures relating to facility status controls are contained in the Production Operations Procedures Manual. The primary administrative controls are stipulated in the Operational Safety Requirements (OSRs), which comprise Chapter 7 of the Bldgs. 776/777 Final Safety Analysis Report (June 1987).
 - o An audit of compliance of the facility with the OSRs performed by the Nuclear and Facilities Safety Department in November 1987 showed that the OSR requirements were being met. A review of this audit report by the assigned appraisal team member confirmed this conclusion.
 - o A review of randomly selected operating procedures showed that conditions required for proper operation of each facility unit are included.
 - o The configuration control system is described in the Rocky Flats Policy Manual, RFPM PLB 6-104 (January 4, 1988). This policy statement establishes an Engineering Review Board and a Configuration Management Board to exercise judgment on proposed configuration changes. The scope of their oversight includes specified new projects and changes to existing plant systems with safety, security, or production missions, but excludes such areas as administrative facilities and buildings and grounds.
 - o Discussions with facility production and building managers indicated their responsibility to ensure safe and reliable operating conditions of plant equipment. This responsibility is included in Rocky Flats Policy Manual, RFPM ONM 7-304 (October 15, 1987) on Building Management.
 - o The alarm indicator lights and the instrumentation on control panel boards were observed to be functioning satisfactorily and to provide adequate indications.
 - * An in-depth examination of the lockout and tagging program in effect in Bldgs. 776/777 revealed significant inadequacies. Specifically:
 - Participation by operations management in the lockout procedure is passive. Locks are rarely placed by the equipment custodian, and in the few cases observed, were not accompanied by a custodial "Do Not Operate" tag.

- No logs of locked-out systems are maintained by any administrative unit. Consequently, there is no convenient way to ascertain the status of equipment or utility lockouts at a given time.
- * The procedure on "Lockout and Tagging" (HSE 2.08, February 12, 1987) in the Health, Safety & Environment Manual does not assign an active role in the lockout and tagging process to the equipment custodian. It does call for maintaining a "Lockout and Tag Log" by the supervisor. However, whether this applies to the operations supervisor or the maintenance supervisor is not clear. Moreover, with one exception, no evidence could be found that such logs were being kept.
- * According to a discussion with the Manager, Industrial and Systems Safety Engineering, HSE 2.08 was issued (as a revision to an earlier procedure) in response to Recommendation PP.7-2 of the report of the Technical Safety Appraisal of Buildings 771/774, Rocky Flats Plant (October 1986). This recommendation was made "to assure that the policy for the use of locks and tags is adequate and that a system is developed for positive administrative control and tracking." In the judgment of the current appraisal team, this condition has not been achieved for operations in Bldgs. 776/777.
- * The isolation of equipment is by the lockout and tagging procedure was in some cases observed to be inadequate.
- * The lockout and tagging procedure does not provide for independent verification of the adequacy of the tagout.
- * The lockout and tagging procedure does not require the use of a master index to provide control of tagouts or plant equipment configuration management.
- * The lockout and tagging procedure allows work to be done in a fluid system without tags or locks if the isolation valve is within reach of the worker.
- * The lockout and tagging procedure does not provide for documentation that the organization in charge of the equipment being removed from service is aware of the tagout or lockout.

CONCERN:
(OP.3-1)

The lockout and tagging program requirements do not comply with ANSI Z244.1-1982, American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements (especially Appendix regarding "Procedure Involving More than One Person").

OP.4 OPERATIONS STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Control stations and facility equipment should effectively support facility operation.

- FINDINGS:
- o Lay-out and use of the control panels for operating areas is outlined in the procedure for that operation.
 - o Virtually all control stations for operating equipment in Bldgs. 776/777 were located and laid out in a manner conducive to performing the work in a safe and efficient manner. Many operations with high background radiation had the control panels well removed from the gloveboxes; the very high radiation areas of the radiography group had many interlocks, indicators, and emergency power cut-offs.
 - o Except for a small area in the utilities fan area on the second floor, the plant intercom system was audible to the appraisers.
 - * Although there appeared to be a sufficient quantity of ladders, platforms, fixed hoists, etc., there were several instances of poorly stored ladders and platforms; and deficiencies regarding hoists is noted in Concern PP.7-1.
 - * Based on the number of incomplete jobs noted during the tours and the dissatisfaction voiced by operating personnel, the response of the Maintenance Department to operations' requests seems inadequate. See Concern MA.6-1.
 - o Tours throughout the work areas indicated that identification labeling of equipment was satisfactory.
 - * General housekeeping and cleanliness is fairly good in most areas. However, housekeeping was unsatisfactory in some areas of Bldgs. 776/777.
 - Seven incidents of non-cleanup by the Maintenance Group were noted in the second floor area. This floor had five areas of poor housekeeping that were generated by groups other than maintenance.
 - First-floor surveys by the appraisal team members identified many areas where maintenance had not properly policed the area upon job completion. Operator-generated "messes" were noted in a couple of cases.

- * Some glovebox interiors contained what appeared to be obsolete equipment (Box 371, for example), clutter (Boxes 370 and 459) and unremoved bagged items (Box 462).

CONCERN: The "... general and specific building practices (OP.4-1) pertaining to personnel safety and housekeeping practices..." (per Building Management, RFPM ONM 7-304, Item 1) are not being followed.

OP.5 OPERATOR PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which he is responsible.

- FINDINGS:
- o Section 7.6.1 in the Buildings 776/777 Operational Safety Requirements (June 1987) delineates operator job knowledge requisites.
 - o Interviews with foremen indicate that the operator's foreman judges when his/her on-the-job training is sufficient for an independent operations assignment.
 - o Observation made of representative operators performing various tasks indicated that these workers were very knowledgeable of all aspects relevant to their duties.
 - o Interviews with the operators substantiated that procedural and other (facility, policy, etc.) changes are disseminated to them by their management promptly.
 - o While performing operations in the work areas, radiological procedures were noted to be followed with few exceptions. However, appraisal team members noted numerous violations of these procedures in the overall Bldgs. 776/777 area by operating personnel. See Concerns RP.1-1 and RP.1-2.
 - o Foremen were seen to be in the operating areas quite often.
 - o Workers stated that they received "lessons learned" information from both industry and their own area. However, only one week following a contaminated wound nail puncture in Room 146, nails were seen protruding from wood in Room 146 in a manner which could lead to a recurrence of such an accident.
 - o A sampling of operators questioned regarding their ability to identify unusual or emergency conditions indicated that proper recognition and response would occur.

OP.6 SHIFT TURNOVER

PERFORMANCE OBJECTIVE: Turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

- FINDINGS:
- o Although not noted as a requirement in formal RI documents, the operating groups which have multiple shift operations use the good industry practice of shift turnover meetings.
 - o A two-tiered (foreman-foreman and crew leader-crew leader) information exchange is performed at each shift turnover.
 - o Turnover meetings are very brief and highlight (1) status, (2) unusual facility conditions to be wary of, and (3) information which would clarify potentially misunderstood data on the data sheets or processing travelers.

OP.7 HUMAN FACTORS

PERFORMANCE OBJECTIVE: Human factors considerations should be evident in the design of systems, controls, and displays to facilitate the observation and interpretation of instruments, alarms, and other information, and the operation and maintenance of equipment.

- FINDINGS:**
- o The RI policy which defines the emergency situation alarms is found in the HS&E Manual, HSE 18.02 (April 20, 1987).
 - o All RI operators are certified in identifying emergency signals which include the various types of audio and visual alarms.
 - o Standardization of visual facility alarms seems satisfactory. Some operating equipment may have status indicators different from other similar equipment (vendor choice), but operators in the work area are able to properly distinguish between the different light displays.
 - o "Clicks" in the contamination survey instruments provide audio indication of contamination severity. Most alarms provide an audio indication that some set point has been exceeded (Stationary Alpha Air Monitor, criticality, fire, etc.).
 - o In tours throughout the Bldgs. 776/777 operating areas, consistency of labeling and general uniformity of instruments which supported the safe operation were noted.
 - o The intercom system was audible to the appraisal team members throughout the building, save for an area near some noisy exhaust fans on the second floor.
 - o It was noted that pipes and equipment were displaying identifying markings.
 - o For the most part, floor striping, low head-room clearances, obstructions, safety shower/eye wash stations, etc., were clearly marked. One apparent storage area along a second-floor corridor could have been "lined off" to indicate the obstruction potential.

C. MAINTENANCE

The maintenance program at RFP for Bldgs. 776/777 is adequate to support production. A significant backlog of maintenance work has developed. Backlog reduction can be attained through more effective use of the existing resources. Quality of the crafts personnel and the maintenance management staff is good. Lack of or inadequacies in systems to ensure quality at the working level is detracting from overall maintenance performance, however. Problems with low standards of job cleanup and housekeeping require management attention.

Although documentation exists to control the maintenance and engineering processes for maintenance service, the quality of maintenance at the job site and as reflected in the facility material condition shows need for improvement.

Because the ramifications of the quality of maintenance performance are so important to safety, six areas of concern were raised regarding the effectiveness of the maintenance system. One deals with establishment of capability to schedule job detail for each work period, showing coordination of craft forces and outside support such as radiological monitoring and production. A second is to establish a system of identifying deficiencies that have been noted and entered in the work control system. A third concern is for improvement in the quality of work, cleanup, and housekeeping. Quality of engineering and maintenance support to the crafts personnel in the form of improved material preparations and more detailed work and test instructions is the subject of a fourth concern. Two concerns are in the area of the receipt inspection of materials and the establishment of a system to identify materials or equipment that do not meet standards or specification to assure they are not used in the facility.

A computerized preventive maintenance system is established and undergoing constant improvement and extension of its capabilities. This program has considerable potential, which, when fully realized, can be extended to enhance the equipment history system.

Spare parts, supplies, and special order items are available. Provisions are in place to support the routine and priority material needs of the facility.

MA.1 MAINTENANCE ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

- FINDINGS:**
- o The organizational structure for the Maintenance Department is defined clearly in the Maintenance Procedure Manual (MPM) under the "Organization" section. The organization is defined and discussed and then presented in organization charts.
 - o The responsibilities of each position are clearly defined in section 6.1 of the MPM. Interviews and discussions were used to confirm personal recognition of responsibilities.
 - o Annual performance appraisals are conducted for each individual per Sections 2.3 and 2.6 of the MPM.
 - o Maintenance management uses several reports which summarize the results of selected indicators to assess the effectiveness of the maintenance effort. Typical reports are the Weekly and Four Week Accumulative Maintenance Efficiency and Realization Reports which show disposition of hours and the efficiency based on those hours.
 - * The adequacy of staffing and resources to accomplish assigned tasks is not obvious. A large backlog of work exists, but that may be corrected by possible improvements in management of resources as discussed under the planning and scheduling of work and improved coordination of craft manpower.
 - * Administrative controls are in place to support safety in maintenance activities. Some improvement is necessary for these administrative systems.
 - * The isolation of equipment for maintenance is inadequate.

CONCERN: The above matters are addressed by Concerns OP.3-1, MA.2-1, MA.3-1, MA.5-1, MA.5-2, MA.6-1 and MA.7-1.

MA.2 FACILITY MATERIAL CONDITION

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe operation of the facility.

- FINDINGS:**
- o The condition of mechanical systems and equipment is adequate. Fluid leaks are at a minimum and well controlled. Lubrication schedules are current.
 - o Backlog numbers (and the attendant delay in commencing a new job) vary by craft from a few weeks for most high priority work to approximately one year for low priority carpenter work. Even high priority carpenter work is subject to a delay of five months. Items assigned a safety priority receive special attention and bypass the normal backlogged work, however. The backlog of safety items is acceptable.
 - * A large backlog of identified deficiencies exists in the work control system. These deficiencies detract from the overall condition and appearance of the plant.
 - * Because the large backlog causes delay of all maintenance work, especially routine or low priority work, there is a frustration in identifying such items on a routine basis. This was evidenced by the findings of a systematic, comprehensive walk-down of each area of Bldgs. 776/777 which was made by individual members of the appraisal team. In each area inspected, it was possible to identify numerous items that needed cleanup or repair, or where obvious deficiencies existed. In some cases, the deficiencies had been entered into the work control system but no system exists to show that they have been identified or placed in the work control system.
See Section OP.4
 - * In many cases, a strip of tape or a note attached to a piece of equipment is used to indicate a deficient condition. This is an inappropriate practice.
 - * No system is established to indicate that plant material or equipment deficiencies have been previously identified and have been entered into the work control system.

CONCERN: There is no system to indicate that deficiencies have been identified and entered into the work control system.
(MA.2-1)

MA.3 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and efficient manner to support facility operation.

- FINDINGS:**
- o All maintenance activities are the responsibility of the Maintenance Manager. He responds to all requests for work in support of the facility using the Maintenance Order System described in section 3 of the Maintenance Procedure Manual (MPM). The Maintenance Manager, and the crafts foremen reporting to him, control the conduct of maintenance once work has been identified and placed in the work control system.
 - o The conduct of maintenance is described to some extent in various sections of the MPM. In most cases, the requirement for quality work is stated. There exists, however, poor conformance to the basic requirements of the manual and good standards of work practice as evidenced by the observations which follow.
 - o Maintenance personnel are well qualified, as determined by observation of work and review of work practices. The work produced is of good quality but is adversely affected by inefficiencies in planning (see Section MA.6), the quality of work preparation and instruction (see Section MA.7), and poor housekeeping and maintenance clean-up.
 - o Maintenance personnel receive initial training and indoctrination when they are brought into the organization. Continuing training presently consists only of annual renewal of the Building Indoctrination Training and some special training to treat specific equipment or as determined by maintenance management. For example, a course was recently given to electricians to refresh them in electrical code requirements. All training and indoctrination is documented in individual training records. A formal, documented, continuing training program is currently under development to improve continuing training.
 - o The Maintenance Manager is involved in review of radiation exposure records for personnel in his department. Some consideration is given to the concept of "As Low As Reasonably Achievable" (ALARA). ALARA principles are considered in job briefings and preparation. Job briefings are not routinely used, however, except for major jobs or where a significant radiological consequence is involved.
 - o Monthly safety meetings are held with all crafts personnel. These meetings are used to keep workers aware of current safety issues, lessons learned, and some training.

- * The lock and tag procedure does not provide for independent verification of the adequacy of the tagout.
- * The lock and tag procedure does not require the use of a master index to provide control of tagouts or plant equipment configuration management.
- * Some items were observed to be "tagged out" using modified material transfer tags or with tape, instead of with "Danger-Do Not Operate" Tags.
- * The lock and tag procedure allows work to be done on a fluid system without tags or locks if the isolation valve is within reach of the worker.
- * The lock and tag procedure does not provide for documentation that the organization in charge of the equipment being removed from service is aware of the tagout or lockout.

CONCERN: The above matters are addressed by Concern OP.3-1.

- FINDINGS:
- * Work procedures did not include bolting torques or sequences for flanges. An example was the installation of flanged connections on new waste (pencil) tanks (Project 362222) where no instructions were provided. Further, maintenance does not maintain calibrated torque wrenches in the event torque values are specified. A plant standard does exist in the form of SP-201, "Standard For Process Piping (Glovebox Internal and All External)," dated April 6, 1987, but this was not specified in the job package.
 - * During suspension of work on a system, such as inspection of the incinerator in the Fluid Bed Incinerator area, parts were not captured (nuts, bolts, washers, gaskets, fittings, and blank flanges) and tools were left scattered at the job site. Also, openings to the equipment were not covered to prevent entry of foreign objects or material. Oil, debris, and dirt were not cleaned up. This was observed over a four week period.
 - * Welding permits and work permits (for safety considerations) are routinely used where necessary. The distribution of copies per instructions on the multi-part forms was not routinely made, however. Often, all copies of a multi-part form were at the job site.
 - * Work sites were often not cleaned up properly when a job was completed. An example was the installation of hydraulic tubing on a pump and accumulator for the Fluid Bed Incinerator. Tools, anti-seize compound, fittings, and debris were left at the job for days after the installation. Oil was not wiped up.

- * Tape used on the painted surfaces of Motor Control Center Number Two on the second level of Bldg. 776 had stripped much of the paint from the cabinets, destroying their appearance and preservation.
- * Work sites were found to be unnecessarily dirty and in disarray during maintenance jobs. An example was the job for bearing replacement on the S-9 fan on the second level of Bldg. 776 where work had been suspended with tools and parts scattered about the job site.
- * Maintenance department internal audits, surveillance, and reviews are not effective in identifying the types of problems discussed in this report so they can be corrected. The numbers of deficiencies noted by the appraisal team members indicates that internal systems for identification of plant deficiencies and safety issues are ineffective. See Section MA.2.
- * Section 1.1, Departmental Safety Policy and Program, of the MPM, requires a quarterly inspection of the safety conditions of maintenance shops equipment and work areas. The last inspection was completed in June of 1987 and only noted minor cleanup issues. Discussions with maintenance foremen revealed, however, that they are conducting other informal, undocumented inspections.
- * Additional findings supporting the Concern below can be found in Section MA.5.

CONCERN:
(MA.3-1)

There is no process that ensures the quality of maintenance or work, cleanliness, cleanup, testing, and restoration of normal facility configuration.

MA.4 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to facility operation.

- FINDINGS:**
- o The Preventive Maintenance (PM) program is established and steadily improving. A commercial computerized system supplied by the PMS Company is in service on the RFP IBM mainframe computer. The system is referred to as the Equipment Management System. It is centrally programmed and controlled, but receives input via remote terminal in response to machine-printed work orders for each segment of the program.
 - o The PM program is maintained current. Delinquencies receive high-level management attention and are kept at a minimum.
 - o A continuing program is underway to effect improvements to the existing system and to expand the system to include additional features such as extending it through equipment history.
 - o Some predictive maintenance features are included such as vibrational signature recording and analysis. Some oil analysis is used. Predictive analysis is not yet being used to full advantage, however.
 - o For each PM requirement, a PM procedure is filed at the affected facility for the specifics of the job. The procedure is used in support of the computer-printed work order.
 - o Backlog and status reports are routinely generated and distributed for the PM program. These reports are used to control the program and assess program effectiveness.

MA.5 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

- FINDINGS:**
- o Maintenance facilities for Bldgs. 776/777 maintenance consist of a small electrical/electronics shop in Bldg. 778 and a larger, but modest, shop in Bldg. 776 used for sheetmetal, machining, and pipefitting support. Long-range plans include provision for moving the Bldg. 776 shop to a larger facility in Bldg. 778.
 - o The shops are well-lighted and include adequate equipment.
 - o Other shops provide backup capability for support of work in Bldgs. 776/777. These are the shops in adjacent Bldg. 778 and the central shops at Bldg. 334.
 - o Some storage space for maintenance materials is provided in the shop areas.
 - o Tools were randomly inspected and found to be in generally good repair. No defective tools were found.
 - * The shop in Bldg. 776 was not generally in order. Housekeeping was poor. Some problems are the result of minimal storage capacity and the numbers of workers using the facilities, but most were the result of poor work practice and lack of supervisory review, as discussed in Section MA.3.
 - * Mixing of carbon and stainless steel work was observed in the Bldg. 776 shop. A carbon steel welding job was in progress on the stainless steel bench and stainless steel piping was being worked on the carbon steel bench. The vise on the stainless workbench has no stainless steel jaw covers. Tools for stainless steel work were not segregated. Carbon steel tools were mixed in with the stainless steel parts for the "pencil" tank job (project 362222).
 - * The only maintenance department equipment or instrumentation in the formal standards laboratory calibration system were two electrical instruments for thermocouple calibration. Torque wrenches, micrometers, and dial indicators receive no calibration.

- * A separate area is provided for radioactively contaminated tools, but they are stored in barrels so are not readily accessible. No formal inventory is maintained for these tools.
- * No separate decontamination facility exists for tools. Tools are decontaminated at the job site if it is deemed practical. Often, they are disposed of as contaminated waste depending on their value and the effort of decontamination required.
- * Tool control is not rigorous as evidenced by tools scattered throughout the facility and at job sites where work was completed or suspended. This issue is complicated by the use of "area" tool boxes that are available for various craftsmen to use. The concept of personal responsibility is lacking.

CONCERN: The above matters are addressed by Concern MA.3-1.

- FINDINGS:
- o Materials for use in-plant as routine shop supplies or ordered for specific jobs are ordered by the planners in the Maintenance department or by the crafts foremen.
 - o Provisions and resources are provided for expediting orders when necessary.
 - o Provisions are established for obtaining or fabricating parts for old or obsolete equipment. The ordering people are skilled from much practice.
 - o The spare parts system has been recently centralized and proceduralized. The system is orderly, well organized, and was demonstrated by examples chosen by the appraisal team to work effectively.
 - * Receipt inspection is not required for material orders. In some cases, the person ordering the material inspects it, but inspection is optional.
 - * Purchased material does not routinely receive engineering review for configuration control or for quality or safety requirements.
 - * No independent review is made of intended purchases to establish that standards or specifications used in the order were proper.
 - * No independent review is made of purchased material or parts received to assure the material meets the required standards or specifications.

- * Ordered materials are not classified as safety-related or critical to establish enhanced inspection requirements; i.e., "quality" inspection, of parts for a safety-related system.

CONCERN:
(MA. 5-1)

There is no system for independent receipt inspection commensurate with the quality or safety level of equipment and material orders.

FINDINGS:

- * No system is established to identify defective equipment or material that does not conform to required standards to prevent its use in plant systems.
- * If material which is ordered is not correct for the intended use, no identification system exists to prevent its use in the facility.
- * If a deficiency is encountered during acceptance testing of a new component, no system is established to identify the non-conformance or provide for its correction.

CONCERN:
(MA.5-2)

There is no system to identify material or equipment which does not conform with standards to prevent its uncontrolled use in the plant.

MA.6 WORK CONTROL SYSTEM

PERFORMANCE OBJECTIVE: The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

- FINDINGS:**
- o The Maintenance Department controls routine repair work, preventive maintenance, and approved construction work (referred to as "authorization" work) using a work control system documented in the Maintenance Procedure Manual (MPM), section 3, Maintenance Order System.
 - o All work is requested on a standard form which is routed to the Bldgs. 776/777 Maintenance Manager.
 - o The Maintenance Manager reviews all work requests and commences their disposition by acknowledging his review, assigning a priority, and determining if Engineering is required. He then sends the form to a planner for number assignment. Since safety-related work receives high priority and special handling, it bypasses other routine work.
 - o All work is prioritized as "high," "medium," or "low" and is assigned an expected work date based on the backlog for the priority of the required craft. No work is done without the authorization form being processed.
 - o Planning for work is done in detail with regard to craft hours and material requirements.
 - * Work scheduling is documented in the MPM, section 3-12, Use of Job Assignment Boards, but this system is not used in Bldgs. 776/777 maintenance. The board for the Bldg. 776 shop has been discarded and the board in the Bldg. 778 electrical shop is not labeled per the procedure.
 - * Work scheduling is not accomplished for each job which coordinates the craft-requirements, time required, and each support function required. Instead, the foremen schedule their crafts people off lists of jobs to be completed, using priorities to establish what will be worked next.
 - * Coordination of crafts is accomplished between foremen, who trade people around as necessary, often at the last minute or during jobs.
 - * No system is established to schedule necessary support functions, such as radiological monitor support for a job. This support was noted to be considerable during the appraisal. In several cases, work was suspended while radiological support was not available. The job to install new filters on the oxygen monitoring system was delayed on

two different occasions. The job to modify security doors in the Bldgs. 771/777 tunnel was delayed, and workers were stopped on glovebox 630 lead removal while waiting for radiological monitors.

- * Several cases of poor manpower utilization were noted during the appraisal because crafts foremen waited until the morning of the job to request radiological monitoring support. In one case noted, one foreman needed four monitors. This lack of pre-scheduling imposes a large load on the radiological support department.
- * No short- or long-range detailed schedules exist for the maintenance department.
- * A morning coordination and planning meeting is held by the Maintenance Manager with his foremen at which they make last-minute changes to their plans and interject any high priority, immediate issues. Unfortunately, this meeting takes place during the time the crafts people are preparing to start work.
- * No schedules exist for the next day, the next week, or the long term. No coordination meetings are held with users (production) or support (radiological) to coordinate the manpower loading or job timing. No "plan-of-the-day or -week" type meetings are used for scheduling coordination.
- * Establishment of production equipment and facility system conditions for maintenance is not routinely scheduled or coordinated.
- * Changes to work schedules were not documented or formalized. (This would be a necessary ingredient of a system that controlled work and craft utilization effectively).
- * Post-installation testing and inspection are not coordinated by schedule.
- * The lack of detailed work schedules, which show job, time, crafts, and support, contributes significantly to the problems of controlling the backlog of work. The backlog results in an inordinate amount of delay between identification of a deficiency and the timely correction of that problem using the established systems. Users of the system are frustrated at delays in obtaining services. See Section OP.4.
- * The Production and HS&E Departments do not participate in maintenance job scheduling even though they are the users or are required to supply support for the work.

CONCERN:
(MA.6-1)

There is no detailed work scheduling system which provides, on a time-line basis, each job to be worked with assigned crafts and other support groups.

MA.7 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures should provide appropriate directions for work and should be used to ensure that maintenance is performed safely and effectively.

- FINDINGS:
- o Maintenance control instructions are prepared using the procedures of the Maintenance Procedure Manual (MPM), section 3, Maintenance Order System and procedures for control of engineering functions discussed in Section TS.1.
 - o Maintenance instructions are prepared for use in the field by planners in the appropriate part of the organization, depending on whether the job was planned by the Maintenance Department or after one of the engineering groups completed the engineering.
 - o The documentation and control of pipe weld quality for the waste "Pencil" tank installation (Project 362222) was reviewed in detail and found to be of good quality. Markings, inspection, and records were in order.
 - * The MPM is not included in the RI document control system. See Concern OA.6-1.
 - * For authorization (construction) jobs, "Prekitting" is being used to stage all materials for a given job. The appraisal team endorses such preparation of materials for a job. This system is not effective at this time, however, because the kits do not receive a complete independent inspection and kits do not have to be complete to be sent to the job site (discussed below).
 - * No provision is established for documenting changes to a work package to accommodate necessary changes in the field unless it is an Engineering Order. (The need for this will become obvious when more detail is provided in work instructions).
 - * Few hold or inspection sign-off points are used in work procedures and instructions. The appraisal team expected to find more of those for safety issues such as radiological monitoring review or final inspection of work on safety-related systems.
 - * Most work is accomplished using little to no amplification for the work instructions beyond that given in the requestor's statement of what has to be done. Examples are "troubleshoot and repair as necessary" or "provide material and labor to..." Amplified or detailed work instructions are not routinely used even for detailed work or complex jobs. It is often not specified what materials to use; that decision is left to the foreman or craftsman.

- * The work package documentation for installation of new electrefining equipment in a production glove box (project 480200) consisted of less than four pages of instructions with five inspections (hold points) during prefabrication, installation, and checkout, and four buyoff signatures. This package was considered to have "detailed work instructions" by the contractor. This job was commenced in the facility during the appraisal. During the first four days, four significant problems were noted as follows (in some cases, delay in the job resulted):
 1. Although "Prekitting" had been done for the job, the kit was taken to the work area before all parts were received. The conduit and conduit reducing bushings had not been received. They were among the first parts needed to be installed.
 2. The motor stand assemblies had been prefabricated in Bldg. 334 shops but would not mate to the glove box bolting array.
 3. Some size-six wire had not been supplied. Size-eight wire was supplied instead.
 4. The installation drawings had been prepared showing an electrical junction (pass through) to the top of the glovebox that is no longer used. A safer design has been in use in the field for several years. The pass-throughs that were ordered met the drawing requirements, but will not be installed.
- * The work instruction to fabricate and install one-inch stainless steel piping with a combination of welded and flanged connections to new waste "pencil" tanks (Project 362222) required the pipefitters to layout the piping and spend time making sketches to facilitate in the layout. The package sent to the field included a one-line diagram without detail for such things as dimensions, weld number assignments, bolting sequences and bolting torques. The tanks had been received one-foot longer than intended, so the piping had to accommodate several interferences.
- * No system exists for controlling wire disconnect and subsequent reconnect or the use of jumpers or interlock defeat. An example of an uncontrolled interlock was discussed with the appraisal team which involved the lubricating oil system for the EXCELLO 616 lathe. This problem resulted in damage to a lead screw which represented considerable repair effort.
- * During the appraisal, considerable craft time was noted to be expended on non-craft work including job organization, coordination, finding parts, and clarifying requirements.

- * Maintenance Engineers spend an inordinate amount of time obtaining adequate drawings, technical manuals, and other technical information to support maintenance jobs. No maintenance library is established at Bldgs. 776/777 to provide these items.
- * At close-out of installation of a new EXCELLO 616 lathe, current drawings and technical manuals were not made available to the Maintenance Department for future troubleshooting and repair of the equipment.
- * Testing of completed work is not always formalized or controlled by procedure, nor are test methods or criteria for acceptance specified. An example is the installation of the electrowinning equipment (project #480200) where the final two steps read:

220.0 Leak check entire system.

230.0 Assist in operational checkout.

CONCERN:
MA.7-1

The systems to assure proper preparation of parts and materials and to assure appropriately detailed work instructions for each maintenance task are inadequate.

MA.8 MAINTENANCE HISTORY

PERFORMANCE OBJECTIVE: Maintenance history should be used to support maintenance activities and optimize equipment performance.

- FINDINGS:
- o Procedures for the maintenance history program are detailed in the Maintenance Procedure Manual (MPM), section 5, Equipment Management/Preventive Maintenance Program.
 - o Equipment history records are maintained at present on hard copy filed by equipment identification. Not all equipment is in the system and in some cases the information entered is not of consequence to equipment history (such as entries that indicate machine shop time was used toward a job).
 - o Equipment history records were not audited critically by the appraisal because the longer-range plans for the Equipment Management System includes provision to extend and improve that program to include equipment history.
 - o Extension of the Equipment Management System to include equipment history will provide a historical record for each item of equipment in the Preventive Maintenance system. That link will provide means to upgrade immediately the history files and each record can be extended to include all major work accomplished on each piece of equipment.

D. TRAINING & CERTIFICATION

RI has a well-qualified, professional Training Program Development (TPD) staff, but limited technical trainers in the line organizations. The TPD staff has completed job task analyses for eight fissile material job classifications and is working with technical subject matter experts to develop and implement the qualification standard training program for designated classifications of fissile material handlers. Since the development, implementation and maintenance of the qualification standard program is resource intensive, there is concern regarding the ability to identify and provide the needed resource mix to effectively implement and maintain this new program.

RI still does not have in place a formal supervisor training program. Previous DOE Technical Safety Appraisals made recommendations in this area for Bldgs. 707 and 771.

There is concern regarding the annual retraining and re-examination in job-related emergency procedures and abnormal conditions which needs to be incorporated into existing training.

A major impact to the maintenance of a well-qualified and trained work force at RFP is the job "bidding" provision. This provision is based largely on seniority only, not qualification. Qualified individuals are being "bumped" from their positions by more senior, but less qualified individuals. Some alternative strategies for internal job "bidding" needs to be evaluated and implemented. The DOE Technical Safety Appraisal of Bldg. 707 had a similar recommendation.

RI has a good core safety training program. Courses include: Resource Conservation and Recovery Act, nuclear criticality safety, industrial safety, radiation safety, respirator training, and glovebox training. A sample check of the training records indicated no deficiencies.

A new radiation worker training course is being developed to meet draft DOE 5480.11 criteria. This course should be implemented as soon as possible to correct the content weaknesses of the current course.

Maintenance training requirements are primarily core safety training and building indoctrinations. Only journeymen are hired. RI's Employment Department has begun testing all new hires in their craft knowledge as part of the selection process. Qualification standards are being developed for the electrician, machinist and electrician technician classifications. However, no firm implementation dates have not been established.

RI has an excellent nuclear criticality safety training program. The criticality simulator is an excellent training tool.

RI's remediation program for assisting those employees with learning difficulties is excellent. This program was judged to be a noteworthy practice.

A central training facility is under construction. When completed, the 30,000 square foot facility will provide needed classroom space. Five satellite training centers provide plant-wide core safety training.

Technicians and foreman in the non-destructive test group are all certified to Level II or III requirements as established by the American Society for Non-Destructive Testing.

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

- FINDINGS:
- o The Human Resource Development (HRD) Department has issued RFP Training Administration Manual which defines the training organizational structure, program requirements, responsibilities, standards and interfaces. The Training Development Standards manual outlines the criteria for training material development.
 - o A formal task analysis was completed for all chemical operators, laboratory technicians, radiation monitors, metallurgical operators, security inspectors and internal dosimetry technician job classifications. Based on the analysis results, certification criteria was identified.
 - o The Training Program Development (TPD) staff has a broad range of experience, education, and training in the analysis, design, development, and evaluation of performance-based training programs.
 - o An adequate system is in place to evaluate training program content and instructor delivery skills and subject matter knowledge. The HRD Department attempts to pilot most programs before release for general use. TPD does perform analyses of course evaluations and examination responses and provides this as feedback to course instructors.
 - o An instructor training course to train and qualify subject matter plant instructors is under development. This course will provide instruction in classroom and on-the-job training (OJT) techniques.
 - o Training records are in place which identify who received training and their examination results. However, these records are scattered among several organizations and tracking for qualification purposes can be cumbersome.
 - o Existing progression/certification training programs do not fully meet DOE 5480.5 training requirements. RI is phasing in a program based upon the military's model of qualification standards training. This type of training is very comprehensive and is recognized for producing well-trained, knowledgeable individuals.
 - * Qualification-standard-based training is resource intensive for both development and training. Current development has an extremely wide range of resource requirements making a clear quantitative projection impossible. However, the best estimates are that programs for all fissile material handlers will not be complete until 1992. This is an excessive time

period to be out of compliance with DOE 5480.5. Additional resources for both Human Resource Development instructional design staff and Subject Matter Experts will be required to shorten the development period.

- * There are currently few provisions for instructional staff within the line organization to deliver the completed training packages. These resources must be identified and trained as certified instructors prior to the start of training. They also must be available for ongoing maintenance and administration, as well as for continuous training and recertifications. Instructional staff may be hourly or salaried, depending on specific training requirements.
- * A dedicated technical training staff in Bldgs. 776/777 to implement these qualification standards is not evident. The only exception is in metallurgical operations. For all other groups, the implementation of these programs must be done by existing foremen and professionals. This will impact their other duty requirements.
- * Previous DOE Technical Safety Appraisals of RFP facilities have identified findings and made recommendations to provide sufficient resources to develop and conduct training and certification programs.

CONCERN:
(TC.1-1)

An appropriate resource mix to more quickly implement and effectively maintain the new qualification standard training programs, and at the same time be able to maintain existing job training programs is needed.

TC.2 REACTOR OPERATIONS

PERFORMANCE OBJECTIVE: The reactor operator and reactor supervisor training and certification programs should be based on Standard ANS 3.1-1980 (draft), as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS: o This Performance Objective is not applicable to Bldgs.
776/777.

TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

PERFORMANCE OBJECTIVE: The nuclear facility operator and supervisor training and certification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:
- o Job task analyses were conducted for all chemical operators, metallurgical operators, radiation monitors, and laboratory technician classifications. Based on the results of the task analyses minimum selection criteria standards were established. A letter dated July 31, 1987 (Pauley to Berumen) established more detailed selection criteria for the chemical operator classification. Approval of these requirements by the Employment Department is needed before they can be implemented. This approval has not been obtained as yet.
 - o Review of RI's qualification standard program indicates it will fully address DOE 5480.5 training requirements for the fissile material handler classifications. Implementation of all these programs may stretch into FY94. Draft qualification standards are in development for metallurgical operators and chemical operators in Solid Waste, Recovery, and Non Destructive Assay. Standards for laboratory technicians supporting Bldgs. 776/777 are also being developed. Radiation Monitoring's qualification standard is approved and ready for implementation.
 - o Current training programs provide training in applicable procedural requirements. This training varies in quality and depth of content among the existing programs.
 - o Existing programs require the operators to complete written tests. Passing scores are defined for each course. The minimum passing score for any course is 70%. Some courses, such as Nuclear Safety, require passing scores of 80%.
 - o Safety meetings are the main means of communicating to personnel in-house operating experiences.
 - o Operators, by policy, must re-qualify in their jobs every two years. Observations are that this requirement is not an integral part, nor consistently applied, within the current training structure.
 - o On-the-job training is documented for operators under the current progression and certification training programs. Performance measures for successful completion of the training requirements are not well stated for all the programs. Job skill evaluation is still largely subjective on the part of the foreman or supervisor. Signature documentation is not always as complete as it should be for possible legal concerns.
 - * The Union/RI's agreement on job "bidding" (aka "bumping") rights, based on seniority rather than qualification, is

impacting the effectiveness of those organizations containing fissile material handler job classifications. Approved personnel limits (APLs) are causing personnel to have to "bid" into other lateral or lower classifications. Qualified, less senior people are "bumped" from their positions by less qualified, more senior workers. This is having a "domino effect" of diluting the number of qualified people who can support operations. In January alone, the Bldgs. 776/777 Non-Destructive Test and Analytical Laboratories Support groups lost approximately 15% of their qualified people due to the seniority bidding or "bumping-in" process.

- * Bldg. 707 had findings and a similar recommendation on the seniority "bidding" process, and the problems it can cause.

CONCERN:
(TC.3-1) Alternative strategies are needed that would lessen the current impact of less qualified personnel "bidding" in to fissile material handler classifications.

- FINDINGS:
- o DOE 5480.5 requires annual retraining and re-examination on emergency procedures and abnormal job conditions.
 - * Current training programs do not incorporate annual retraining or re-examination of personnel on emergency and abnormal conditions respective to their job assignments.
 - * Those qualification standard programs in development have not included provisions for annual retraining and re-examination on job related emergency and abnormal conditions.

CONCERN:
(TC.3-2) DOE annual training and examination requirements for emergency and abnormal conditions are not incorporated into fissile material handler training programs and other progression/certification programs as required.

- FINDINGS:
- o Supervisors and foreman are current in required core safety training and building indoctrination.
 - o DOE 5480.5 specifies a supervisor's training program must be established for those who supervise activities relative to the operation or maintenance of a nuclear facility.
 - * A program which addresses and documents required supervisor training is largely non-existent at this point. The Human Resource Development Department is developing a module on "Administrative and Safety Aspects for Supervisors" to partially fulfill DOE requirements. The technical content of the program, above operator knowledge requirements, needs to be developed and implemented.
 - * DOE Technical Safety Appraisals of Bldgs. 707 and 771 had

recommendations regarding implementation of a supervisor certification program.

CONCERN: The certification program for foremen and supervisors does not
(TC.3-3) meet the requirements of DOE 5480.5.

TC.4 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: The personnel protection training programs should develop and improve the knowledge and skills necessary for facility personnel to perform their assigned job functions, while minimizing exposure of individuals to radiation and chemicals to as low as reasonably achievable.

- FINDINGS:
- o Core safety courses are developed, and required safety training by job classification is identified. The core safety program and jobspecific on-the-job training provide training in basic occupational safety, industrial hygiene and radiation safety.
 - o Core safety courses are largely computer-based training (CBT). The benefits of this training strategy include self-paced delivery, flexibility in scheduling personnel for training, and real-time updates of training records.
 - o Resource Conservation and Recovery Act (RCRA) and RCRA job specific training programs are developed and implemented. The state has reviewed the presentation course material, and determined it meets state requirements.
 - o Super Fund Amendment and Reauthorization Act (SARA) training needs to be updated to meet new regulations promulgated in an August 1987 Federal Register announcement. Future SARA requirements will be incorporated into the qualification standard programs.
 - o Visitors and subcontractor personnel must complete, as applicable, the same safety courses that contractor personnel attend.
 - o All building personnel must re-qualify in core safety training every two years. Safety meetings are the most common means of relating operating experience to personnel.
 - o A ten percent sampling of core safety training records for radiation monitors, chemical operators, maintenance, and utilities revealed no deficiencies.
 - o A comprehensive qualification standards program for radiation monitors (RMs) has been written and approved. The program will be phased in per the existing union/company labor agreement. Incumbent RMs qualify under the existing progression program. RMs must complete yearly comprehensive examinations and complete specified hours of on-the-job work experience. Work experience hours are documented on log sheets.
 - o Radiation worker training courses are being revised to upgrade technical content and to incorporate draft DOE 5480.11 requirements. Course materials are scheduled to be developed by September 1988. Training will follow in FY89.

- * The appraisal team members took the CBT Radiation Safety-Pu course. A consensus of the team felt that the course was too shallow in technical content. Follow up discussions with operating personnel in Pyrochemical Operations, Solid Waste, and Non-Destructive Assay indicated a lack of understanding of dose relationships and the biological hazards associated with gamma/neutron exposures, and corresponding internal hazards associated with poor contamination control practices.

CONCERN:
(TC-.4-1)

Training delivery dates for the new radiation worker training program are too lax.

TC.5 MAINTENANCE PERSONNEL

PERFORMANCE OBJECTIVE: The maintenance personnel training and qualification/certification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:
- o The maintenance organization currently hires only craft journeymen. Craft apprenticeship programs are not functional at this time. Written examination of potential new hires is being administered by the Employment Department in their respective craft discipline as part of the selection process.
 - o A training master plan for the Maintenance Department was developed in August 1987 (Drawing No. 900458-001). This plan matrices the current training requirements by building.
 - o Building maintenance training requirements primarily consist of core safety training and building indoctrinations. Continuing training is largely core safety re-qualifications and safety meetings. During the past year, Electrical Code update training was conducted. Vendor supplied training on new equipment installations is also a common practice.
 - o Qualification standard training programs are being developed for electricians, machinists, and electrician technicians. These standards will implement written job specific examinations and formal skill performance evaluations. However, no implementation date for this type of training program has been established.
 - o Training records are maintained by Training Administration & Assessment, the Maintenance Department, and individual foremen. A sampling of selected maintenance personnel core safety training requirements showed no deficiencies.
 - o Stationary Operating Engineers (SOEs) have a qualification program in place. The average building experience level is ten years. The nine SOEs have documented written examinations for job specific qualifications. Only three of the nine SOEs have formal skill performance evaluations documented.
 - o Maintenance procedures contain instruction for working on special equipment. However, no evidence was found that any training or instruction is formally documented.

- o On-The-Job training requirements are not well specified or documented for job related tasks or knowledge.

TC.6 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks.

- FINDINGS:
- o The nuclear criticality safety training programs are delivered by knowledgeable criticality engineers. Six course variations are presented which meet the needs of the respective job classifications.
 - o The new criticality simulator is an excellent training device for demonstrating those concepts of criticality prevention and the effects of a prompt criticality event.
 - o Job-specific checklists are developed for approximately 45 different job classifications. These checklists aid the supervisor in disseminating required job-specific nuclear criticality safety information. However, the checklists do not provide criteria for what are acceptable levels of satisfactory performance or understanding on the part of the employee.
 - o Newly trained personnel in nuclear criticality safety must attend a six months refresher course.
 - o Building personnel participate in annual criticality evacuation drills. These drills are critiqued and results documented.
 - o Criticality Engineering provides monthly bulletins to the building on issues of concern. The staff is available to provide special training as requested.
 - o A technical inaccuracy exists in the presentation course. Neutron dose rates are designated as mR/hr instead of mrem/hr. This is inconsistent with the material presented in the Radiation Safety training.
 - o Only one test version is given with each of the various courses. A good practice is to have multiple test versions to reduce the chances of the test being compromised.

TC.7 TRAINING FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.

- FINDINGS:
- o Satellite Training Centers are established at various plant locations. Each center is manned by a representative from the training organization. These centers house the computer-based training for core safety training programs.
 - o A central training facility is under construction. This 30,000 square foot facility will house the training organization as well as classrooms and training laboratories. Occupancy is scheduled for August 1988. The completion of this facility will greatly enhance the quality of the training environment.
 - o Existing RFP training classrooms rank from excellent to poor. Buildings 776/777 do not have dedicated classroom space. Those multi-purpose rooms where training classes are held do not present a good training environment due to outside noise and cramped space.
 - o The training materials drafted for the various qualification standard programs are well designed and very comprehensive. Operations reference manuals are being developed for each qualification standard.
 - o Existing job-specific checklists for building operators and radiation monitor do not provide guidance to the trainee or instructor on standards required for satisfactory performance. This deficiency will be corrected when the qualification standards are implemented.

TC.8 QUALITY CONTROL INSPECTOR AND NON-DESTRUCTIVE EXAMINATION TECHNICIAN

PERFORMANCE OBJECTIVE: The quality control (QC) inspector and non-destructive examination (NDE) technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:
- o All Non-Destructive Test (NDT) technicians must qualify to the standards established by the American Society for Non-Destructive Testing (ASNT).
 - o With the exception of the two new people in the group, all technicians and foremen are current in their applicable ASNT Level II or III certification training.
 - o Documented work experience and training time-log sheets are maintained and reviewed by management for NDT trainees. Evaluations are conducted every sixty days for those in progression programs.
 - o Seniority "bumping" during January, coupled with approved personnel limit requirements, resulted in a loss of three Level II technicians. This translates into an effective loss of approximately 15% of the buildings' qualified staff, even though the net headcount loss was only one.

E. AUXILIARY SYSTEMS

Auxiliary systems review was involved with engineered safety systems, ventilation, cooling systems, hazardous waste, solid waste and fissile material storage. Liquid wastes from janitor sinks and floor drains are collected, sampled and transferred to Bldg. 374 for processing. No liquid wastes are discharged to the environment from this building.

Gaseous effluents are filtered, sampled and discharged to the environment. Radioactive content of the discharges is below allowable levels. Ventilation control instruments are not on a calibration schedule to confirm accuracy of pressure and flow measurements.

Vital supply systems and engineered safety systems are provided with backup capabilities. They are satisfactorily maintained; however there is a need to better define and identify these systems to assure that they are a part of the preventive maintenance program. The heat removal systems have the capabilities needed to remove heat from process operations and to control humidity in the Zone Two atmosphere.

A program has been established to develop and put into practice methods to minimize the amount of solid waste generated. Environmentally compatible substitutes have been found for certain hazardous materials that were used in process operations. Goals have been established for reducing water usage by developing recycling methods. However, the practicality of using recycled water as feed to some steam boilers needs to be reviewed.

Fissile material is stored properly in three well-controlled vaults. The areas for storage of drums of recoverable scrap are so crowded that inventory, drum movement and proper posting of limits are difficult to perform.

The nuclear materials safeguards measurement control program is well documented. Software aspects minimize opportunity for operator error. Instruments are properly maintained and calibrated. The development of a Confirmatory Measurements Counter to be used throughout DOE is considered a noteworthy practice.

AX.1 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment meets DOE and EPA standards.

- FINDINGS:**
- o Effluent treatment systems were reviewed and found to meet DOE and Environmental Protection Agency standards for release of hazardous materials.
 - o Radioactive liquid waste is collected from floor drains on the second floor, sump pumps, janitor sinks and decontamination showers, sampled and transferred to Bldg. 374 for treatment.
 - o The radioactive contamination of the air that is discharged from Bldgs. 776/777 ventilation systems is well below applicable limits. Auditable records are maintained and reviewed to detect trends.
 - o A program has been started to reduce the amount of solid and liquid waste generated and goals have been established. Progress has been made in reducing solvent use, reducing the amount of packing material taken into the plant and establishing plans and programs to recycle certain aqueous streams.
 - o Waste system operators were observed to be knowledgeable of the procedures and systems used to collect, handle, package, and ship radioactive waste.
 - o Solid materials were observed being surveyed with monitoring instruments to determine whether they could leave the plant area as uncontaminated waste or if they should be treated as low specific activity (LSA) waste. See Concern RP.8-1.
 - o Selective Alpha Air Monitors (SAAMs) will alarm if contamination is released to the room atmosphere. See Concern RP.8-2.
 - o Liquid waste is processed in Bldg. 374 and final liquid discharge is done from there, not from Bldgs. 776/777.
 - * A procedure or checklist for how to safely combine various chemicals in collection drums for ultimate waste processing could not be located.
 - * Existing Material Safety Data Sheets are too difficult and time consuming to use on the process floor.
 - * The potential exists for combining wrong chemicals that can lead to undesirable reactions.

CONCERN:
(AX.1-1)

Readily useable instructions to operators on how to safely
combine chemicals used in Bldgs. 776/777 are not available.

AX.2 SOLID WASTES

PERFORMANCE OBJECTIVE: Solid hazardous wastes should be controlled and handled to minimize the volume generated, and provide for safe storage and transportation.

- FINDINGS:**
- o Operators were observed following written procedures (RFP procedures WO-4034, WO-4033, C01097B and C01084A) for the handling, storage and transportation of hazardous wastes and fissile material. Records are maintained by the waste management group as to which operators have been trained in these procedures so that the operators can be classified as Certified Waste Handlers.
 - o There has been an understanding regarding not taking packing materials into radiologically controlled areas to minimize the amount of solid waste generated. This policy was acknowledged by a January 29, 1988, memorandum. However, there were many cardboard boxes and other packing material present in the plant, as noted on tours.
 - o RI has appointed a program manager to head up a Waste Minimization Program which is seeking ways to minimize waste by reducing the generation rate and by recycling liquids.
 - o RI operates a laundry for recycling protective clothing to minimize amount of solid waste that would be generated by using disposable clothing.
 - * Drums of radioactive and/or hazardous waste are stored in Bldgs. 776/777 in many areas. They are so close together that they cannot be inventoried easily as required by DOE 5480.5, Section 13.
 - * In one room it was observed that the array of drums prohibits changing the pre-filter on the room exhaust duct.
 - * The close array creates a large area of high radiation.
 - * In the basement storage area, drums have been exposed to moisture and are rusting.

CONCERN: The 1992-1993 time frame to reach "current" status for the
(AX.2-1) "Actions to Reduce Drum Backlog" plan for removal of the backlog of scrap stored in Bldgs. 776/777 is excessive.

AX.3 STORAGE AND HANDLING OF FISSILE MATERIAL

PERFORMANCE OBJECTIVE: Fissile material should be stored and handled in a manner which minimizes the chances of loss, contamination, release, or inadvertent criticality.

- FINDINGS:
- o Fissile material handlers have been certified in criticality safety, in handling, storing, shipping and accountability procedures, in radiological safety and in the use of emergency procedures and equipment.
 - o All fissile material in the A and B vaults in Bldg. 777 is stored in shipping drums or in approved racks in accordance with DOE 5480.5, Section 13.
 - o Transfer carts were observed to have fixed holders to provide proper spacing as part of criticality control.
 - o Recoverable material in storage areas in Bldgs. 776/777 is stored in 55-gal drums on the floor.
 - o The nuclear material measurements section has an excellent control program to assure the accuracy and reliability of measurements of fissile material.
 - o Employees interviewed or observed were knowledgeable in procedures for packaging and unpackaging fissile material.
 - o Storage vaults in Bldgs. 776/777 do not meet the criteria of DOE 6430, in the area of physical construction and seismically qualified shelves, although the security of the material and criticality safety concerns are adequately addressed.
 - * There are many problems of drum storage in Bldgs. 776/777. Present storage practices do not comply with DOE 5480.5, Section 13b(8). Criteria and procedures are lacking for determining when, where, and for how long drums may be stored.
 - In addition to storage in designated fenced storage areas and vaults, drums are being "temporarily" stored in unused glovebox areas (e.g., northwest corner of Room 430) and corridors. Additional storage is being set up on the second floor in the utilities area.
 - Very old drums (5 - 15 years old) of recoverable scrap and residues are stored in Room 127 and in its basement, even though Bldg. 776/777 is not supposed to be a long-term storage area. Other drums can be found almost everywhere, including in designated storage areas, in the glovebox area in the northwest corner of room 430, and in corridors in Bldg. 777. At present, Room 127

contains over 1100 drums; the basement has about 290. Considerable drum shuffling is done without specific guidelines or criteria.

- Most drum storage areas were not marked as being radiation areas at the beginning of the appraisal, in violation of DOE 5480.5, but by February 2, all fenced areas had been marked. Unfenced drum storage areas were still not marked at the end of the appraisal period.
- A commonly observed situation found both loaded and empty drums stored together in both working spaces and corridors.
- There were several instances of drum storage blocking access to emergency equipment and information.
- * The drum identification system was found to have deficiencies and problems.
 - The primary drum identification tag is a plastic bar code label. This tag is not fireproof. Metal tags are not used. The plastic bar code gives the RI Item Description Code (IDC).
 - A secondary means of identification is an 8 1/2" x 11" card, either stock number RF46045 for dry material or RF46046 for moist material. This card is secured on the drum lid by the use of yellow plastic tape.
 - An inspection of many drums indicated that the placement of the above card was inconsistent.
- * Additional findings supporting the Concern below can be found in Section TS.7.

CONCERN:
(AX.3-1)

Criteria and procedures for determining when, where, and for how long, drums may be stored need to be established.

AX.4 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration.

- FINDINGS:**
- o The ventilation systems are balanced so that pressure differentials assure that air flows in the direction of increasing levels of radioactive contamination.
 - o Filters in the main exhaust plenum for the room air system are inspected monthly for damage.
 - o The filter plenum for the room air system is monitored monthly for alpha contamination on the downstream side of the filters.
 - o Pressure drop measurements are recorded and plotted to detect trends toward plugging of filters. Filters are changed when the pressure drop reaches two inches of water.
 - o Filters are tested with dioctyl phthalate after installation to assure compliance with ANSI N510-1980.
 - o Review of effluent monitoring records has shown that releases of radioactive contamination are well below acceptable levels.
 - o The process air ventilation system has seven filter plenums, all of which have redundant fans operating off separate electric supply breakers.
 - o Emergency procedures are in place that include use of an emergency generator to provide power to process air fans that keep gloveboxes negative to room air pressure and thereby prevent release of contamination.
 - o Chapter Seven of the Final Safety Analysis Report for Bldgs. 776/777 specifies appropriate bounding conditions. Review of records and control room operations showed that the required tests and measurements are being made.
 - o The emergency generator is no-load tested once each month and also full-load tested once each month.
 - o Air flows can be adjusted and fan switching can be done at the control room.

- * The instruments in the utility control room are not calibrated. On February 4, 1988 eight instruments were put on list of items to be calibrated by Physical Metrology lab.
- * Some room air exhaust intakes were eliminated when the building was modified after the 1970 - 71 time period, leaving certain small side rooms and the corner areas of some rooms without an air exhaust duct. Some doors labeled "Fire Doors" were propped open to compensate for this but that action violates fire protection codes.
- * The process air exhaust systems are running at capacity and are not capable of handling current needs.
- * Effluent sampling devices do not comply with ANSI N13.1-1969 and ANSI N13.10-1974 in the positioning and design of sampling tubes.
- * Additional findings supporting the Concern below can be found in Section TS.7.

CONCERN:
(AX.4-1)

There is insufficient ventilation in each room to assure that all areas have a safe atmosphere. Air sampling does not comply with the ANSI Standards N13.1-1969 and N13.10-1974.

FINDINGS:

- o Zone 2 (room air) is now in a recirculation mode. Air is drawn from process rooms through two banks of HEPA filters and discharged to the second floor. Second floor air, plus fresh air, (equal to 25 to 30%) is supplied to the process rooms in Bldgs. 776/777.
- * Carbon tetrachloride (CCl_4) is stored in a tank on the second floor. This tank is filled by pumping from a large tank located outside the building. The CCl_4 goes by gravity to degreasing operations in the process rooms.
- * A leak in the CCl_4 storage tank or in the piping could release CCl_4 fumes to the process rooms via the recirculated air.

CONCERN:
(AX.4-2)

The storage of hazardous chemicals on the second floor of Bldgs. 776/777 needs safety review.

FINDINGS:

- * Several inert gloveboxes in the Special Assembly area are equipped with recirculating atmosphere systems which are equipped with mechanical pressure relief devices.
- * A crew leader in charge of a recirculating atmosphere glovebox stated that in case of pressurization of that box, the control room would notify the operators. (The control

room operators stated they do not have pressure read-out gauges for individual gloveboxes.) The foreman stated that, as the recirculating system was used only when operators were present, a fail-safe pressure relief device was not needed. It was learned during these interviews that this box had experienced a pressurization during checkout prior to the introduction of radioactive materials.

- * Mechanical pressure relief devices have been known to fail at other sites. They have been replaced with non-mechanical devices (bubblers).

CONCERN:
(AX.4-3)

There are no positive non-mechanical pressure relief devices on inert recirculating atmosphere gloveboxes that can be isolated from the conveyor by a door.

AX.5 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services needed by the facility.

- FINDINGS:**
- o The plant site is fed by 115 kv electrical service from two lines (Boulder and Valmont) from the Public Service grid.
 - o The emergency generator is tested the first Sunday of each month with "no-load" and the last Sunday of each month with "full-load." Review of records indicated that the tests are performed in accordance with IEEE 308-1980 and the applicable Bldgs. 776/777 Operational Safety Requirements.
 - o The operability of the emergency generator was demonstrated on January 23, 1988, when both Public Service lines failed and the generator automatically picked up its designed load.
 - o The emergency generator is backed up by an uninterruptible power supply of storage batteries to maintain operability of control room instruments.
 - o Air pressure is used to operate dampers and valves in the ventilation system. Nitrogen from the plant system is piped into the control line so it can be used to operate the valves if air pressure fails.
 - o Water supply reliability is increased by having a main loop around the plant plus on-site storage.
 - o Operators are trained to bring backup supply systems on line if automatic switching or start-up does not occur. Operators that were interviewed were knowledgeable of control room instruments, data logging and utility systems.
 - o The Plant Test Schedule listing gives the date of last service and due date for next service of vital equipment. It is used as a check-off list to assure that vital equipment items are serviced. The current list, dated 2-1-88, was checked against equipment that is in use and was found to contain some items that have been removed.

AX.6 HEAT REMOVAL

PERFORMANCE OBJECTIVE: The heat removal system should reliably remove heat as required from the reactor or process.

- FINDINGS:
- o Process heat load is generated in the Fluid Bed Incinerator. This load can be shut-off and incinerator cooled by air-flow if chilled water system fails.
 - o An ethylene glycol-water system is used to control humidity and temperature of the room air ventilation system.
 - o Monitoring instruments provide control room operators with temperature of supply and return streams. Abnormal temperatures result in an alarm that requires operator action.
 - o The chilled water systems in Bldgs. 776/777 are cooled by a cooling tower. Cooling tower water blowdown goes to the sanitary sewer line.
 - o Secondary chilled circulating water systems operate at higher pressure than primary system to prevent contamination from getting out of the building to the cooling tower.

AX.7 ENGINEERED SAFETY SYSTEMS

PERFORMANCE OBJECTIVE: Engineered safety systems should be reliable and available to provide protection to the facility when needed.

- FINDINGS:**
- * Air to process rooms in Bldgs. 776/777 is supplied by nine fans. Room air and process air are exhausted through nine filter plenums. These are not interlocked for automatic control as stated on page 7-5 of the Bldgs. 776/777 FSAR dated June, 1987. The control room is manned 24 hours per day, seven days a week. Supply fans are shut down manually when exhaust fans fail.
 - * Some of the load bearing structural steel members were observed as not being covered with a fireproofing material, as stated on page 5-34 of the Bldgs. 776/777 FSAR dated June, 1987.
 - * Ventilation penetrations of fire barriers are not provided with automatic fusible-link fire dampers. On page 7-11 of the Bldgs. 776/777 FSAR dated June, 1987 it states that these dampers are provided.
 - * In Room 452, Bldg. 777 hoods were observed as having far less than 50 linear feet per minute instead of the 150 linear feet per minute face velocity required by the OSR in Chapter Seven of the Final Safety Analysis Report (FSAR) for Bldgs. 776/777 dated June, 1987 where it states that the 150 feet per minute is a minimum requirement.

CONCERN: Operating conditions in Bldgs. 776/777 are not in compliance with the requirements of Chapter Seven of the Final Safety Analysis Report for Bldgs. 776/777.
(AX.7-1)

- FINDINGS:**
- o A preventive maintenance program exists in the Maintenance Department for utility systems. In addition they have a Plant Test Schedule for checking and lubricating vital equipment.
 - o The emergency generator is tested twice each month.
 - o The uninterruptible power supply system is monitored by instrument read-out in the utilities control room.
 - o Maintenance and operating procedures for the utility systems are well documented in the Bldgs. 776/777 Utilities Phase II Training Manual.
 - * Chapter 5.4 of the FSAR for Bldgs. 776/777 lists "Systems Critical to the Safety of the Facility". However, Chapter 5.4 does not cover all the systems which fit the definition

of engineering safety features given in DOE 6430.1A glossary.

- * Some examples of engineered safety systems not identified in Chapter 5.4 of the FSAR are the filter plenum deluge systems, the exhaust duct dampers and the pressure relief devices for recirculating atmosphere glove boxes.
- * Identification of all engineered safety systems is needed so that these items can be placed in the Preventive Maintenance Program and the Plant Test Schedule.

CONCERN:
(AX.7-2)

All engineered safety systems that provide protection to the facility are not identified.

AX.8 COOLANT CLEANUP SYSTEMS

PERFORMANCE OBJECTIVE: Recirculating coolants should be cleaned continuously or intermittently to minimize the buildup of contamination and reduce corrosion.

- FINDINGS:**
- o Process cooling water is sampled quarterly to detect presence of any contamination and any depletion of ethylene glycol concentration. Procedures are in place to direct performance of corrective action.
 - o Cooling water that is contaminated with radioactive material is transferred to Bldg. 374 for treatment as waste solution.
 - o Cooling tower blowdown water is sent to the sanitary waste treatment plant.
 - o The cooling water systems in Bldgs. 776/777 have not had to be replaced because of contamination.

F. EMERGENCY READINESS

The emergency readiness program of Bldgs. 776/777 is well documented and drills are conducted regularly. Procedures are in place for all credible emergencies and building personnel are trained on their use. Effective management of emergency events is provided by the Emergency Director and the Emergency Operations Center cadre. Excellent assessment tools and staff are also utilized.

Six concerns were identified regarding this program. Three deal with training and the mechanics of exercises and drills. The exercise conducted for the appraisal team was not very useful as a learning tool and suffered for a lack of content and on-scene controllers. Though critiques are routinely held immediately following exercises and drills, there is no system to track and verify completion of corrective actions. Initial training of emergency cadre is not routinely provided and some emergency personnel do not receive annual training.

The three other concerns address required procedural items and protection of site personnel. Emergency event classification criteria are inconsistent with DOE guidance and need revision. Backup emergency centers have not always been identified and where they have, they are in close proximity to the primary facility and could be affected by the same airborne plume of radioactivity or toxic material. Finally, the current system for personnel accountability is not adequate for handling visitors and employees who have unescorted access but are not permanently assigned to the building.

ER.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, facility emergency response.

- FINDINGS:
- o The RFP emergency organization is described in the Rocky Flats Emergency Plan and the Emergency Management Handbook. The specific building emergency organizations for Bldgs. 776/777 are defined in Building 776 Emergency Plan and Building 777 Emergency Plan.
 - o The RFP emergency organization effectively integrates the DOE Rocky Flats Area Office (RFAO) and RI, the operating contractor. The authority and responsibility for executive direction and administration are assigned to RFAO, while RI provides the expertise and personnel necessary to carryout emergency activities.
 - o A review of the emergency cadre roster verified that emergency personnel are assigned positions based on their normal day-to-day work responsibilities and their ability to perform under emergency conditions. The responsibilities, authorities, and relationships of emergency personnel are clearly outlined in the above documents.
 - o Approximately 80 emergency cadre positions are defined, each with a primary and two alternates, providing adequate personnel and technical expertise. A number of cadre members, from manager to clerk, were interviewed and found to be knowledgeable as to their responsibilities and authorities.
 - o A small staff of emergency preparedness personnel is housed in the Emergency Operations Center and are assigned the responsibility of maintaining equipment, facilities, and emergency plans. The Building Managers of Bldgs. 776/777 are designated these responsibilities for their respective buildings.
 - * A review of past exercise and drill critiques indicated a number of items that were identified as problems or deficiencies. Some of these items were assigned to individuals or groups for corrective action, while others were left unassigned.
 - * Improvement items are also identified through internal and external evaluations and appraisals. Currently no system nor procedure exists which permits emergency management to track these items to completion and verify the corrective actions.

CONCERN: There is no method to track and verify correction of
(ER.1-1) emergency response deficiencies and improvement items.

ER.2 FACILITY EMERGENCY PLAN

PERFORMANCE OBJECTIVE: The emergency plan and its supporting documents should provide for effective response to abnormal conditions.

- FINDINGS:
- o Facility emergency guidance is provided in the Rocky Flats Emergency Plan, the Building 776 Emergency Plan, and the Building 777 Emergency Plan.
 - o These documents are developed based on the requirements of DOE N 5500.2 and DOE 5500.3.
 - o Additional specialized emergency procedures exist for Bldgs. 776/777 response teams and site-wide response teams within the Security, Fire, Maintenance, Operations and the Health, Safety, and Environment organizations.
 - o RFP and building emergency plans are kept current through a controlled distribution system. A review of records indicated the document owners, their copy number and location, and receipt and replacement of any updated information.
 - o Plans are required to be reviewed at least annually and updated as needed. The current emergency plans are new (dated 1987) with only one update for the Building 776 Emergency Plan having been distributed.
 - o The Bldgs. 776/777 emergency plans and procedures are thorough, usable, and provide guidance for credible accidents. Notification of onsite response teams, response to alarms, evacuation of building personnel, accountability, access control of evacuated areas, and re-entry and recovery are clearly outlined.
 - o The Rocky Flats Emergency Plan describes onsite and offsite support organization agreements and the notification process. Specific notification procedures and forms are provided in Emergency Operations Center procedures.
 - o It was noted that notifications were timely and appropriate during the February 5, 1988 emergency exercise conducted for the appraisal team.
 - * Emergency procedures are not controlled. Emergency plans are controlled by the emergency preparedness staff or by the Building Manager, not by an RFP document control system. See Concern OA.6-1.

ER.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

- FINDINGS:
- o Emergency response training is provided in various ways including: participation in drills and exercises; normal day-to-day position certification; and special emergency response training.
 - o Annual building exercises are conducted at all major facilities. One site-wide exercise was conducted during 1987 and at least four site-wide exercises will be held during 1988.
 - * Emergency training for Emergency Operations Center (EOC) personnel is the responsibility of the emergency preparedness staff. This training has primarily been provided through exercises and occasional lectures. No initial training was documented, though training sessions are now being planned for the new EOC.
 - * Training for building and support organization response personnel is the responsibility of the respective managers. Through interviews with emergency cadre members it was learned that this training is inconsistent between groups - some very good, others none at all - and not routinely documented.
 - * It was observed that due to the large size of the emergency cadre, approximately 200 people, and the frequent turnover and adding of new members, at least 20 to date in 1988, that initial and annual training is not done.
 - * Training records for each EOC cadre member are not kept.

CONCERN:
(ER.3-1) Initial training for all new emergency cadre members and annual training for all members is inadequate and undocumented.

- FINDINGS:
- o An emergency exercise was conducted on February 5, 1988 as part of the appraisal process. In general the response was timely and appropriate.
 - * The following areas of concern were identified by the appraisal team evaluating the exercise:

- Many individuals, in addition to those that had a need to know, were aware of the exercise time and scenario. Building supervisors were observed reminding employees to don their respirators when the fire alarm sounded just before the exercise began.
- Emergency cadre members began arriving at the EOC eight minutes before the ringdown phone requested them to report.
- Confusion existed at the event scene as to the size of the fire, where the injuries were located on the victim, their extent, and contamination levels due to the lack of an on-scene controller.
- Command and control was not demonstrated at the Emergency Control Station. Emergency responders appeared to function independently.
- EOC personnel did not consider compounding events and other potential problems since they already knew the scenario (the real emergencies, a fire alarm and an injured person, that occurred during the drill added this element and demonstrated their competence).
- Critiques held following the drill were not of uniform quality - some excellent and some poor.
- The drill scenario was so elementary that it did not appear to be an effective learning tool.

CONCERN:
(ER.3-2)

Emergency exercises and drills that are challenging and effective learning tools are not being conducted.

ER.4 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support facility emergency operations.

- FINDINGS:
- o The Emergency Operations Center (EOC), located on the second floor of Bldg. 111, houses the Shift Superintendent (Emergency Director) and the emergency preparedness staff on a daily basis and is always ready for emergency use. When activated it houses the Crisis Management and Information Management Teams in minimally adequate space.
 - o The EOC location is convenient to emergency cadre responders and close to resource materials. A new EOC in Bldg. 115 will be operational in April 1988.
 - o The Emergency Control Station (ECS), or on-scene command post, is setup by the Emergency Director in close proximity to the emergency event. The Emergency Director carries necessary emergency equipment with him.
 - o The Bldgs. 776/777 emergency headquarters are the Building Managers offices where they maintain emergency plans, procedures and necessary equipment. Upon evacuation, they bring this material with them to the ECS.
 - o Emergency equipment and supplies for Bldgs. 776/777 were verified as being present and operational in an emergency cabinet in the 559 trailer. Materials are inventoried, replaced when necessary, and checked routinely. All instruments have current calibration stickers. Additional materials are available in nearby buildings.
 - o Support organizations send representatives to the EOC and ECS and setup their satellite headquarters. Emergency equipment, supplies and communications necessary for accident assessment, personnel monitoring and meteorological evaluations are present at these locations.
 - o Six emergency dosimeters are carried in the Emergency Director's vehicle and a limited supply is available in the area. These dosimeters are not calibrated or tested routinely. See Concern RP.5-4.
 - * Alternate EOCs are housed in Bldg. 121 and Bldg. 331, both of which are located in the same wind direction as the primary EOC, and are vulnerable to radiological and toxic material releases. The new EOC is HEPA filtered but is still vulnerable to toxic gas releases.

- * The satellite emergency centers are facilities with no designated backups. Interviews with satellite managers verified that these unprotected facilities would have to be evacuated if a radiological or toxic material release comes towards them.

CONCERN:
(ER.4-1)

Appropriate backup facilities for the Emergency Operations Center and the support satellites have not been identified.

ER.5 EMERGENCY ASSESSMENT AND NOTIFICATION

PERFORMANCE OBJECTIVE: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

- FINDINGS:
- o The Rocky Flats Emergency Plan is integrated with the State of Colorado emergency plan to coordinate emergency efforts, assessments and protective response recommendations. Interviews with the Colorado State Division of Disaster Emergency Services indicated that they are pleased with the RFP participation in annual exercises and that their working relationship is excellent.
 - o The Terrain-Responsive Atmospheric Code (TRAC) has been developed at RFP to assist in assessment of airborne radiological releases. This model takes into account the unique meteorology and wind conditions of the Rocky Flats site.
 - o Interviews with emergency assessment personnel verified their expertise and experience in assessing hazards. Maximum release values are based on information contained in safety analysis reports. As better information becomes available, it is used for assessment. Hazardous material assessments are based on chemical inventories.
 - o A computerized log of ongoing events and responses is kept by the Historian and utilized by most EOC participants. In addition, actions and requests are documented on emergency action forms and maintained in the emergency event file.
 - * Emergency classification criteria in the Rocky Flats Plant emergency plans and procedures is not consistent with DOE N 5500.2 (2/26/87) and DOE 5500.3. RFP classification corresponds with State guidance and differs in offsite release criteria.
 - * In communicating with DOE/AL or DOE/Headquarters, this classification inconsistency could cause confusion and result in an inadequate emergency response.

CONCERN: DOE-required emergency classification categories for all
(ER.5-1) communications with DOE/AL and DOE/Headquarters are not being followed.

ER.6 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: Personnel protection procedures should control and minimize personnel exposure to hazards during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

- FINDINGS:
- o The Radiological Emergency Procedures document the exposure limits for saving a human life or protecting vital equipment, and the formal requirements for volunteering and receiving management approval. These limits are in conformance with DOE 5480.1A Chapter XI requirements.
 - o All first aid supplies and treatment are provided at the medical facility, except for emergencies, where emergency medical technicians and/or medical professionals may report to the scene. The medical facility is open 24 hours a day, 7 days a week, and staffed by competent professionals.
 - o Simple decontamination of unbroken skin is handled by radiation protection personnel at the facility. More complicated decontamination involving wounds, cuts, eyes, or cases not responding to simple washing are referred to medical. Procedures and limits have been established for decontamination activities.
 - o Instrumentation for measuring exposure to toxic materials is readily available from industrial hygiene.
 - o Sufficient personnel dosimeters are readily available and can be readout onsite in approximately one hour.
 - * Radiation monitoring instruments are available in emergency supply cabinets and surrounding facilities to handle emergency events. These instruments have calibration stickers, but their calibration is inadequate. See Concern RP.8-1.
 - * Exit routes are generally marked by arrows on the floor. Arrows are not visible from all areas and the second floor is not marked. See Concern FP.1-1.
 - * A manual system for personnel accountability is in place and past criticality drills indicated that it has worked effectively. During the appraisal it was noted that visitors or employees with unescorted access (casuals) were requested to sign in and out of the building in the Building Manager's office. This procedure is not enforced and thus, there is no positive control. Casuals would be difficult to locate or account for during emergencies.

* Accountability was not demonstrated during the February 5, 1988 exercise.

CONCERN:
(ER.6-1)

The personnel accountability system does not provide positive control of casual building occupants.

G. TECHNICAL SUPPORT

Technical support is provided to Bldgs. 776/777, primarily by support operations, quality engineering and control, and safety, security & safeguards. The groups are adequately staffed with experienced and skilled personnel, are well supervised, and are governed by a comprehensive set of policies and procedures.

Facility modifications are performed by a team that includes a project engineer from facilities engineering, a project administrator from facilities project management, the user, and representatives from HS&E and fire protection. Because minor deficiencies were noted, audits appear to be warranted.

The new War Reserve Quality Manual and the recently completed Non-War Reserve Quality Manual, awaiting DOE approval, are comprehensive and consolidate information from many earlier quality program procedures. These manuals address the requirements of the ANSI Quality Assurance Program Requirements for Nuclear Facilities and the Quality Control Policy of the DOE Albuquerque office.

Performance of operations in Bldgs. 776/777 is monitored by quality engineering and quality laboratories, and inputs to the operations are monitored by nuclear material safeguards. The statistical data generated and the trends established are reviewed weekly, and any deviations from the quality limits are investigated and corrective action is initiated. Manufacturing Technology Department monitors DOE and industry developments and establishes programs to develop new and improved equipment and procedures.

Effluents from Bldgs. 776/777 are restricted to the air that passes through multiple banks of high efficiency filters. These are a small fraction of the RFP release to the atmosphere, and these are in turn, a small fraction of the allowable limits. Liquid and solid effluents from Bldgs. 776/777 do not enter the environment except for some condensate overflow. New programs have been established at RFP to meet the new federal resource conservation and environmental liability regulations and to minimize the waste generated within the entire site.

RI's program for packaging, materials handling, and transportation (PMHT) has a reputation throughout DOE for excellence. This appraisal largely confirmed that reputation. The on-site and off-site (out-of-building) part of that program is closely managed by the Traffic Department. Written procedures are extensive, and most of them are current, although not well-tied together. Consolidation of those procedures into a single plant-wide transportation manual is planned. Complete records are kept of shipment activities. The regulatory compliance records is excellent. Loading and tie-down practices are reasonable, although undocumented.

Materials movement activities within Bldgs. 776/777 have also had a good safety record, although the paperwork backup for procedures and records is not as comprehensive. In general, good work practices were observed in materials movement.

RI irregularly audits the on-site and off-site activities to some extent, but the Bldgs. 776/777 activities go largely unchecked by independent auditors.

All persons involved in PMHT are trained and certified, and recurrent training is regularly conducted and monitored.

The quality assurance program in PMHT is not well documented, and lacks a visible checks and balances system, but appears to have been adequately effective in the past. With the growing collection and storage of drums in Bldgs. 776/777, this is a weak spot that needs some additional emphasis to bring it into compliance with DOE orders. A fuller use of a uniform working checklist system would bolster that weakness.

The drum identification, handling, and storage problem in Bldgs. 776/777 is probably the facility's most significant weakness in its PMHT program. Instant recognition of the various drum content categories is almost impossible. Short-term (30-45 days) storage of drums appears rather helter-skelter, and often extends beyond a reasonably short time period. Paperwork is often incomplete.

Hydrogen gas generation problems may exist in Bldgs. 776/777, especially in the basement storage area. Movement of drums into and out of that area under present procedures could be risky.

TS.1 FACILITY MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by the facility to execute modifications should be carried out in accordance with sound engineering principles.

- FINDINGS:
- o Technical support to Bldgs. 776/777 is capably provided by many organizations including Support Operations; Quality Engineering and Control; and Safety, Security & Safeguards. Personnel are experienced, skilled, and well trained.
 - o Procedures for facility modifications are detailed in the Facilities Engineering and Project Management Policies and Procedure Manual and the Facilities Engineering and Facilities Project Management Training and Reference Manual. These manuals are generally current and widely available. Five new procedures are being prepared and eight existing procedures are being revised to comply with the Design Control section of ANSI NQA-1-1986 Edition, Quality Assurance Program Requirements for Nuclear Facilities (NQA-1), a reference standard of DOE 5700.6B.
 - o The policies and procedure manual of the above finding specifies use of the environmental, safety, & health standards required by DOE 5480.4, Attachment 2 and establishes a system to identify and use all appropriate industry standards for facility design. Design codes and standards most commonly used are reviewed by the issuing group at least once a year.
 - o Facility modifications are managed by a project team that includes a project engineer from Facilities Engineering, a project administrator from Facilities Project Management, and the user as a minimum. Representatives from HS&E and fire protection attend team meetings, as needed. The team meets as needed and signs off on a design review record that has a variety of checklists and criteria before the project goes into construction. Sixty-one projects are currently being conducted in Bldgs. 776/777.
 - o A project file index and records checklist is used to organize and index the project files from inception, including history, through authorizations, engineering documents, cost estimates, schedules, procurement, construction, to the placement of original drawings updated to as-built in the vault.
 - o A system exists to ensure that all as-built drawings are reviewed for accuracy and completeness and a tracking system exists to ensure that as-built drawings are issued within 90 days of job completion. The recently completed projects for Bldgs. 776/777 were checked, and the two projects for which as-built drawings were required were in Compliance.

- o The full support operations management, with representation from procurement and accounting and finance, review all projects monthly in a four hour program review meeting. A conference room is maintained as an "Action Center" with status boards that are regularly updated from computer generated status reports.
- * Six projects of varying complexity and age were audited from inception through design and construction to completion or current stage, including review of files, discussion with engineers and final users, and field observation. The results were mixed.
 - The project files were well documented with project committee reviews and sign-offs in place for each state of progression.
 - One young project and one nearly completed project were both going well as judged from the files and from interviews with the user.
 - One project in the construction phase had inadequate field drawings and significant field changes specified by the project engineer without formal change orders.
 - One project (a maintenance work order for an air ducting change) had not been executed properly in the field, and this was discovered only in the investigation of an incident.
 - Safety reviews were performed on the projects by the safety representatives who are part of the project design teams. NQA-1 requires an independent safety review. See Concern FR.2-2.

CONCERN:
(TS.1-1)

There is no system for independent audits of facilities modification projects that span the range from project initiation to final project close-out.

TS.2 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Technical support organization and administration should ensure effective implementation and control of technical support.

- FINDINGS:
- o The technical support organizations addressed in this section include Facilities Engineering, Facilities Project Management, Quality Engineering, Quality Laboratories, Product Acceptance, Environmental Management, and Manufacturing Technology Development.
 - o RI has a comprehensive policy manual that defines management relationships, responsibilities, and authority, specific responsibilities, and functional responsibilities for each major management position. Each directorate has manuals for policies, procedures, reference, and training that are specific to its operation.
 - o Most incumbents are both experienced and well trained. For example, four of the eight technical personnel in the Quality Engineering group that supports Bldgs. 776/777 operations have quality control engineer certificates from the American Society for Quality Control.
 - o Individual performance is appraised annually. Employees are encouraged to continue their education at local colleges and universities and are frequently sent off-site for special training.
 - o The quality assurance responsibilities are shared by the Quality Engineering & Control directorate and the Facilities Inspection group of Construction Management & Inspection. The latter has quality assurance responsibilities for all design and construction activities and the former for all other quality assurance activities.

TS.3 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, and should be effectively used to support safe operation of the facility.

- FINDINGS:
- o A comprehensive Final Safety Analysis Report (FSAR) for Bldgs. 776/777, containing 14 sections and three appendices, was issued in June 1987. The report is site specific and draws from the RFP interim Safety Analysis Report prepared for the entire site. The document is praiseworthy in its scope and detail. However the appraisal team noted some significant discrepancies between the FSAR and the actual Bldgs. 776/777 conditions. Among these are: 1) process air is not interlocked for automatic control (page 7-5), 2) some load bearing structural steel members were not fire proofed (page 5-34), 3) automatic fusible-link fire dampers are not provided for all fire-barrier ventilation penetrations (page 7-11), 4) some hoods did not have the required 150 linear feet per minute face velocity (page 7-8), and 5) the diesel fuel supply system (page 5-29) did not include the fuel supply system for the fluidized bed incinerator.
 - o Facilities Engineering and Project Management procedures are controlled for preparation, review, approval, and revisions by procedures ADM-1, "Engineering Procedures" and ADM-2, "Procedures Manual." All Facilities Engineering, Facilities Project Management, and Construction Management and Inspection procedures receive extensive reviews by all management within those groups.
 - o Procedures are clear, concise, and contain adequate information for users to understand and perform their activities effectively. Where possible, training and reference manual procedures are written in chronological order and clearly distinguish actions by different groups. A reference section in each procedure cross references documents and procedures in other manuals that affect the procedure.
 - o Procedures are readily available throughout the support organizations. Discussions with many engineers included discussions of procedures. When a question arose, a procedure manual was almost invariably on the shelf or only a few steps away.
 - o A project record management plan requires that project records and drawings be permanently maintained. A Project File Index and Records Check List is used to organize and identify the contents of a file. After project completion

- o The analytical chemistry laboratory supporting Bldgs. 776/777 operation that is part of Quality Laboratories under the Quality Engineering & Control directorate has just implemented a quality assurance program that has consolidated a variety of programs and procedures throughout the laboratory into a consistent set of quality assurance guidelines for all quality laboratories. This program, for which a manual has been prepared and a coordinator appointed, has improved and standardized analytical chemistry quality assurance practices plant-wide, ensured confidence limits for analytical data, improved the quality assurance audit trail and established an internal audit program.

TS.5 EVALUATION OF OPERATING EXPERIENCES?

PERFORMANCE OBJECTIVE: Industry and in-house operating experiences should be evaluated by technical support analysts and appropriate actions taken to improve facility safety and reliability.

- FINDINGS:
- o The Manufacturing Technology Development department of the Production Operations directorate has primary responsibility for developing or identifying equipment to improve facility safety and reliability. This group has experts in materials, fabrication, and joining technology and is responsible for the introduction of ion sputtering, and laser and electron-beam welding techniques.
 - o Both production and manufacturing technology personnel exchange information on operating experience with their counterparts at Los Alamos National Laboratory, Savannah River Plant, Mound Laboratory, Lawrence Livermore Laboratory, Hanford Site, and Sandia Laboratories. Manufacturing technology personnel also stay current with industrial equipment development that would be applicable to Bldgs. 776/777 production processes.
 - o The Quality Engineering department evaluates the production processes on a continuing basis and provides statistical data and trend analyses to indicate when corrective actions are necessary, and evaluate the effectiveness of the corrective action.
 - o Weekly meetings are held among the production personnel, quality assurance personnel, and manufacturing technology development personnel dealing with war reserve production, to review operating experience, quality trends, and equipment developments.
 - o The Industrial and Systems Safety Engineering quarterly report summarizes the Defense Programs Unusual Occurrence Reports (UORs). Copies of the complete UORs are sent to the departments to which any are specifically relevant.

TS.6 ENVIRONMENTAL IMPACT

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of the facility should be minimized.

FINDINGS: o The impact of Bldgs. 776/777 on the environment is minimal because all liquid wastes go to a central treatment facility for distillation and recirculation, all solid wastes are treated as contaminated and packaged for storage or shipment to a disposal facility, and only gaseous effluents that have passed through multiple banks of high-efficiency filters are released to the atmosphere. The reported air emission levels summed from nine emission locations are:

Plutonium	0.47 microcuries/year
Uranium	2.35 microcuries/year
Tritium	0.08 curies/year
Beryllium	0.005 grams/year

Each is a small fraction of the corresponding total for the entire plant, which in turn is a small fraction of the corresponding Derived Concentration Guide.

- o The Environmental Management group of the Health, Safety & Environment directorate has been working with state and local environmental agencies for about 17 years in a highly visible arena. Their performance has been recognized as highly competent and scrupulously professional.
- o Recently a group has been formed to address the requirements of the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the Comprehensive Environmental Assessment and Response Program (CEARP). This group will coordinate efforts to comply with federal, state, and local RCRA/CERCLA/CEARP regulations and is preparing applications, feasibility studies, remedial investigations, and waste minimization programs.
- o A Waste Minimization Program has just been established as part of Waste Operations with a mandate to reduce the amount of waste generated, ranging from the solvents used to degrease parts to enhancing water treatment processes and recycling paper products.

- o A condensate tank in Bldg. 776 (between columns K1 and K2) accumulates steam condensate primarily from the adjacent laundry but also from Bldg. 779 from space heaters from Bldgs. 702 and 703, and from the 15-gallon condensate tanks from the Bldg. 776 supply-air fans located on the second floor. There are two pumps for returning the condensate to the boiler. One of the pumps is out of service and a work order for its replacement was prepared in June 1987. Meanwhile, condensate containing small amounts of ammonia occasionally overflows through the riser vent leading outside the building and drips onto the adjacent shed and then onto the roadway below.

TS.7 PACKAGING AND TRANSPORTATION OF HAZARDOUS MATERIALS

PERFORMANCE OBJECTIVE: Performance of the materials handling, packaging, in-transit storage, and other functions related to transportation of hazardous materials should assure conformance with existing standards and accepted industry good practices as given in DOE 5480.3 and its references.

(Note: Under Performance Objectives TS.7, the term PMHT refers to the general area of packaging, materials handling and movement, and transportation. Further, the term "movement" refers to handling activities within a single building [intra-building], "transfer" refers to on-site between-building exchanges, and "transportation" refers to off-site shipments.)

Program Administration

- FINDINGS:
- o Strong management support for transportation safety programs is reflected in the written plant and departmental directives and procedures and work practices. They are current, complete, and comprehensive, with a few exceptions. Standards and references stated therein are current and pertinent, and adequately address the packaging and transportation standards of DOE 5480.3, Section 10.
 - o Responsibilities for PMHT are clearly delineated in two RFP manuals -- On-Site Transportation and Material Packaging, Shipping, and Transportation.
 - o Delineation between staff and line functions were not clear; many line functions were being performed by staff personnel, e.g., trucks carrying certain nuclear materials are driven by Security Inspectors (guards), and committees are given unilateral authority to establish standards and procedures. This is not common management practice, but was not seen to have a direct adverse effect on safety in PMHT operations. See, however, Concern OA.1-1.
 - o Staffing in the PMHT areas appeared to be adequate. Salaried and hourly employees demonstrated competency in the work assigned. Workers were observed following good practices in packing and moving drums and boxes. Checklists were used for some packaging operations but not for materials movements.
 - o A central control of on-site material transfers is provided through the Traffic Office. There was no obvious or declared central building control of intra-building movements, including through the computer tracking system.
 - o Personnel turnover rates were within the norms for the Plant.
 - o The On-Site Transportation Committee is chartered to maintain the on-site transportation plan in a current state, to perform audits of the activities of the transportation system, to approve on-site packaging, and to advise management on hazardous materials transportation matters. The committee has both line and staff responsibilities (see findings preceding Concern OA.1-1). Members are assigned from each major involved department. It is chaired by

the Traffic Manager. The committee meets at least monthly and reports to the Executive Safety Committee.

- * There was no evidence of a system for periodic review of the management directives and procedures in the PMHT area. See Concern OA.1-2.
- * A review of the PMHT program has revealed serious deficiencies in several areas. These deficiencies are summarized below, and are discussed in detail later under this Performance Objective. Analysis, evaluation, and correction of these PMHT problems would benefit from a plant-wide coordinated effort toward problem solution.
 - Drums and boxes of plutonium-contaminated materials are inadequately marked and identified.
 - Criteria and procedures for drum movement, handling, and storage are lacking.
 - The program for independent PHMT audits is weak.
 - The Quality Program Plan for PHMT is out of date and inaccurate.
 - Written procedures and checklists are lacking for loading, tiedown, and unloading of containers for both onsite transfers and offsite transportation.

CONCERN: (TS.7-1) The systems and procedures for drum handling, marking, storage, and loading/unloading, and for independent audits and quality assurance, do not comply with DOE 5480.3, DOE 5480.5, and ANSI Standard NQA-1-1986.

(See also Concerns OA.1-2, OA.4-2, FR.4-1, RP.3-1, AX.2-1, and AX.3-1.)

Training

- FINDINGS:
- o Training of PMHT personnel is accomplished through the RI training program, as required by the On-Site Transportation Manual. Both core training and job-specific training is provided every other year for hourly and salaried personnel. Certificates are issued.
 - o A curriculum review indicated that the in-house training program (conducted by Training and monitored and scheduled by Traffic) meets the training requirements of DOE 5480.3 and DOE 5610.1. In addition to the in-house program, selected management personnel and all of the Traffic Department have received off-site hazardous materials transportation training.
 - o Traffic and Package Engineering staff regularly attend DOE-wide transportation meetings to exchange information on practices, regulatory changes, and lessons learned for incidents and

operations. This information is integrated into the plant-wide training program for drivers and material handlers, although there is no formal program for doing so.

Quality Assurance

- FINDINGS:
- o A review of documented procedures and discussions with staff verify that there is an operating quality assurance program that generally meets the essence of DOE 5480.3, Section 9, and DOE 5700.6B, Section 9. This plan is described, in part, in Quality Program Plan -- Material Packaging, Shipping, and Transportation.
 - o Three independent internal audits were conducted during the past few years for on-site transport activities. The audits were conducted by Management Systems and Audits, assisted by members of the On-Site Transportation Committee. A review of the reports indicated that the auditors were competent and objective, and the audits were comprehensive, incisive, and relevant. The focus of the audits' recommendations was on out-dated management directives. Follow up action has been taken.
 - * There was no evidence of a system for regular, independent, and auditable verification of PMHT activities within Bldgs. 776/777. Audits are carried out on an irregular rather than routine and periodic basis, usually stimulated by some problem, rather than by the status and importance of the activities being audited. This does not meet the requirements of ANSI Standard NQA-1-1986 and DOE 5480.5, Section 9g. See also NUREG-1055, Alternatives b(3) and b(4).

CONCERN: The above matter is addressed by Concerns TS.7-1 and FR.4-1.

- FINDINGS:
- o Specifications for new packaging procurement are prepared by Package Engineering (in Program Management) for War Reserve (WR) materials, by Waste Operations for waste materials, and by other user organizations for their materials. There is no central RI control of package design activities with regard to regulatory compliance.
 - o Packaging procurement is managed by Procurement Quality Engineering.
 - For WR packaging, an RI assessment of a vendor's QA program is required by the WR Quality Manual. There is no specified procedure for QA assessment of vendors for non-WR packagings, although there is significant activity in that area. Reports ("Vendor Source Acceptance Report") of six vendor visits were reviewed, and several others discussed.
 - Spot checks of vendor-supplied internal containment vessels (pressure cookers) are made at RFP by radiographic inspection.
 - * The document, Quality Program Plan -- Material Packaging, Shipping, and Transportation, provides for the evaluation of activities and

periodic verification of compliance. However, this plan does not cover intra-building movements. It was prepared in 1982 and last revised in 1983. It is out-of-date and essentially useless (and unused) as a working QA document. This document does not meet DOE 5480.3 and DOE 5700.6B requirements. It lacks a system for checks and balances covering movement of drums and boxes of hazardous materials.

- * There was no evidence of a plant-wide, operating system of quality assurance in PMHT for management and operational accountability and day-to-day compliance assurance. Some elements of a potential system were in evidence in the form of written operational procedures and checklists.

CONCERN: The above matters are addressed by Concern TS.7-1.

Regulatory Compliance

- FINDINGS:
- o Plant and departmental procedures for the PMHT program for offsite transportation provide adequately for compliance with DOE 5480.3 and the applicable Federal regulations.
 - o A cursory review of off-site shipping records and discussions with Traffic Department staff revealed no significant or recent violations of DOT or EPA transport safety regulations, or of DOE operational safety requirements as listed in DOE 5480.3.
 - o The On-Site Transportation Manual meets the provisions of DOE 5480.5, Section 10, and has incorporated many of the provisions of draft DOE 5480.3, particularly with regard to standards for on-site transfers.
 - o Certificates of Compliance (CoCs) have been issued as required by DOE 1540.1 and DOE 5610.1 for packaging for off-site shipments. CoCs are current.

Accidents and Incidents

- FINDINGS:
- o Accident/incident reporting procedures for PMHT activities are covered in the plant's Health, Safety, and Environment Manual. These procedures are in conformance with the requirements of DOE 5480.3, DOE 5000.3, DOE 5484.1, and the DOT regulations.
 - * There were four Special Investigation Reports during the past three years involving PMHT in Bldgs. 776/777. Three of them (85-2-776.1, 85-4-776.1, and 87-9-776.1) resulted from the inability or failure of an employee to fully read or understand the paperwork regarding drum/box contents. The fourth (86-4-776.2) involved the misreading and misunderstanding of posted criticality limits.

CONCERN: The above matter is addressed by Concern TS.7-1.

Operations - General

- FINDINGS:
- o According to the On-Site Transportation Manual, confirmed by observations, there is an effective and positive central management of all on-site and off-site transportation activities, by the Traffic Department, supplemented by the On-Site Transportation Committee.
 - o Storage, inspection, and maintenance of reusable off-site shipping packagings is done by Production Control in Bldgs. 991. A review of that program indicates that it meets good practice and the quality requirements of DOE.
 - o One DOE exemption is in use at RFP, that for the use of the ATMX railcar for transporting contaminated waste to Idaho. Numerous variances to a Certificate of Compliance for the 2030-1 package have been issued over a period of years by the DOE; these variances are being combined into the new Safety Analysis Report for Packaging for that package. All shipments of WR materials are made under the terms of the National Security Provision.
 - o Procedure 200-6, "Non-Routine Shipment Traffic Procedures," makes provision for the handling of each non-routine PMHT operation. Each such shipment requires approval of Traffic Department. None was observed during the appraisal. The procedure prohibits hand-carrying of fissile nuclear materials between Material Balance Areas. No instances of hand-carrying were observed.
 - o Marking and identification of non-radioactive hazardous materials drums is clear and understandable, and in compliance with DOT regulations.
 - * The intra-building package identification system for drums and boxes containing plutonium is inconsistent, cumbersome, and ineffective, and does not meet the criteria in DOE 5480.5, Section 13-b(12). It does not provide a system for quick identification of packages containing radioactive materials, one which readily identifies package contents and provides a traceable container serial number that is fire resistant.
 - The primary container identification is a plastic bar code tag placed on the outside of the drum. Current production drums have no permanent marking, as by metal tag or chemical embossing. Drums and boxes are not marked with the usual DOT markings, contrary to RFP policy regarding conformance with DOE regulations, whenever practicable.
 - The primary means of identification of the contents consists of a card stock form secured in place on the drum lid or the box wall with yellow plastic tape. The paperwork placement was haphazard and inconsistent. Paperwork was frequently not completely filled out, or was illegible due to age or carelessness.
 - The radiation symbol is not used to indicate the presence of nuclear materials. This is a violation of DOE 5480.5, Section

13b, regarding hazard marking. There is no quick way to tell the drum contents from a distance. The paperwork on the drum/box must be studied to determine the contents. Previous incidents (reported in the SIRs) of errors in trying to understand the contents exemplify the results of the lack of a "quick-identification" system for the drums/boxes.

- With the backlog of material awaiting processing or reclamation, and the resultant rapidly growing number of drums in Bldgs. 776/777, the problem of drum identification is likely to become greater.

CONCERN: The above matter is addressed by Concern TS.7-1.

FINDINGS: o Drums containing both plutonium and organic materials generate hydrogen and other gases. Accountability records and radiation measurements confirm that drums stored in the basement of Room 127 have large quantities of both plutonium and organics.

- * According to HS&E representatives who are conducting RI's hydrogen generation studies, no studies have been made of the potential gas generation and control problems in that area. Further, no gas samples have been taken and measured for hydrogen content/concentration, either of individual drums in that area or in the room itself. This is in violation of DOE 5480.5, Sections 13b(13) and (16).
- * The Final Safety Analysis Report for Bldgs. 776/777 mentions drum storage in the Room 127 basement, but there is no mention that the safety aspects of gas generation in those drums has been analyzed.

CONCERN: (TS.7-2) The safety implications of hydrogen gas generation in all drums and drum storage areas has not been reviewed in order to determine the magnitude of the problem, and determine whether changes in the current procedures are required.

(See also Concern AX.3-1).

FINDINGS: * Access to the drum storage area in the basement of Room 127 is via a stairway (for personnel) or through a ceiling access panel. Drums were lowered into the room through the hole in the ceiling by means of a chain hoist and drum clamping ring. The stated plans for removing the drums is the same chain hoist system, without adequate safety redundancy.

- The drums have been exposed to water due to partial flooding of the storage room several years ago. Most drums were observed to have rusty bottoms. The bottoms could conceivably fall out when they are lifted. Most drums are many years old, and the state of their integrity is unknown. DOE 5480.5, Sections 13b(15) and (17), requires inspections for integrity.
- The basement is presently stuffed with drums, making maneuvering difficult. Drum identification papers and forms are faded from

age, curled from moisture, and generally unreadable, making it difficult to clearly know the status of each drum.

- If a drum is dropped during vertical handling, rupture is likely, resulting in major contamination of the room.

CONCERN: There is no safety analysis of the present system for drum movement (TS.7-3) into and out of the basement of Room 127.

(See also Concerns AX.4-1 and PP.7-1).

Operations - Intra-Building Movements

- FINDINGS:
- o Transfers of materials between Bldgs. 777 and 991 are handled by Production Control. A review of Radioactive Shipment Preparation forms revealed that they were all completed correctly, signed, numbered, and dated.
 - o Specific packaging procedures for each type of packaging were in use (e.g., Procedure W0-4034C for waste). A checklist system was in place and used for product packaging, with signatures of the clerk packers and initials of the supervisor. A list of authorized signatures was posted. Shipping memos and bills of lading for off-site shipments were complete and correct.
 - o During the appraisal, traffic lanes and corridors in Bldgs. 776/777 were free of obstructions that might affect movement safety.

Operations - On-Site (Interbuilding) Transfers

- FINDINGS:
- o On-site transfers appear to meet the requirements of DOE 5480.3 and DOE 5480.5, Section 12f. Materials transfer safety is also covered in Nuclear Safety's Intraplant Shipment Manual.
 - o An example of the directives for on-site transfers is Procedure CO-4037-B, "Packaging Liquid Wastes for Intraplant Transport", which limits liquid waste shipments to on-site only, and specifies packaging and handling techniques. No liquid waste is shipped offsite.
 - o Vehicles carrying hazardous materials on plant site are not required by plant procedures to be placarded.
 - o Packaging, labeling, and marking requirements are clearly spelled out in the On-Site Transportation Manual. For example, the On-Site Transportation Manual requires that each shipping container bear the Radioactive On-Site Shipping Label (RF-46751). However, many in-transit drums were observed without it.
 - o Transfers between buildings are handled either by Plant Services (for waste materials) or Plant Protection (for all other radioactive materials).

- Packages are loaded and tied down in vehicles by either Production Control or Waste Operations.
- Participation by the protective forces in moving materials was stated to be historical rather than logical. Although there is a potential for conflict of interest in this crossover between staff and line functions, the system appears to have worked well in the past.
- This operation has not been covered by an independent internal contractor audit. Health, Safety and Environment, as well as Criticality Engineering, provide routine observation of the protective force's trucking function, and Traffic conducts spot checks about monthly on intraplant truck transfers.
- * There are no comprehensive written procedures or checklists for techniques for loading of hazardous materials packages on, or unloading off, vehicles, or for tie-down of those packages on the vehicles, for either on-site transfers and off-site transportation. The On-Site Transportation Manual contains only a brief general statement to that regard, along with several directives of what not to do.

CONCERN: The above matter is addressed by Concern TS.7-1.

Operations - Off-Site Transportation

- FINDINGS:
- o Packaging, labeling, and marking requirements and responsibilities are clearly spelled out in the Material Packaging, Shipping, and Transportation Manual. The manual is up-to-date; the last revision was in 1986, and reflects current DOE and regulatory requirements.
 - o Procedure WO-4034, "Packaging Waste for Shipment Off-Site," is used by Waste Operations in Bldg. 776 for waste packaging. Use of checklists was somewhat limited in practice, but people obviously knew what they were doing.
 - o Procedures are specified for inspection of packages prior to shipment, as required by DOE 5480.3, and for handling of packages which do not meet the requirements. These procedures contain some checks and balances to ensure quality performance in shipment preparation.
 - o The Traffic Office maintains records of shipments and receipts of hazardous materials. A review of the records showed that the various forms are properly filled in, dated, and signed. There is a complete document trail of those movements. Fissile materials shipments meet the requirements of DOE 5480.3, Section 10e.
 - o Traffic requires receipt acknowledgment from receivers of most shipments of radioactive materials from RFP, as required by DOE 5480.3. A follow-up tickler file is used to be sure that receipt acknowledgments are received in a reasonable time.

TS.8 REACTOR ENGINEERING

PERFORMANCE OBJECTIVE: Reactor engineering activities should ensure optimum nuclear reactor operation without compromising design, safety, or nuclear fuel limits.

COMMENT: This Performance Objective does not apply to Bldgs. 776/777.

TS.9 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE: Specialized support for criticality safety issued should be fully integrated into the operation of the reactor, and the handling and storage of fuel by facility personnel.

COMMENT: This Performance Objective does not apply to Bldgs. 776/777.

H. SECURITY/SAFETY INTERFACE

Security, safety, and safeguards interfaces are working harmoniously at RFP. A proper balance has been established which assures satisfaction of the requirements for each discipline.

Safety is a consideration in all security and safeguard matters, both routine and emergency. The security inspectors demonstrate a close but properly official working relationship with other plant workers.

Responsibilities during emergencies are well understood and clearly defined in guidance documents. Drills and exercises are conducted for both operational and security events to maintain program effectiveness.

Provisions for emergency access and egress are established and well practiced. The special professional skills and well-practiced protective function of the security inspectors minimize the risk to plant personnel and equipment in security activities.

SS.1 SAFETY OF IMPROVEMENTS

PERFORMANCE OBJECTIVE: Security/safeguards improvements should not create or increase hazards that would impede the safe, reliable operation or shutdown of the facility in normal, abnormal, or emergency situations.

- FINDINGS:
- o All security/safeguards improvements and facility modifications use the same engineering system and receive the same controls as any other modification. Safety and security involvement is complete and proper in all modifications. (See Section TS.1)
 - o Documentation of safety and security contribution to modifications is documented as part of the modification control process.
 - o Priorities for safety and security input to modifications are appropriate. Comment resolution to the satisfaction of the reviewer in any case is covered by the review procedure.
 - o Safety and security personnel are involved in all aspects of facility planning and construction. The effectiveness of this was confirmed by including representatives of Safety, Plant Protection (Security), and Safeguards on walk-throughs of the facility by the appraisal team. Each individual demonstrated excellent familiarity with the facility and effects of modifications to his specialty area.

SS.2 COMPATIBILITY

PERFORMANCE OBJECTIVE: Security/safeguards improvements should use design criteria consistent with the facility equipment/structures being protected.

- FINDINGS:
- o Facility designs for security, safety, and safeguards modification are subject to the same engineering system as for any other modification. Therefore, they are subject to the same requirements for natural phenomena including fire, seismic, wind, and flood. (See Section TS-1)
 - o All RI employees including the security inspectors receive core training in hazardous materials, criticality, and safety.
 - o Security inspectors receive weapons and other protective force equipment training as part of common training for the assignment. Continuing training is controlled by the captain and lieutenants of each of the three shifts for the personnel assigned to that shift. Safety is an integral part of all security force training.
 - o Interviews with individual members of the security forces were used to confirm training effectiveness. Further, a security exercise was observed to assess the effectiveness of security forces in simulated field conditions. No adverse conditions regarding safety performance were observed.
 - o Individual training records are maintained for each security inspector.

SS.3 EMERGENCY ACCESS

PERFORMANCE OBJECTIVE: Authorized facility and safety support personnel should not be denied access or exit in an emergency.

- FINDINGS:
- o Emergency equipment access to controlled areas is not impeded. This is simplified by the sequential security perimeter concept because fire and emergency equipment are stationed inside the basic perimeter of the RFP.
 - o Methods are established for drivers of emergency vehicles to indicate duress, making it possible for security to not extend unimpeded access to the vehicle.
 - o Egress is unimpeded from all parts of the facility. Provisions were inspected for each vault, cell, and general area and found to be adequate. Loss of electrical power has been included in egress provisions.
 - o RFP does not use any special "holding areas" to contain personnel upon emergency egress. Safety representatives are sensitive to the use of such areas as developed in scenario discussions.
 - o Safety representatives discussed egress from each area of Bldgs. 776/777 with the appraisal team members and demonstrated that a thorough review had been completed.
 - o Access to RFP key facilities is controlled by area and each compartment has appropriate controls. Monitoring and entry log records are commensurate with the compartment or function involved.
 - * Bldg. 776/777 is quite a complicated maze of rooms, areas, and corridors. In event of emergency, all outside doors provide quick egress from the building. In most cases, small arrows are provided on the floor to provide guidance to the exits. These arrows, where installed, would be helpful to evacuate the people. Some areas, such as the entire second level (freshly painted), do not include these arrows. Other freshly painted areas had the same problem.
 - * Exit signs are provided at each exit, but "EVACUATION" or "ASSEMBLY AREA" directional signs to guide an evacuation or assembly are not routinely provided.
 - * Exit signs have required considerable work to maintain them operable as evidenced by review of work requests over the past year.

- * Consistently adequate markings for personnel evacuating from the facilities and to assembly areas are not provided in all cases.

CONCERN: The above matters are addressed by Concern FP.1-1.

SS.4 FACILITY PLANNING FOR SECURITY/SAFEGUARDS EMERGENCIES

PERFORMANCE OBJECTIVE: Safety authorities and responsibilities for all types of security/safeguards emergencies should be clearly defined and understood by all involved parties.

- FINDINGS:
- o The RFP emergency response plan and procedures integrate security/safeguards emergencies with other credible events. Responsibilities, authorities, and relationships are defined in the Rocky Flats Emergency Plan and the Emergency Management Handbook. Specific security-based procedures are found in the operating procedures.
 - o A review of past exercises documented that the emergency cadre can satisfactorily shift from controlling a security event to an operational safety event and then back to a security event again. Changes in responsibility are minimal. Security participates in all emergency exercises.
 - o During the appraisal, a security exercise was conducted which involved a hostage situation with the use of weapons (dummy) and the principle of containment of the perpetrator. All safety aspects of the exercise were adequate, including a briefing (held at shift change) exercise control, and critique. Safety was always of primary concern.
 - o Security personnel are trained in emergency readiness.

SS.5 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous materials should be identified and understood by all involved parties.

- FINDINGS:
- o This area was assessed by the appraisal team through review of training given the security forces, observation of an exercise in the field which simulated the taking of a hostage and through interviews with members of the security force.
 - o All RI personnel including security inspectors are given safety training in hazards of the materials used in the operation at the plant and in criticality safety.
 - o Security inspectors demonstrated an awareness of the types of hazards which may affect their actions in performing their jobs, including the use of weapons and other protective force equipment. This issue is treated in the course of field training and receives proper attention from security management and supervision.
 - o The established security plans for various types of events contain considerations of plant hazards in the establishment of personnel location areas and movements.

I. EXPERIMENTAL ACTIVITIES

Experimental activities in Bldgs. 776/777 are for the most part directed toward improving existing process steps or developing new processes to be carried out in building facilities. The former usually results from requests from operations management to the Manufacturing Technology Development (MTD) Department for technical support; the latter is normally an MTD program initiative. In most cases the effort culminates in a plant verification (run-in) test.

The technical support (MTD) personnel are well qualified and knowledgeable of Bldgs. 776/777 operations. MTD provides its own personnel for both operation & monitoring plant tests of new or improved process steps. Permanent operations personnel assume operating control of altered process steps as they become familiar with the procedure, but MTD personnel assigned to the project stay in close communications until all run-in work is satisfactorily completed.

Proposed experimental activities are carefully scrutinized and reviewed, but not by a review group independent of the work. As a result, the review does not comply with DOE 5480.5.

Proposed operations support projects are subjected to an extensive review process, which is outlined in the Production Operations Procedures Manual. The proposal must contain information that permits evaluation of all aspects (including safety) of the experimental development and tests. However, the approval sequence for authorizing validation or run-in tests carried out in plant facilities is not defined explicitly. A formalized approval of all experimental tests performed in plant facilities is needed.

Both operations supervision and MTD engineers are present or on-call during plant tests designed to validate or run-in new or improved process steps or equipment. Careful attention is paid to the safety and health aspects of the operation during the test.

EA.1 EXPERIMENTAL ACTIVITIES

PERFORMANCE OBJECTIVE: Persons conducting experiments in or with the facility should have their relationship to the operating group clearly defined.

- FINDINGS:
- o The policy and practices that pertain to the major experimental activities performed in Bldgs. 776/777 are stated in Procedure No. PO H-1, "Manufacturing Technology Development Procedures" (August 1987), Production Operation Procedures Manual.
 - o The Manufacturing Technology Development (MTD) Department has the responsibility both for initiating development activities directed toward process improvements and for responding to operations management requests for technical support. In both cases, as reported by operations managers, the support activity often culminates in plant tests. The system appears to be well-structured and to achieve its mission of demonstrated process improvement.
 - o On the basis of discussions with operations managers, MTD personnel are technically qualified and very knowledgeable of Bldgs. 776/777 operations.
 - o MTD normally provides its own personnel for initial in-plant tests of potentially improved process steps, while permanent Operations personnel observe.
 - o As permanent operations personnel become familiar with the altered process steps, they gradually assume the operational responsibility. However, the MTD personnel assigned to the project stay in close communication with the Operations personnel until all run-in work is completed in a satisfactory manner.

EA.2 EXPERIMENTAL ACTIVITIES

PERFORMANCE OBJECTIVE: A safety review committee should be available to review the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and DOE 5482.1B, Section 9.d.

FINDINGS: * None of the standing safety committees are charged with the responsibility to review experiments; therefore, there is no independent review of experiments performed at RFP. This matter is addressed in Concern FR.2-2.

EA.3 EXPERIMENT CATEGORIES

PERFORMANCE OBJECTIVE: All proposed experiments should be approved before they are performed.

- FINDINGS:
- o The policy and practices that pertain to the major experimental activities performed in Bldgs. 776/777 are stated in Procedure No. PO H-1, "Manufacturing Technology Development Procedures" (August 1987), Production Operation Procedures Manual. The review and approval procedure for proposed experimental activities is treated in Section 4.3 of this reference.
 - o The Manufacturing Technology Development Group Managers review experimental development proposals, which may also be reviewed by a technical review board. However, as discussed in section EA.2, the review process is not carried out by persons independent of the experimental program.
 - o For experimental support of existing processes in War Reserve (WR) work, safety reviews and approvals of plant tests are formalized through the use of form Q-1404/MPA. The test is authorized by the Production Manager for Bldgs. 707/776/777 or his subordinate manager for the area in which the test is being made.
 - * In other categories of experimental work performed in Bldgs. 776/777, the approval sequence for authorizing plant tests is not defined explicitly.
 - * Appropriate reviews are performed if the proposed test requires operations outside the bounds of a previously prepared operational safety analysis; however, even in these cases, no formal authorization sheet is circulated and no final approval for the test is documented.

CONCERN: The system that requires formal approval does not cover all
(EA.3-1) experimental tests performed in plant facilities.

EA.4 EXPERIMENT PROPOSALS

PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

- FINDINGS:
- o The policy and practices that pertain to the major experimental activities performed in Bldgs. 776/777 are stated in Procedure No. PD H-1, "Manufacturing Technology Development Procedures" (August 1987), Production Operations Procedures Manual.
 - o Preparation and evaluation of proposed experimental activities is treated in Section 4.2.2 of the reference cited above. The Manufacturing Technology Development (MTD) Process Development Program Manager is responsible for initiating proposed projects and for procuring a description of production problems and desired improvements in existing operations.
 - o As determined through discussions with operations and MTD managers, the proposals must contain information that permits evaluation of all aspects (including safety) of the experimental development and tests by various review groups that are illustrated in Figure 8 of the above reference (p. 23 of 43). Recommendations made in the review process are incorporated into the proposal before final approval.

EA.5 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in reactors or process facilities or experiments performed with a reactor should not present undue risks.

- FINDINGS:**
- o The policy and practices that pertain to the major experimental activities performed in Bldgs. 776/777 are stated in Procedure No. PO H-1, "Manufacturing Technology Development Procedures" (August 1987), Production Operations Procedures Manual.
 - o Discussions with operations managers indicated that:
 - Tests of steps designed for improvement of existing processes in existing equipment are performed by operations personnel with Manufacturing Technology Development (MTD) personnel present as observers and advisors.
 - Tests of new developments from MTD designed for improvements in existing processes or for new processes are performed by MTD personnel (including experimental operators) with operations personnel observing.
 - o As described by operations managers, if conditions adverse to safety or health develop during the tests, technical (MTD) personnel are always present or on-call to correct the condition promptly. Any incidents that occur are reported in accordance with the established RI incident reporting system and applicable DOE orders.
 - o As confirmed in discussions with operations and MTD managers, all in-plant experimental tests are conducted according to approved procedures.

J. FACILITIES SAFETY REVIEW

The purpose of a facility safety review system is to provide contractor and DOE management with the assurance that all aspects of safety have been thoroughly considered and independently reviewed. This is a birth-to-death concept including analytical, documentational and operational aspects.

A review was made of the various safety related committee charters, minutes and records. Discussions were held with committee chairmen, facility and HS&E personnel involved in the safety program, and a review was made of typical programs and projects. From this it is evident that the committees are staffed adequately, with technically competent and independent personnel and are producing auditable documentation. Design packages are receiving safety input during all stages of the process, and there is an active self audit program.

The various safety committees established by RI at RFP provide the operational audit aspects of this independent review process but none of the committees have been assigned the responsibility to independently review new or modified facilities or programs with safety significance. The triennial review, which should be providing management with an assessment of how well RI is fulfilling the total safety program requirements, has been primarily auditing the operational aspects of the criticality safety program.

Six concerns have been raised regarding the effectiveness of the independent review system. Four of these concerns deal with committee charters. Management commitment to improvement can be readily demonstrated by the issuance of updated and enhanced committee charters. These new charters should cover all required audit areas as well as providing for the independent review of new or modified facilities or programs. Management's role in the safety review process needs to be reinforced by making committee recommendations advisory to top management as opposed to the current practice of committees directing line organizations. The triennial review process needs to be expanded to cover all aspects of the RI safety review program to assure top management that an effective and fully compliant safety program is functioning at Rocky Flats Plant. One concern was with regard to the timely review of incident and other unusual event reports.

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A safety committee should be available to review safety questions.

- FINDINGS:
- o The RI Organization Manual Policy #9 states the policy for committee charters. It outlines the requirements for establishing committees and their charters including purpose, scope, specific responsibilities, and composition of committees.
 - o A review of committee membership indicates that all committees have sufficient technical expertise covering the range of disciplines necessary to accomplish their tasks effectively, efficiently and with objectivity.
 - * The RI Organization Manual lists seven standing safety committees that have been established by management with written charters for six, dating from 3/81 to 10/86. Four of these committees are subcommittees of the Executive Safety Committee.
 - * Management has been in the process of updating committee charters and establishing several new safety committees. Eventually (target date 3/88) management expects to have nine standing safety committees by establishing three new committees and dropping one old one. This process has been underway since 7/86 with only one charter updated (Nuclear Criticality Safety Committee) and drafts of the other eight awaiting approval of the President, RI.
 - * Even though not officially established, one of the three new committees is already functioning while the other two are still in the process of organizing.

CONCERN: New safety committees have not been formally established and
(FR.1-1) existing committee charters are out of date.

- FINDINGS:
- * All of the committees, contrary to the written RI Organization Manual Policy #9 stated above, provide direction to the line organizations rather than advisory recommendations to management.
 - * In the case of the Executive Safety Committee this ability to direct actions is stated in the committee charter.

- * The mechanism employed by the committees to direct actions is by specifying what action is required and assigning it to an organization in the minutes of the meeting thus obviating management's role in the process. Minutes are forwarded to all involved parties including management.
- * Additional findings supporting the Concern below can be found in Sections TS.7 and FR.3.

CONCERN:
(FR.1-2)

Stated Rockwell International policy that safety committees are to be advisory to management is not being complied with.

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the safety committee should be well defined and understood by facility management.

- FINDINGS:
- o As appropriate, each committee is charged with responsibility to review changes to or violations of Operational Safety Requirements (OSRs) or any other matter of safety significance germane to their function.
 - o The various safety committees, as appropriate to their function, are charged with the responsibility to review accidents, incidents and Unusual Occurrence Reports (UORs).
 - * It was noted that generally the Executive Safety Committee did not review UORs earlier than six months after the incident. This means they are released to DOE without this committee's review. Timely review of accidents, incidents and UORs by safety committees is essential to assure root cause determination, corrective action and implementation of lessons learned.

CONCERN:
(FR.2-1)

There is a lack of timely safety committee review of accidents, incidents and Unusual Occurrence Reports to assure root cause analysis, corrective actions and implementation of lessons learned.

- FINDINGS:
- * None of the committees are charged with the responsibility to review experiments (with the exception of the Nuclear Criticality Safety Committee reviews of the Critical Mass Laboratory), significant modifications, or quality assurance activities as required by DOE 5480.5 Section 9.h.
 - * Some committees do perform such reviews under the catchall criteria of items that the committee feels may have safety significance but not necessarily prior to commencement of activities regarding the matter under review. Health Safety & Environment Manual procedures 2.02, 2.03, and 26.01 describe the procedures used by RI employing the Area Safety Engineer, Area Safety Teams and Safety Analysis to provide the professional safety input for the required safety documentation (Safety Analysis Report or Operational Safety Analysis). However, this is no different from the engineering and other specialized assistance provided to the program. Therefore, this is not a fulfillment of the independent review requirement of DOE 5480.5 Section 9.h.

* Additional findings supporting the Concern below can be found in Section TS.1.

CONCERN:
(FR.2-2)

There is no independent safety committee reviews of experiments and major modifications of safety significance prior to their implementation.

FR.3 OPERATION OF SAFETY COMMITTEE

PERFORMANCE OBJECTIVE: Review of facility activities by the safety committee should ensure achievement of a high degree of safety.

- FINDINGS:
- o A review of the various safety committee minutes indicates that facility concerns are brought to the attention of the appropriate safety committees, and often presentations of these matters are made to the committees. Additionally, the various facility audit reports are sent to the committees for their information.
 - o Review of the audit activity performed directly by the committees over the past year indicates it is of high quality and well documented.
 - o The need to adjudicate committee recommendations with the facility/program managers is rare, and all committees indicated that should resolution be necessary, it would be documented.
 - * Recommendations are rarely addressed to top contractor management, and therefore, there is no record of their acceptance, rejection or forwarding to the facility/program manager for implementation. Top management does receive copies of all committee minutes, and therefore, it is assumed that disapproval of a recommendation would be made known to the parties. See Concerns FR.1-1 and FR.1-2.

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management.

- FINDINGS:
- o The Nuclear Criticality Safety Committee (NCSC) is responsible for performing an annual audit of facilities with regard to criticality aspects only.
 - * Audits are required to be performed annually. The last NCSC audit of Bldgs. 776/777 was performed five months late.
 - * The NCSC charter does not include coverage of all of the areas required of the annual audit as contained in DOE 5480.5 Section 9.h, nor does it cover all the safety disciplines.
 - * No other committee is currently performing annual reviews in their safety disciplines covering such items as modification and experiments having safety significance, procedures, training, organization and staffing, etc.
 - * Additional findings supporting the Concern below can be found in Section TS.7.

CONCERN: Annual audits of facilities which cover all areas required by
(FR.4-1) by DOE 5480.5 are not performed.

FR.5 TRIENNIAL APPRAISAL OF FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

- FINDINGS:
- o The requirement for a triennial review has been accomplished in the past by the appointment of an ad hoc committee. The next triennial review is scheduled for June 1988 and is planned to be conducted by the President, RI and several of his division directors.
 - * Past triennial reviews have been limited to nuclear criticality safety and did not cover all the safety disciplines required by DOE 5480.5.
 - * The triennial review tends to concentrate on the performance of the various organizational groups in complying with requirements. They have not reviewed the management systems to determine how RI is meeting the overall DOE requirements for an independent review system and if the system is performing as intended. The review should cover all the safety disciplines and all aspects of safety from conception, design, construction, operation to ultimate disposal. This is the more important aspect of this review to management and DOE.

CONCERN:
(FR.5-1) The scope of the triennial review does not include all safety disciplines nor does it determine the adequacy and performance of the management systems established for independent safety review.

K. NUCLEAR CRITICALITY SAFETY

Fissile material processing, storage, and movement within Bldgs. 776/777 are governed by documented policies and procedures which are consistent with DOE Orders. The deployment of nuclear criticality accident dosimeters and radiation monitor alarms have been evaluated and documented to be in compliance with DOE Orders by the RI Nuclear Facility and Safety personnel.

The nuclear criticality safety program is well documented. The Criticality Engineering Department Manager and the Bldgs. 776/777 Criticality Engineer are capable and demonstrate an enthusiasm for criticality safety and show a high degree of support for the program.

Nearly all observed deficiencies of the program can be related to the inexperience and limited professional development of a highly transient staff of nuclear criticality safety engineers.

CS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Management of nuclear facilities in which fissionable materials are handled, processed, or stored should organizationally address nuclear criticality safety and administer a nuclear criticality safety program meeting the requirements of DOE 5480.5, Section II, and ANSI/ANS 8.1-1983 to ensure nuclear criticality safety during all activities.

- FINDINGS:**
- o The nuclear criticality safety program is well defined and documented in the HSE procedures series 17.XX as an implementation of the RFPM MHS 3-001, "Nuclear Safety Policy" (November 31, 1986) and RFPM MHS 1-001, "Health, Safety and Environment" (November 1, 1986).
 - o The Criticality Engineering Department is an entity independent of operational organizations, as depicted in the RFP Organizational Charts 10000, 40000, 41000, 41200 dated September 29, 1, and November 15, 1987, respectively.
 - o The requirement for formal internal review and audit of conformance of operations to the nuclear criticality safety program is documented in "Procedures for Criticality Engineers" (October 19, 1987) and in the "Nuclear Safety Committee Charter" (October 1, 1986).
 - o A formal documented system for the control and traceability of required records and documentation exists and is defined in the "Procedures for Criticality Engineers" (October 19, 1987).
 - o Nuclear accident dosimeters are employed. Their number, type, and placement were reviewed and found to be appropriate. Locations of the dosimeters are documented in the HSE Procedure 17.05 (draft procedure awaiting approval since September, 1986).
 - * Annular tanks in the Advanced Size Reduction Area have a pressure rating of 16 psig. Operating personnel reported that the two solution supply pumps (multi-horse power) had controlled pressure output ratings of about 30 psig. The pump volume output rates were not ascertained. It was not known if the pumps supplied the tanks, wash nozzles, or both. Also, the building criticality engineer did not know if the solution supply pressure to the tanks was compatible with solution vent capabilities of the annular tanks. Overpressure of the tanks could cause distortion of the subcritical annular solution dimension.
 - * Prior to this Technical Safety Appraisal, the building criticality engineer had no records of material content or safety analyses to demonstrate the criticality safety of

numerous 36-liter unpacked (Raschig rings) vacuum surge tanks used with vacuum chuck fixtures.

- * Prior to this Technical Safety Appraisal, the building criticality engineer did not have current or past audit records from prior criticality engineers identifying the absence of required anti-by-pass valves in the full flow filter housings located in the Size Reduction Vault.
- * The primary containment vessel wall thickness for the 5332 fissile material shipping container is specified differently in the safety analysis for the container than it is in the past and current Interim Certificate of Compliance for packaging of fissile material weapon component product. All past and currently proposed safety analyses specify a wall thickness of 0.10 inches whereas all past and current certificates specify an 0.06 inch wall thickness. This inconsistency was not identified by the Criticality Engineering Department.
- * The RFP Material Hazards Manual (issued by the Hazardous Materials Committee August 1, 1976) directly identifies only one plutonium form/compound, out of 18, as a possible criticality hazard, thus implying no criticality hazard of the remaining listed forms of plutonium.
- * Various Nuclear Material Safety Limit (NMSL) postings were observed to not have specific mass or part limits specified. Reference was made on the NMSL postings to sections or chapters of the operating area criticality safety manual located away from the work station or storage area.
- * Criticality engineer professional development activities (participation in American Nuclear Society Nuclear Criticality Safety Division, and DOE Office of Nuclear Safety Nuclear Criticality Technology and Safety Project; visitations to other DOE facilities' criticality safety organizations having similar operations or projected needs; and publication of computational applications or parametric/sensitivity studies) occur at a frequency of less than one engineer every two years.
- * Over the last five years, only three out of seven criticality engineers have remained in the Criticality Engineering Department. Over this period, 15 persons have transferred out of the remaining four positions in the department with about half transferring to other organizations within the RFP.
- * One of the recommendations by the RI Nuclear Criticality Safety Committee 1987 audit was for the Nuclear Facility & Safety Manager to assess the manpower needs of the Criticality Engineering Department. During the review of the audit with the Committee Chairman and the Manager of

Nuclear Facilities & Safety, the Nuclear Facilities & Safety Manager indicated that his preliminary assessment was that current staffing would soon satisfy the needs of the Criticality Engineering Department.

- * Numerous different criticality engineer signatures on posted limits over the last five years demonstrate a frequent "turnover" rate of criticality safety responsibilities in Bldgs. 776/777.
- * The current criticality engineer has a total accumulated time of responsibility for Bldgs. 776/777 of one year fragmented over two separate assignments for the building.
- * Staff members were questioned about the character and frequency of job-required intrusions into their private lives and time. They perceive an imbalance of compensation for the frequency of off-hour call ins.
- * It is the policy and practice of the Nuclear Facility & Safety and Criticality Engineering Department to use the KENO Monte Carlo Computer Code as a "black box." Critical Mass Laboratory Department personnel have performed an impressive number of calculations of critical experiments for the purpose of validating and testing the interfaces among the computer-code/cross-sections/computer-machine/user. Results of the validations and guidance for the use of the computer code are provided to the Criticality Engineering Department for production safety analysis work. The Criticality Engineers have not benefited professionally from the remote validation process nor have they validated their interface with the computer-machine and selection of cross-sections.
- * The application of the excellent "Certification Program for Criticality Engineers" (May 31, 1985) (cited in Section IV as a Noteworthy Practice) provides a good indoctrination for newcomers to the Criticality Engineering Department. However, the nomenclature of the program (i.e., certification) can be misleading to management as implying that a person is professionally developed and experienced to the point of independent competency in all aspects of nuclear criticality safety.
- * In some instances, the lack of adequate professional development and training of Criticality Engineering Department personnel has led to incomplete criticality safety analyses, such as inadequate consideration of the effect of reflector materials on system reactivity. A thorough parametric study of the NDT Vault Storage contents was performed. However, responsible Criticality Engineering Department staff failed to recognize the potential impact of reflector material choice (type of concrete) on system reactivity (i.e., no reflector parametric study was performed to assure that system

reactivities would not exceed specified criteria for subcriticality or criticality under normal and abnormal conditions). The basis for the selection of a particular concrete mix for the analysis was not known by the responsible Criticality Engineering Department personnel. Discussions with the person from the Critical Mass Laboratory who performs the computer-code/cross-section validations revealed his understanding of the concern for reflector material influence on margins of safety.

- * When taken as a whole, the deficiencies listed in PERFORMANCE OBJECTIVES CS.1, CS.2, CS.3 and CS.5 indicate that the Criticality Engineering Department staff has been inexperienced and professionally underdeveloped for several years. This observation is supported by the high turnover rate of criticality engineers having responsibilities in Bldgs. 776/777 and within the department. Long-term, seemingly innocuous, potential criticality problems have gone undetected for several, if not many, years within Bldgs. 776/777. Additionally, technical criticality safety analyses are performed with a limited understanding of the bases for guidance in the use of the computer code.

CONCERN:
(CS.1-1)

The staffing requirements for a nuclear criticality safety organization specified in ANSI/ANS-8.1-1983 are not being met. The root cause(s) of the deficiencies needs to be determined with the help of qualified experts independent of the HS&E organization.

CS.2 USE OF NUCLEAR CRITICALITY SAFETY CONTROL PARAMETERS

PERFORMANCE OBJECTIVE: Nuclear criticality safety should be achieved by controlling one or more specified parameters of the system within subcritical limits.

- FINDINGS:**
- o Criticality safety analyses and numerous operations were observed which demonstrated the application of section F. of the "Procedures for Criticality Engineers" (October, 1987) requiring that reliance be placed on geometry controls rather than administrative controls, where practicable, and limiting the size of equipment to provide criticality safety.
 - o Except for a few instances, it was observed that administrative controls used to maintain nuclear criticality safety are specified and are posted at operational locations.
 - o Review of analyses indicate that, where credible, multiple batching is considered during the technical safety analysis process.
 - o In most instances, mass limits are determined experimentally or from calculations utilizing a computer code which was validated by Critical Mass Laboratory personnel.
 - o Safety analysis protocol specified in the "Procedures for Criticality Engineers" requires that process designs incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a nuclear criticality accident is possible. Reviews of selected analyses on record demonstrated concurrence with the specification.
 - o Analyses take no credit for incidental soluble neutron absorbers in processes. Historical usage data confirm the suitability, presence, and reliability of borosilicate glass Raschig rings for use in unfavorable geometry solution tanks of mixed and unmixed acidic and basic solutions. RI procedures for acceptance, testing, usage and inspection of Raschig rings are consistent with the requirements of ANSI/ANS-8.5-1979.
 - o Appropriate degrees of neutron moderation and reflection are considered in the systems observed involving fissile materials.
 - * The "Procedures for Criticality Engineers" (October 19, 1987) specify that safety margins include the above considerations and include an allowance for experimental and computational uncertainties. However, responsibility

for the demonstration and consideration for computational uncertainties and validation of the computer code has been delegated to Critical Mass Laboratory personnel. Criticality engineers do not participate in the validation process for developing an understanding of experimental uncertainties and determination of computational uncertainties. See Concern CS.1-1.

CS.3 NUCLEAR CRITICALITY SAFETY EVALUATIONS

PERFORMANCE OBJECTIVE: Nuclear criticality safety evaluations of the design and operation of process equipment should assure that criticality safety is achievable under normal and abnormal operating conditions.

- FINDINGS:**
- o New operations and changes to operations are evaluated before startup or change.
 - o Control parameters used to ensure criticality safety are explicitly identified for each operational step or work station.
 - o Recent criticality evaluations are well indexed and cross-referenced to the limits, with sufficient detail to allow independent review.
 - o RI has an operational Software Quality Assurance program (SQA). The criticality computational codes are controlled in accordance with the applicable requirements of the SQA.
 - * Before starting a new or modified operation with fissile material, the adequacy of the nuclear criticality safety evaluation is independently reviewed by a second criticality engineer and the Manager of Criticality Engineering. A review of one analysis showed that consideration for the type of concrete reflector modeled in the calculations was not recognized as potentially significant to the safety of the system. See Concern CS.1-1.

CS.4 OPERATING PROCEDURES AND CRITICALITY SAFETY LIMITS

PERFORMANCE OBJECTIVE: The approved written operating procedures should address criticality safety limits in providing effective guidance for all aspects of facility activities.

- FINDINGS:**
- o Operating procedures are posted at most work stations and reference the posted Nuclear Material Safety Limits (NMSLs).
 - o Since operating procedures make reference to the posted NMSLs as a separate entity, operating procedures generally do not require revision when NMSLs are revised.
 - o In nearly all instances, NMSLs are posted, where practicable, at work stations involving fissile material or in conspicuous places near fissile material storage areas.
 - o New or revised operating procedures are reviewed and co-signed by Criticality Engineering for conditions or changes which may impact nuclear criticality safety.
 - o Reporting and investigation of occurrences involving criticality safety limits are conducted in accordance with RI RFP HSE 3.01 (Sept 1, 1987) and with concurrence of the Rocky Flats Area Office.

CS.5 CRITICALITY ALARM SYSTEM AND EMERGENCY PROCEDURES

PERFORMANCE OBJECTIVE: An alarm system should exist which will immediately detect a criticality accident and will automatically alarm with sufficient volume and coverage to be heard in all areas that must be evacuated.

- FINDINGS:**
- o As demonstrated by the continued playing of music on the public address system, the criticality alarm system is clearly audible in nearly all areas of Bldgs. 776/777 which must be evacuated, except the second floor fan and filter house areas.
 - o The current detector and electronics design of the criticality alarm system minimizes false alarms and includes provisions to include concurrent response of two or more redundant systems to assure a fail-safe mode of operation.
 - o Bldg. 776/777 is entirely covered by a frequently tested and periodically calibrated criticality alarm system that conservatively meets the detection-threshold requirements of the ANSI/ANS 8.3-1986 Standard, "Criticality Accident Alarm System." Tests are performed monthly and continuous public address system monitoring is available.
 - * The need for a portable criticality alarm monitor near the NDT Vault was not recognized by the Criticality Engineering Department until recently. See Concern CS.1-1.

L. RADIOLOGICAL PROTECTION

This appraisal was based on a review of the RI HS&E Manual, procedures associated with facility safety, procedures related to specific health physics areas, audits, appraisals, and unusual occurrences. This review was supplemented by inspections of the facilities and discussions with operating and HS&E staff and management. Appraisal findings from the Bldgs. 707 and 771 DOE Technical Safety Appraisal reports and the June 1985 DOE/AL appraisal and the proposed RI responses were also considered.

Experience and training of the professional and technical radiation protection staff is very good. The professional staff includes several senior Health Physicists who are recognized by their peers for their competence and knowledge.

Many of the radiological protection performance objectives and criteria used for this appraisal team are either marginally met or not met at all. This is particularly true in organization and administration, procedures and posting, fixed and portable instrumentation, and radiological monitoring and contamination control. Twenty-five concerns have been identified by the appraisal team. Many of these require management initiatives by both the radiation protection and the operating staffs. The accomplishment of the technical improvements in the occupational exposure measurement and contamination control programs requires RI management's commitment, direction, and exercise of authority. Several of the concerns involve the expenditure of substantial staff and/or financial resources, including capital equipment and facilities, to effect the improvements needed.

The RI radiation protection staff have previously identified many of the deficiencies detected by the appraisal team and have initiated corrective action. However, progress in correcting the deficiencies noted has been impacted by the changing requirements of national guidance and severely restricted by limited resources.

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Facility organization and administration should ensure effective implementation and control of radiological protection activities within the facility.

- FINDINGS:**
- o Safety policies and responsibilities are clearly defined in the Health, Safety and Environment Manual (HSE) 18.02 and (HSE) 18.03.
 - o Safety responsibilities for building management, Bldgs. 776/777, are stated in "Building Management" RFPM ONM 7-304.
 - o The Director of Health, Safety and Environment (HS&E) has direct access to the Plant Manager.
 - o Responding to a finding in the June 1985 DOE safety program appraisal of DOE/AL, there was a reorganization in HS&E that moved Radiation Monitoring under the same manager as Health Physics, i.e., Radiation Safety.
 - o A subsequent reorganization in 1987 resulted in the combination of Radiation Monitoring and Radiation Protection into one organization. This placed professional health physicists in the Radiological Monitoring Program.
 - o Line management responsibilities for safety are scattered throughout the Rocky Flats Plant Policy Manual. These responsibilities are not summarized in one document. See Concern OA.6-1.
 - * Management of operations is divided among a number of organizational components. Individual managers and building managers defer to the HS&E organization for implementation of radiation protection practices within the building.
 - * Radiation Protection personnel have been trying to solve many safety problems identified during previous appraisals, which is actually the responsibility of line management. See Concern OA.1-1.
 - * Building and individual managers tolerate repetitive violations of building radiation and contamination control requirements and good radiation protection practices.
 - * Enforcement of requests to cleanup and to change ruptured and/or contaminated gloves has become a duty of radiation protection rather than line management.
 - * Personnel were observed working on potentially contaminated items without wearing surgeons gloves as required. One worker was observed machining uranium in an open glovebox without

surgeons gloves. Two maintenance workers were working on top of a glovebox without wearing required surgeons gloves.

- * The As Low As Reasonably Achievable (ALARA) coordinator responsibilities are not documented.
- * Observations of worker behavior by all appraisal team members leads to the conclusion that radiological protection requirements are not actively administered by management and supervision and adhered to by plant personnel.
- * Workers, management and monitors were observed leaving a room without surveying themselves for contamination.
- * Positive control was not established for monitoring within and upon departure from work areas. Workers were observed leaving the process area and exiting the building without being surveyed by a monitor.
- * Workers and managers were observed chewing gum in the work area.
- * Additional findings supporting the Concern below can be found in Section RP.11.

CONCERN: Realistic, understandable and enforceable operating
(RP.1-1) requirements and rules related to radiological protection are
 lacking.

CONCERN: There is no management system which provides continuous and
(RP.1-2) effective enforcement of radiation protection requirements,
 including clear assignment of responsibilities.

FINDINGS: o An extensive program to improve the quality of various elements
 of the radiation protection program has been identified by
 HS&E. HS&E has initiated the design of the new calibration
 facility, specification, and purchase of new equipment and
 sources, and will be developing procedures for characterization
 of source fields and establishment of traceability to the NBS.

 * Radiation Protection staffing in 1985 was 190 persons. This
 included 153 radiation monitoring technicians (monitors), 28
 foremen/managers, and 9 professional Health Physicists (HP).
 In 1988, the staffing level is 176. This includes 151
 monitors, 4 professional HPs (1 open requisition), and 21
 foremen/managers/secretary/ specialist. A reduction of 17
 percent in plant staff occurred during the past three years.
 Part of the professional health physics staff, a reduction of
 ~45 percent, were transferred into management functions. This
 strengthened management capabilities, however, it appears to
 the appraisal team that there is less professional staff time

than in the past to deal with substantitive issues that have been identified.

- * During the last five months, nine qualified monitors were replaced (bumped) by non-qualified staff as a result of union "bidding" as described in Section TC.3. During the previous six months a similar number were lost. It takes up to three years to qualify new monitors. (The contractor hired an additional twelve monitors including ten trained monitors previously bumped during the course of this appraisal.)
- * In 1985, the radiation instrumentation section consisted of 38 personnel. This included four foremen/managers, two professionals, six probe and cable technicians, and 26 electronic technicians. In 1988, the staffing level is 30 including two foremen/managers, two professionals, four probe and cable technicians and 22 electronic technicians. The number of instruments to be calibrated and maintained have not been reduced. Scheduled changes, which include quality control, calibration and testing to meet ANSI N323 requirements, will substantially impact the staffing requirements.
- * HS&E received a \$30K allocation for radiation protection from the RFP capital equipment budget of \$8M in FY88.
- * The upgrade of the radiation protection program to meet new or existing standards and regulations as planned by RI is heavily dependent on the receipt of additional or new instruments or equipment.

CONCERN:
(RP.1-3)

The resources required to conduct an effective Radiation Protection Program are not available.

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

- FINDINGS:**
- o RI policies concerning Internal Audits and Investigations are stated in HSE 1.02, 2.02, 3.01, 17.01, and 17.04 and RFPM MHS 3-061, 8-100, and 16-500.
 - o There is an annual safety audit of Bldgs. 776/777 performed by a multi-disciplinary group.
 - o The radiation protection aspects of the audit include a review of survey operations, radiological reports, trend analyses, equipment, and compliance.
 - o Reports are reviewed by management and a formal response is required on plans for corrective actions and their implementation.
 - o Audit reports are sent to the Building Manager, the Manager of Operations, and the Health Physics' supervisor.
 - o The Director, HS&E requests a formal response on planned actions for corrective measures identified by these audits. A formal tracking system is necessary to ensure timely response to and completion of these corrective measures.
 - * The Health Physics' member of the audit group is not independent of the program being audited, but is the Health Physicist for the building.

CONCERN:
(RP.2-1) The requirement of DOE 5482.1B, Section 10 to assign individuals to the audit team who are independent of the Bldgs. 776/777 operations is not being complied with.

RP.3. RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generation devices should provide for safe operation and for clearly identifying areas of potential hazards.

- FINDINGS:**
- o Radiation protection procedures are documented in the HSE 1.02, 2.02, 18.02, 18.03, 18.04, and 18.05 and RFPM MHS 3-001, 3-050, 3-060, 3-061, 3-062, 3-065, 3-600, 8-100, and 16-500. However, control of this document and others developed by HS&E is inadequate. See Concern OA.6-1.
 - o Operational Health Physics is developing a procedure and policy guide covering five major areas to supplement the HS&E Manual.
 - o The radiation-generating machine control program, including posting practices, meets the DOE requirements and performance criteria contained in appropriate ANSI standards such as N43.2 and N543.
 - o A complete record of radiation-generating machines and surveys is maintained by machine number.
 - o Machine surveys are conducted on a semi-annual basis.
 - o All surveys of radiation generating equipment have been completed on time, as specified in HS&E procedures.
 - o Fail-safe interlocks are used on radiation-generating devices to ensure the safety of operators and other personnel.
 - o All purchase, use, storage, and disposal of sealed radioactive sources must be approved by Health Physics.
 - o All sealed sources are inventoried semi-annually.
 - o Sealed-source requirements outlined in HSE 18.04 (Sources) and 18.05 (Devices) are under revision. This will separate present requirements into two parts: (1) sealed sources and, (2) radiation producing devices.
 - o The revised draft requirements contain a mandatory training requirement. Health Physics is conducting its own training for custodians and users of sealed sources and radiation producing devices.
 - o Health Physics has developed a training manual for custodians and users of sealed sources.
 - o To ensure the safety of work in Bldgs. 776/777 that involves special operations such as repair and maintenance, a properly

executed Work Permit must be prepared. This permit must be reviewed and approved by HS&E.

- * Posting of radiation levels at the entrance to radiation zones is not consistently provided.
- * Radiation work permits were not posted at the entrance to the basement drum storage area where the radiation level at the perimeter was as high as 30 mrem/hr and the air samplers were shut off. The appraisal team was told that materials accountability personnel climb on barrels in storage areas to perform periodic accountability surveys. Some of the barrels do not contain a record of the dose rates and some of the areas are not posted with the dose rates.
- * Radiation levels are not consistently posted on waste drums and drum storage areas even though the neutron and photon dose equivalent rates may be in the tens of mrem/hr.
- * Dose rates in the tens of mrem/hr were detected at the surface of some gloveboxes. These were not posted and the operators were unaware of the radiation levels.
- * Appraisal team members were taken by their escorts into the basement storage area, without protective clothing. They were not accompanied by a monitor to perform contamination/radiation surveys.
- * The escorts notified the work area manager that entry was going to be made, and were not told of any restrictions. RI procedures require the wearing of coveralls if entry is made into an area where respiratory protection is required. The respiratory protection sign was posted. The posting of other requirements, such as wearing of coveralls was inadequate.
- * Upon exiting from the building, one of the escorts was found to have contamination on his personal clothing. Internal Investigation Reports are to be written on both the inappropriate entries.

CONCERN:
(RP.3-1)

Posting of radiation type and levels at the entrance to all radiation zones and on waste containers and gloveboxes is inadequate.

FINDINGS:

- * Smear sample counters receive only one ten minute source count every 24 hours. Adjustments are made as necessary in the source position. The source is recounted to achieve the desired counting level. During a re-check at 2000 hours on February 2, 1988, three of the five channels were outside calibration parameters.

- * One ten-minute count does not constitute a good statistical (Chi-squared) test of the counter operation.
- * No statistical control chart is maintained for the counter.
- * No records are maintained as to the count that is obtained for each channel. Only an indication of the efficiency of each channel is written on the instrument (a new log book was instituted; however, the data recorded was inadequate to justify the quality of the counter).

CONCERN:
(RP.3-2)

There are no procedures to ensure that: smear counters are properly calibrated; calibration data are recorded and maintained; and defective smear counters are removed from service and repaired.

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

- FINDINGS:**
- o** The RI policies concerning the external radiation exposure control program are stated in HSE 1.02, 2.02, 18.02, and 18.03.
 - o** Operational controls are established for personnel dose, facility does-rate measurements, air sampling, and smear results.
 - o** HS&E personnel are involved in the approval process for radiation work permits and facility design changes.
 - o** Radiological control data is routinely provided to foremen or line supervisors.
 - o** An extensive dose-reduction program has been developed and presented to management. This includes (1) maintaining exposures below 2.5 rem/year even after the neutron quality factor is changed, (2) reducing reliance on administrative controls, and (3) extensive reduction of staff.
 - o** Average doses for the radiation workers in Bldgs. 776/777 are on a downward trend.

RP.5 EXTERNAL DOSIMETRY (ROUTINE AND ACCIDENT USE)

PERFORMANCE OBJECTIVE: The routine and accident personnel dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

- FINDINGS:**
- o The RI policies concerning external dosimetry (routine and accident) are stated in HSE 1.02, 18.02, and 18.03 and RFPM MHS 3-050 and 3-060.
 - o Comprehensive quality assurance procedures are currently being documented in response to the Office of Nuclear Safety's appraisal of DOE/AL, May, 1985.
 - o Documentation of personnel dosimeter response to neutron radiation in the workplace is completed.
 - o The HS&E staff has identified the need for a new calibration facility for several years. The new facility is a line item project for FY1988.
 - o Conversion from the Harshaw to the Panasonic wrist dosimeters will be implemented when the computer support capability is completed. This will result in enhancement in the wrist dosimetry program.
 - o Personnel dosimeter response is routinely verified by comparison with exposures provided by another contractor laboratory using traceable standard sources.
 - o Placement criteria are documented for the nuclear accident dosimeters. The gamma measuring component of nuclear accident dosimeter integrates dose. Revision to procedures has been completed to address routine changeout of the gamma-responsive element.
 - o Fixed nuclear accident dosimeters were introduced into Bldgs. 776/777 in response to the appraisal of DOE/AL noted above. This brings this part of the program into compliance with DOE 5480.1A, Chapter XI, Part 2.
 - * DOE 5480.1A, Chapter XI requires gamma dose response to be within 20% of true dose in the presence of neutrons. Neutron dose response was characterized during a 20-second intercomparison of criticality accident dosimeters during August 12-16, 1985, but the gamma dose was not. The gamma component was to have been characterized in August 1986; however, the test was cancelled.
 - * Conversion factors were determined in 1972 for translating the dose measured at the wrist to the dose received by the finger. These factors were verified in 1981. A single conversion

factor of 2.5 is used for all work in Bldgs. 776/777. Some production components handled directly by personnel were measured by the appraisal team. Photon readings taken close to the component were as high as one rem/hr. Correcting the instrument reading for geometry to estimate the surface dose equivalent rate would increase the reading up to a factor of ten. The study in 1972 suggested a correction factor for the wrist to finger tip of up to 6.5 may be appropriate.

CONCERN:
(RP.5-1)

There is a need to verify wrist badge-to-finger dose equivalent conversion factors for the various jobs and document the response of personnel dosimeters and wrist dosimeters to photon and neutron dose in the workplace.

FINDINGS:

- o The number of dosimeters not being exchanged at the end of each badge cycle has been reduced to almost zero by implementation of a chain-of-control procedure.
- o Coveralls with a pocket having a clear window to secure the whole-body dosimeters close to the trunk, as required by plant policy, are being procured.
- * Employees wear their dosimeter on a chain around their neck or clipped to their clothing (usually their collar.) The neutron portion of the dosimeter is designed on an albedo principle. Thus, the dosimeter must remain close to the trunk for the reflected neutrons to interact. This was a finding in the DOE Technical Safety Appraisals of Bldgs. 707 and 771.
- * Several exposure situations were observed where dosimeter placement was inadequate. For example, truck drivers wore their dosimeters on their chest while driving trucks carrying low-level radioactive materials located behind them so that their body shielded their dosimeter.

CONCERN:
(RP.5-2)

Dosimeters are not being worn correctly to ensure proper measurement.

FINDINGS:

- o A comprehensive short-term and long-term plan was developed in 1987 which will permit RI to obtain accreditation of their external dosimetry program to implement the changes resulting from the revised DOE 5480.11 draft.
- * Measurement of energy levels for photons and neutrons is important in the proper assessment of external dose, particularly the neutron component. The program to collect these data in the workplace has been on hold since the health physicist performing that function departed in July 1987.

CONCERN:
(RP.5-3)

The program to measure and document the radiation energy levels in the workplace is incomplete.

FINDINGS:

- * The number of emergency self-reading pocket dosimeters in Bldgs. 776/777 is limited. The shift superintendent carries six pocket dosimeters with a range of 0-100 R. Control of the other emergency dosimeters is inadequate. The dosimeters are neither calibrated nor tested based on the requirements in ANSI N13.5 and N322.

CONCERN:
(RP.5-4)

Emergency dosimeters are not located strategically throughout the facility and are not calibrated.

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

- FINDINGS:**
- o The RI policies concerning the Internal Radiation Exposure Control Programs are stated in HSE 7.03, 7.05, 6.05, and 10.02 and RFPM MHS 2.1, 2.2, 2.3, 2.4, 2.6, 3.1, 3.2, 3.3, 3.4, 3.5, 5.1, 5.2, 5.3, 5.4, 6.1, 7.1, 7.2, 7.3, 7.4, 9.1, 9.2, and 10.1.
 - o An aggressive air-sampling and air-monitoring program is conducted by Radiation Protection. This results in collection of ~700 samples per month in Bldgs. 776/777.
 - o Engineered controls such as the following are used when feasible to prevent the intake of radioactive material:
 - Ventilation systems are balanced to ensure that the airflow is toward areas of higher contamination.
 - Portable filtration systems are used to control air-borne contaminants.
 - Containment structures, such as temporary containment tents, are used to protect personnel working in adjacent areas.
 - o Routine contamination surveys are performed at appropriate frequencies in an effort to characterize the radiological conditions in the facility.
 - o Radiation work is controlled through a series of formal documents or permits including operating safety analyses, operating procedures, and work permits. All of these require radiation protection reviews and signoff.
 - o Reduction of contamination incidents and amounts of contamination are major FY1988 RI initiatives. This has resulted in a program to ensure quality of glovebox seals, purchase of improved coveralls and gloves, and establishment of contamination control committees that meet regularly and receive input from hourly workers.
 - * Continuous Selective Alpha Air Monitors (SAAM's), currently used at Rocky Flats have a detection level of 24 maximum permissible concentration-hrs (MPC-hrs) this is 24 times the Bldgs. 776/777 radiation control guide.
 - * Many false alarms occur because of high radon levels. This tends to reduce employee confidence in the monitor.

- * During the past few weeks, several SAAM's were turned off without notifying either radiation monitoring or the instrument technicians. These instruments were operational when turned back on. There is no electronic method to automatically display their operational status in the monitoring office.
- * A line-item budget of \$4.5M to upgrade the air-monitoring system to include ~450 of the new RFP and 50 of the new Lawrence Livermore National Laboratory (LLNL) designed alpha air monitors for stack monitoring was defended and approved in FY85 and early FY86. This line item was deleted by DOE/HQ at mid year FY86. RI has continued to attempt to gain this funding.
 - New alpha air monitors developed by RI have a detection level of about three MPC-hrs and have passed a portion of the performance test criteria contained in Draft ANSI N42.17B.
 - More complex air monitors developed by LLNL to meet RI requirements have a detection limit of ~0.5 MPC-hrs. These are scheduled in FY88 for a complete test against Draft ANSI N42.17B performance criteria.
 - RI has a design for a new alpha air monitor data logger that will permit transmission of air-monitoring data to a remote location such as the EOC.
- * Additional findings supporting the Concern below can be found in Section RP.10.

CONCERN:
(RP.6-1)

The alpha air-sampling/air-monitoring capabilities in Bldgs. 776/777 are inadequate.

- * Three contaminated glovebox gloves were not changed in the four-week period between the first and last time that they were seen by appraisal team members. This is contrary to good radiation practice.
- * The appraisal team was told by radiation monitoring personnel that this is a common maintenance problem.

CONCERN:
(RP.6-2)

The program to ensure that contamination in the workplace is promptly removed is ineffective.

RP.7 INTERNAL DOSIMETRY

PERFORMANCE OBJECTIVE: The Internal Dosimetry Program should ensure that personnel radiation exposures are accurately determined and recorded.

- FINDINGS:**
- o The RI policies concerning internal dosimetry are stated in HSE 18.02 and 18.03 and RFPM MHS 3-050 and 3.063.
 - o Internal dosimetry staff have identified several areas of internal dosimetry where improvements can be made in the quality of the program. These include prospective dosimetry, developing activity-level inventory, quality assurance/quality control documentation, data tracking, modeling, and algorithm development. A comprehensive short-term and long-term plan was developed in 1987 which will permit RI to obtain accreditation of their internal dosimetry program and to make the substantial changes resulting from the requirements in the Presidential Directive in the Federal Register, (Volume 52, No. 17, January 27, 1987) and reflected in DOE 5480.11 draft. This plan which includes the need for substantial staff and physical resources to accomplish the effort, will ensure that the internal dosimetry program will meet all applicable DOE, NCRP/ICRP, and ANSI requirements and recommendations.
 - o The technical criteria employed to determine which employees are included in the bioassay program and the frequency of bioassays are documented and appear to be consistent with performance requirements, ANSI N343, ANSI N13.30 (draft), and ALARA practices. Evaluation methodology responsive to new draft DOE 5480.11 requirements has been developed. This includes the use of ICRP 26/30 models modified by Langham/Durbin excretion studies and studies by Falk in developing a new model for plutonium excretion. This will permit the calculation of radiation dose to organs. This model represents a significant upgrade in the assessment of the systemic deposition of plutonium from urine data.
 - o The contractor has a documented policy on work restrictions as a result of internal exposure. Permanent work restrictions are in the employee's occupational exposure record. Temporary restrictions are maintained by Medical. It was recommended during the May 1985 appraisal of DOE/AL that a copy of the temporary restrictions also be placed in the occupational exposure record file. This is still open.
 - o A new, more sensitive portable plutonium wound counter has been developed. A new detector is being developed to precisely locate contamination at a wound site. This should permit reducing the size of the excision.
 - o A major upgrade of the RFP body-counter computer and data-acquisition system has been accomplished. Data

acquisition, reduction, and report generation are now done by computer.

- o As a result of management initiative, scheduled staff participation in scheduled whole-body counting increased from 65% to ~ 80% for 1987. Cancellations and no shows have decreased.
- o Tracking the status of bioassay sampling is extremely difficult because of the large volume of samples and the absence of automated techniques.
- * Improved tracking of the routine bioassay program including backlog identification and followup action is a RI CY 1988 goal. This depends on implementation of the scheduling module of the Health Physics Database.
- * Completion of the Health Physics Database has been delayed due to technical and staffing problems.

CONCERN:
(RP.7-1)

A method to track routine and special bioassay requests is needed.

FINDINGS:

- o HS&E is in the midst of upgrading their Quality Protection Plans. It has issued a departmental Quality Assurance Procedures Manual based on Nuclear Quality Assurance-1 (NQA-1) requirements. The quality assurance manual for Radiation Dosimetry is scheduled to be rewritten by June 1988.
- * No independent audits have been performed on the Internal Dosimetry program in the last several years. (The HS&E Quality Group has initiated such audits.)

CONCERN:
(RP.7-2)

There is no independent audit program for internal dosimetry.

FINDINGS:

- o Analyses are currently performed to compare the correlation between fecal results, contamination levels in nose smears, and contamination smears.
- * The comparison of work location air contamination to the above parameters is not performed. Such comparisons may provide a better relationship to depositions and a better check on the adequacy of the bioassay sampling frequency.
- * These comparisons would permit the automatic estimation of dose from intake where bioassay sample detection limits are not low enough. This will be necessary to meet the draft DOE 5480.11, requirement to calculate the residual committed dose.

CONCERN:
(RP.7-3)

The program to compare in-vivo and in-vitro results for employees with air contamination in their workplace is incomplete.

RP.8 FIXED AND PORTABLE INSTRUMENTATION (NORMAL AND EMERGENCY USE)

PERFORMANCE OBJECTIVE: Radiological protection instrumentation used to obtain measurements of radioactivity or personnel dosimetry should be calibrated, used, and maintained so that results are accurately determined.

- FINDINGS:**
- o The radiation protection instrument maintenance and calibration program is documented in HSE Manuals 18.02 and 18.03 and RFPM MHS 3-050 and 3-063.
 - o Radiation safety has an adequate number of dose rate and contamination-measurement instruments (approximately 6000 for the plant) to meet the needs of their programs. The performance stated by the manufacturer would appear to be adequate to meet performance standards if the instruments actually were tested to meet the criteria.
 - o The 22 instrument technicians appear to be well qualified in their work. However, one technician has a permanent medical restriction and is not available to perform the routine work of a Radiation Instrumentation Technician.
 - o Selective Alpha Air Monitoring (SAAM) instruments alarm at the monitoring office in addition to the alarm at the instrument.
 - o Plans are underway to extend the criticality alarm signals to a panel in the Emergency Operations Center. This effort will depend on the available workforce.
 - o The criticality alarm system includes detection systems that have been qualified for high-power wide-band radio-frequency interference, shock to 100 G, and seismic testing above 9 on the Richter scale. Testing shows that the RFP criticality alarm system responds faster for a given flux level than any other system tested.
 - o A new calibration facility with substantially enhanced capabilities is scheduled for completion in FY91.
 - o As a result of a recent reorganization and the development of short term and long term plans, RI is attempting to improve the quality of their portable and fixed radiation protection instrumentation program.
 - * The electronics package in all combo of a certain model were replaced in FY87 to improve the quality and standardize the instruments throughout the plant. However, the appraisal team found old models that had not been upgraded. (Subsequently the old ones have been removed.)
 - * The current written calibration procedures for portable dose rate and contamination survey instruments do not meet the

requirements contained in the DOE-prescribed calibration standard ANSI N323.

- * One procedure for Ludlum Model 12 alpha survey instruments that had been prepared to meet the requirements of ANSI N323 had not been approved and was incomplete since source calibration was not required. (The procedure has now been completed and approved.)
- * Some instrument technicians were using the old procedure and some were using the new unapproved one. (All now use the same, approved procedure.)
- * An ANSI N323 type annual calibration is not performed on routine and emergency instruments used for establishing dose rates.
- * An NBS-traceable transfer instrument is not currently being used to establish uniformity between multiple laboratories and to establish linearity of source fields in the photon source calibrator.
- * Neutron and photon instruments are calibrated in seven facility instrument-repair locations, including one in Bldg. 776. No fixed-geometry and well-characterized radiation field calibrators are used. This could lead to differences in calibration between various instrument laboratories.
- * No central facility is available where radiation sources traceable to NBS are operated in a fixed geometry. (The contractor identified a building to be used as an interim facility during the appraisal.)
- * Dose-rate instruments are not checked with a source daily when in use to ensure continued accuracy as required by ANSI N323. Gamma and neutron dose-rate instruments are kept on carts in the radiation area of the Bldgs. 776/777. No check sources are available to verify proper operation. (Instruments are now kept in the office and are source checked, for response prior to use.)
- * The source used at the calibration facility is inadequate to calibrate the high range instruments and to provide the tests for overload response for all instrumentation. This is of particular concern for emergency radiation protection instrumentation such as the Radector III's.

CONCERN:
(RP.8-1)

The portable instrument calibration program does not meet the requirements of DOE-prescribed standard ANSI N323.

FINDINGS:

- * Hand and shoe counters (Combos) and fixed survey instrumentation (Alphamets) do not receive a calibration, only

a one point check. (Combos and Alphamets are now being calibrated.)

- * Radiation sources used by electronic technicians are of different strengths and are not traceable to the nbs.
- * One technician using the same source, checked ~12 Combos. The instrument response varied substantially. Response time and maximum response also varied.
- * SAAMs do not receive an ANSI type calibration. They are only doing a one point check. (They are now being calibrated.)
- * Radon compensation calibration procedures for the SAAM's are not uniformly applied by the Instrument Technicians. A carefully calibrated instrument will experience few false alarms.

CONCERN:
(RP.8-2)

Combos, Alphamets, and SASMs are not calibrated as needed to assure continued effective operation.

FINDINGS:

- o The DOE-prescribed calibration standard (ANSI N323) includes several parameters that are to be evaluated upon purchase of the instrument and when major changes (change in components) have been made to the instrument. These include range, sensitivity, linearity, detection limit, response to overload conditions, accuracy and reproducibility, energy dependence, and temperature and pressure dependence.
- * Performance tests, as required by ANSI N323, have not been performed on all radiation protection instrumentation. Performance tests conducted by other organizations reveal failure of a substantial number of instruments to meet required or advertised performance specifications.
- * RI is dependent on the performance criteria provided by the manufacturer. In many instances, the performance criteria provided by the manufacturer is not based on actual tests of performance such as that suggested in Draft ANSI N42.17A. When this is true, calibration of new instruments will not satisfy requirements such as assessing the energy response of the instrument.

CONCERN:
(RP.8-3)

The health physics instruments used for personnel protection do not all conform to appropriate performance requirements of applicable standards.

FINDINGS:

- * No comparison is performed independently to ensure that the procedures for maintenance and calibration are applied uniformly at each of the seven RFP instrument laboratories and

that the instruments respond similarly to the same radiation level.

- * Probes are re-built in a hallway adjacent to the Bldg. 776 instrument shop. The area is dusty, thus impacting the quality of the probe. (RI has relocated this operation to a more appropriate area.)
- * A satisfactory quality control (QC) program for checking the new probes had not been developed. (This has been done as a result of this appraisal.)
- * A QC program has not been established for replacement parts and probes for Health Physics instrumentation. (This has been developed.)
- * Many instruments are constructed such that adjustments can be made by monitors and operating staff. (RI has sealed the adjustment unit.)
- * Radiation monitors were not routinely source checking their Ludlum alpha survey instruments using the new sources purchased for that purpose. A spot check of seven "calibrated" instruments being used by monitors revealed that all seven were outside the calibration limits. (Ludlums are now checked daily.)
- * Monitors carry an extra probe for the Ludlum and freely exchange the probe if they feel the instruments are too "noisy" or "contaminated". ANSI N323 requires recalibration if probes are exchanged. One such instrument, which had had a probe changed by a monitor earlier in the day, was approximately 40% low on all scales. (Monitors are no longer permitted to perform field maintenance.)
- * Monitors in the past have requested that the Ludlum's sensitivity be "set" high. It appears that the monitors may adjust their instruments high, since the Instrument Technicians will no longer honor this request. (Daily performance checks are now performed and operators no longer adjust instruments.)

CONCERN:
(RP.8-4)

There is no effective quality control program for radiation protection instrumentation.

RP.9 RESPIRATORY PROGRAM

PERFORMANCE OBJECTIVE: The respiratory program should ensure optimum protection against internal radiation exposures to workers.

COMMENT: This Performance Objective is addressed in subpart RP.2 of this report.

RP.10 AIR MONITORING

PERFORMANCE OBJECTIVE: Air monitoring systems selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.

- FINDINGS:
- o A documented air-sampling and air-monitoring program is in operation. Approximately 700 samples are collected each month in Bldgs. 776/777.
 - o An appropriate flow calibration program is in place; however, the flow meters were not marked as to the appropriate flow rate. (RI initiated an immediate fix to this.)
 - o RI has established a Radioactive Concentration Guide for Bldgs. 776/777 that is the same as the Maximum Permissible Concentration values in DOE 5480.1B, Chapter XI.
 - o RI has identified the need for an upgraded air-sample vacuum capability in Bldgs. 776/777 for the last five years. This currently has not been approved by DOE.
 - o Air sampling in breathing zones will become a required part of estimation of internal exposure when the draft DOE 5480.11 is in place.
 - * Air monitors are source-checked at least quarterly. However, this does not accomplish an adequate calibration of the instrument.
 - * Air sampling and air monitoring is inadequate in Bldgs. 776/777. The location of the samplers and monitors, in many instances, are neither representative of the breathing zone contamination levels nor the contamination levels at the air exhaust from the room.
 - * With the exception of a few locations, all air samples are currently collected near room exhausts. These sample locations are partially blocked and the rooms are crowded. Thus, these samples are not necessarily representative of worker's exposure.
 - * At several locations the sample head is located to the side of the filter box and pointed away from the filter box. With the high flow rate through the filter and the low flow rate through the sampler, it is doubtful that the sampler is collecting an adequate sample.
 - * No high volume filter or impactor samplers were available for use in Bldgs. 776/777 if rapid and/or spectrographic analyses were required. (This problem has been corrected.)

- * Instruments are not checked periodically for in-leakage into the sample chamber. For an in-line monitor such as one monitoring airborne contamination through a wall or in a plenum, the sample integrity may be impacted severely.
- * Tygon tubing is frequently used to connect in-line Selective Alpha Air Monitoring instruments to the area being sampled. The static charge in the tubing can prevent proper collection of a sample.
- * Several tritium absorbers (bubblers) and air monitors are connected by 1/4 inch tygon tubing to plenums or gloveboxes. Condensate was noted in the upstream side of the bubblers or monitors. This will absorb tritium until equilibrium is reached.

CONCERN:

The above matters are addressed by Concern RP.6.1.

RP.11 RADIOLOGICAL MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiological monitoring and contamination control program should ensure worker protection from radiological exposures.

- FINDINGS:**
- o The RI policies concerning radiological monitoring/contamination control are stated in HSE 18.02 and 18.03.
 - o Radiation Monitoring has a contamination survey program with adequate frequency to identify and control contamination in the workplace.
 - o Special operations, such as bagouts, involving a high risk of spreading contamination are well planned and executed. Control and monitoring by the radiation monitor is a strong contributing factor to the successful completion of many of these activities each week.
 - o RI has a formal program for changing glovebox gloves on a set frequency.
 - o Maximum permissible personnel contamination levels (skin and clothing) have been established. Detected contamination in excess of these levels is investigated and documented as to source, probable cause, and other pertinent information. Records of these investigations are manually maintained and reviewed by Radiological Protection management for trends, and corrective action is taken as necessary.
 - o Adequate facilities for decontamination are available. Contaminated wounds are decontaminated by medical personnel.
 - o A documented radiological monitoring program is in place that includes the frequency and location of radiological surveys.
 - o The DOE ALARA Manual DOE/EV/1830-75 suggests that change rooms should be used to restrict contamination and protective clothing to a radiation area.
 - o A DOE prescribed, "Guide to Good Practices at Plutonium Facilities," BNWL 2086, 1977, requires that (Section 3.4.3, pages 3-18) the normal (non-emergency) exit be from the controlled area through change rooms for men and women. It requires a clear demarcation between the clean and potentially contaminated areas.
 - o Accepted contamination control practices at most plutonium facilities include the use of at least laboratory coats for any entry or work within a radiation area.
 - * Supervisors and visitors are permitted in the controlled work areas without coveralls or laboratory coats.

- * Twenty percent of the laboratory coats had missing buttons. Several had no buttons.
- * Coveralls worn in the work place are allowed in the 700 Area lunch room if they have been surveyed. Personnel were observed exiting the process areas in coveralls and entering the cafeteria without either changing the coveralls or having them surveyed.
- * Masks are allowed in the lunch room in coverall pockets, if surveyed. Not all of these are surveyed before they are taken to the cafeteria.
- * Laboratory coats are allowed in the office areas of the adjacent Bldg. 750.
- * Adequate instructions to guide personnel in contamination control procedures are not always posted. These are accomplished through the use of marks on the floor with appropriate messages, e.g., "shoe covers required" on one side and "remove shoe covers" on the other. At most Combo locations, it is not clear if a survey is to be made before passing the Combo in any direction.
- * Personnel were observed entering "no shoe cover" areas wearing shoe covers.
- * Workers commented to appraisal team members that there is inequality and dichotomy in making them wear coveralls and take showers, while their supervisors can observe them for the entire period wearing only shoe covers.

CONCERN: The above matters are addressed by Concern RP.1-1.

- FINDINGS:
- * Personnel repeatedly violate procedures by not using the Combos and Alphamets.
 - * Some personnel do not survey themselves for the period of time specified in the procedures (10 seconds for each foot using the Combos). There is no instruction as to how long to survey each hand. Most personnel are monitoring for no more than 1-2 seconds for each extremity. (New instructions for self-monitoring have been placed on each instrument.)
 - * Some personnel were observed by the appraisal team exiting the process area and leaving the building without obtaining a personal survey from the monitors. (Radiation monitors have been placed at all exits to perform personnel surveys.)

CONCERN:
(RP.11-1)

Effective procedures for self-monitoring by personnel using the Combo instruments and survey instruments (Alphamets) have not been developed and personnel have not received training in their use.

FINDINGS:

- o RI is planning a new laundry facility including new monitoring equipment to be completed in FY89. The facility will have two automatic laundry monitors.
- * No procedures exist to ensure that radiation monitoring staff perform the clothing survey properly, including length of time under the monitor instrument. (A procedure has been implemented.)
- * The clothing monitor instrument was not being routinely calibrated by the instrument technicians. (This calibration is now required routinely.)
- * The new laundry monitor instrument was checked with two americium sources by the appraisal team. The instrument did not respond to these sources.
- * Another laundry monitor instrument was also being used for checking clothing. No calibration procedure was written for this instrument. (It subsequently was removed from the laundry.)
- * The log book for the new laundry monitor instrument is inadequate in terms of the calibration data recorded.
- * Only laboratory coats and coveralls that have been identified as "contaminated" are surveyed after washing. Most protective clothing is not surveyed.
- * Shoe covers are not surveyed after washing or inspected for holes.
- * Appraisal team members observed that many shoe covers (in bins of clean covers) contained holes.
- * Twenty percent of the laboratory coats in a clean laundry basket in the entrance hall to Bldg. 776 had missing buttons. Several had no buttons.

CONCERN:
(RP.11-2)

The survey and inspection of washed clothing at the laundry is inadequate.

RP.12 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained As-Low-As-Reasonably-Achievable.

- FINDINGS:**
- o A formal plan for ALARA exists at RFP as described in HSE 1.02 and RFPM MHS 3-065.
 - o Measurable, realistic goals are established for Bldgs. 776/777.
 - * The ALARA plans and goals are not part of the internal audit program.
 - * There are no procedures for implementing the ALARA program in Bldgs. 776/777.
 - * The responsibilities of the ALARA Coordinator and other staff are not documented.

CONCERN: Documentation of the Health Physics ALARA program for Bldgs. 776/777 is non-existent and the responsibilities of the ALARA Coordinator and other staff are not specified.
(RP. 12-1)

- FINDINGS:**
- o HS&E personnel have developed monthly trend analyses of: (1) all production groups at risk of receiving annual dose equivalents equal to or greater than 500 mrem/person, (2) all process air sampling data greater than the RCG, (3) all contamination incidents, and (4) all process area contamination survey data.
 - o Exposure trends continue to be decreasing for most employee groups in both internal and external exposure.
 - o Operational controls are established for personnel dose, dose rate measurements, air sampling, and smear results. Only air sample results equal to or greater than RCG receive trend evaluation.
 - o A significant amount of data entry for trend results is performed manually. An automated tracking and analysis system is being developed by Radiation Protection. Once interactive sharing of air sampling, body counting, personnel dose, etc., is available, trend evaluation can be greatly expanded. This will be completed as staff is available.
 - o Radiation exposure reduction goals are established for various working groups and appropriately exclude group members who are not normally exposed.

- o Trend analyses are performed to include total man-rem average exposure, and maximum exposure for each group.
- * Air samples are evaluated only when they equal or exceed RCG.
- * Data gathering and reduction and trend analyses are accomplished manually. This is a labor intensive process. These tasks are performed by health physicists, as they should be, but health physicists are a short resource.
- * The program for automation of the data reduction and trend analyses has been developed. Shortage of health physicists, as discussed in Section RP.1, have precluded their leaving their work place to be trained to use the program and then going to the records storage area to perform the data trend analyses. Communication connections must be made to the offices and personnel must be trained to use the automated trend analysis.

CONCERN:
(RP.12-2)

The automated data entry and trend analyses program for air samples and personnel exposure is not operational.

FINDINGS:

- * Dose rates in the tens of mrem/hr were detected on the surfaces of several gloveboxes. The dose rates were not posted and the operators were not aware of the radiation levels.
- * Copies of radiation and contamination surveys are not given to the foreman whose area was surveyed for his review and posting in the workplace.

CONCERN:
(RP.12-3)

Contamination/radiation survey results are not provided to the supervisor/foreman responsible for each area for their review and posting.

RP.13 RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

- FINDINGS:**
- o RI policies concerning records are stated in HSE 18.02 and HSE 18.03 and RFPM MHS 3-060, 3-061, and 3-600.
 - o The HS&E laboratory information system has been developed and implemented. This system is a precursor to implementing a program to interactively communicate pertinent radiation exposure information to management and appropriate health and safety personnel.
 - o A central organization within HS&E was established to maintain occupational exposure records.
 - o Prior exposure history, bioassay data, dose assessment methodology, personnel dosimetry results and air sampling data are maintained in a centralized location protected from loss.
 - * Occupational exposure records as defined in ANSI N13.6 are stored in several locations. There is no procedure that clearly defines the records that are to be included as an "occupational exposure record", the organization responsible for generating the record, the custodian, and the retirement schedule which is compatible with DOE orders.
 - * Historical records required by ANSI N13.6 are not accumulated consistently and maintained in one central location. It took one day to find the study which justifies the conversion factors for the wrist dosimeter.
 - * Radiation monitoring records do not contain the instrument number nor the initials of the surveyor as required in ANSI N13.6.
 - * Most records inadequately state the conditions that were found and they do not show follow-up survey results.
 - * Survey records are maintained at the Health Physics office in Bldgs. 776/777, separate from a centralized location. The records are not in fire proof safes. See Concern OA.6-2.
 - * Some monitors record the measured radiation/contamination level even if it is zero and some record the lower limit of detection for radiation/contamination below that level (e.g. <20 disintegrations/minute).

CONCERN:
(RP.13.1)

The occupational exposure record program does not meet the requirements for maintaining complete records.

(See also Concern OA.6-2.)

M. PERSONNEL PROTECTION

The personnel protection programs in industrial hygiene and occupational safety were consistent in scope with the potential hazards associated with Bldgs. 776/777. The personnel protection-related professional and technical resources in the safety, operations, and maintenance organizations were observed during the appraisal and found to be technically competent. Violations of basic safety practices were observed during facility and area tours; however, imminent hazards were not apparent.

Eight areas of concern were identified that, when corrected, will enhance the programs currently in place. These concerns address: (1) routine monitoring to confirm the effectiveness of chemical control measures; (2) hazard ratings for chemical mixtures; quality control measures in (3) respiratory protection programs, and (4) laboratory analysis of samples; (5) a common data base for industrial hygiene records; (6) better utilization of technical resources; (7) an effective hoisting/rigging program; and (8) an aggressive safety awareness and promotion program. For several of the concerns, the root cause could relate to a failure to effectively implement programs currently established at RFP.

PP.1 INDUSTRIAL HYGIENE PROGRAM CONTENT

PERFORMANCE OBJECTIVE: The industrial hygiene program should minimize the probability of employee illness, impaired health or significant discomfort by identifying, evaluating, and controlling those stresses arising in the workplace.

- FINDINGS:**
- o The industrial hygiene program is well defined in the Health, Safety and Environment Manual. The program scope is clearly defined and responsibilities identified in Chapter 13; major program elements are described in related chapters.
 - o Detailed directives for implementing the technical basis of the industrial hygiene program are provided in the Rocky Flats Industrial Hygiene Procedures Manual.
 - o During 1987, one incident of potential excessive exposure to a chemical agent was reported. The incident was investigated and corrective action implemented.
 - o No evidence exists that chronic exposures in excess of permissible limits occur during the routine use of chemicals or non-ionizing physical agents in Bldgs. 776/777.
 - o The industrial hygiene staff participates in the review of facility work orders, work permits, engineering job orders, Operational Safety Analyses (OSAs), and review of Incident Investigation Reports (IIRs). This ensures identification of potential industrial-hygiene related hazards through knowledge and continuing assessment of operations.
 - o The capability exists to obtain, analyze, and interpret bioassay samples; however, routine bioassay is not indicated for potential chemical contaminants in this facility.
 - o The RI plan for maintaining occupational exposures as low as reasonable achievable (ALARA) applies to both radioactive and non-radioactive hazardous materials.
 - o The RI program for controlling exposures to chemical carcinogens is well developed and special emphasis programs for asbestos, beryllium, and chlorinated solvents confirm a commitment to maintain potential exposures as low as reasonably achievable.
 - o The Industrial Hygiene Procedures Manual describes in detail specific procedures for addressing potential hazards such as lasers, beryllium, asbestos, microwaves, radiofrequency, sanitation, heat stress, and confined space entries.
 - o Routine water samples are collected at selected plant sites and analyzed for compliance with potable water standards.

PP.2 CHEMICAL CONTAMINATION

PERFORMANCE OBJECTIVE: Chemicals should be controlled so as to minimize contamination of areas, equipment, and personnel.

- FINDINGS:
- o Procedures, including administrative controls, have been implemented as required to minimize potential health risks associated with chemical handling. The procedures are documented in the Health, Safety and Environment Manual, the Operational Safety Analysis (OSAs), and/or specific work procedures as appropriate.
 - o All significant quantities of chemicals are generally handled and contained in gloveboxes or laboratory hoods.
 - o Transport of process-related chemicals are commonly through closed systems to the point of use.
 - o The preventive maintenance program includes inspection and maintenance of mechanical/engineering contaminant control systems.
 - * Over 15,000 gallons of carbon tetrachloride are used annually in Bldgs. 707 and 776/777. Data collected in the 1970's, and observation of the work areas, indicate a minimal risk of exceeding the time weighted average (TWA) permissible exposure limits; however, chemical spills and bagging of wastes have not been adequately evaluated.
 - * The odor threshold for carbon tetrachloride is less than the permissible exposure limit; therefore, in the absence of periodic monitoring there may be no obvious indication in the workplace when permissible limits are exceeded.
 - * Significant quantities of other chemicals (solvents, epoxies/resins, laboratory reagents) are used in the facility; however, current monitoring data are limited other than for beryllium and asbestos.

CONCERN:
(PP.2-1) There is no routine monitoring program to confirm the effectiveness of control measures for chemicals utilized in the workplace.

- FINDINGS:
- o The documentation of the respiratory protection program meets the DOE prescribed standard, ANSI-Z88.2.
 - o Plant supplied breathing air systems and self-contained breathing apparatus are routinely inspected, tested, and meet the required Compressed Gas Association Grade D Breathing Air Quality.

- o Personnel are provided formalized training, quantitative fit testing, and potential hazard indoctrination prior to wearing respiratory protective equipment.
- * Sanitized respirators are handled in the immediate vicinity of soiled and contaminated units (up to 20,000 cpm). A new laundry facility is under design, but construction completion is over two years away.
- * No method exists to determine when a respirator was last sanitized or tested.
- * Respirators were routinely observed stored in unsanitary locations and on potentially contaminated surfaces.
- * Respirator storage cabinets were frequently observed to be inadequately stocked with commonly used respirators.

CONCERN:
(PP.2-2)

A quality assurance program is needed to minimize and routinely identify and correct deficiencies in the respiratory protection program.

PP.3 HAZARD COMMUNICATION

PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of chemical, physical, and biological stresses they may encounter in their work environment.

- FINDINGS:
- o The hazardous material control program is well documented in Chapter 9.07 of the Health, Safety and Environmental Manual.
 - o A program exists for the uniform labeling of chemical containers, pipes, and vessels.
 - o Material safety data sheets (MSDSs) are readily available for chemicals in the work area.
 - o Employees receive training in the purpose and requirements of hazard communication programs, the RI hazard rating and labeling system, and the availability and interpretation of MSDSs. This training is supplemented with specific on-the-job training by supervision.
 - * The labeling of tanks/vessels containing mixtures of chemicals is confusing and misleading. A standard chemical hazard rating label is used for each chemical constituent rather than developing a single rating permitting the more appropriate application of a single label on each tank/vessel.
 - * The actual chemical constituents are not labeled on tanks/vessels.

CONCERN: Vessels/tanks/containers containing chemical mixtures are not
(PP.3-1) labeled with appropriate hazard ratings.

PP.4 STAFFING

PERFORMANCE OBJECTIVE: The evaluation of chemicals and physical and biological stresses should be performed by personnel who have the knowledge and practical abilities necessary to implement personnel protection practices effectively.

- FINDINGS:**
- o The industrial hygiene staff includes qualified experienced personnel, including five Certified Industrial Hygienists. Additional professional, technical, and support personnel are included in the Industrial Hygiene Department. Experienced industrial hygienists work in other organizational components in direct support of classical industrial hygiene programs (i.e. hazardous materials control).
 - o Personnel protection staff members are technically qualified to perform their assigned duties.
 - o Resources are provided for health and safety personnel to obtain and maintain technical competency and professional contacts within their respective disciplines.
 - * The professional industrial hygiene staff was observed to be regularly engaged in subprofessional tasks such as clerical, data entry, respirator fitting, and routine services to the extent that these detract from the hazard identification, surveillance, and control functions of the industrial hygiene program.
 - * Typical deficiencies observed in the work place included inappropriate labeling of tanks, chemical containers without hazard warnings, a maintenance work task without appropriate review, and limited survey data to support subjective evaluations. Such deficiencies may reflect personnel resource limitations for program implementation.
 - * This problem was also addressed by a recommendation in the DOE Technical Safety Appraisal Report of Bldg. 771/774 conducted in October 1986.

CONCERN: The current utilization and availability of staff resources may be adversely affecting the quality of the industrial hygiene program.
(PP.4-1)

PP.5 SURVEILLANCE

PERFORMANCE OBJECTIVE: The surveillance of chemical, physical and biological stresses should ensure that potential personnel exposures are accurately determined and recorded.

- FINDINGS:
- o A documented program is followed for conducting annual walk-through type facility inspections as part of a multi-discipline safety team. Additional inspections are conducted as required; there is evidence that industrial hygiene representatives are regularly in the process, research, and maintenance areas of Bldgs. 776/777.
 - o Employees are provided with available monitoring results upon request, or when exposures exceed permissible limits.
 - * Available industrial hygiene exposure assessment and surveillance data are contained in several records systems and of those only a limited number are in computerized data bases.
 - * Retrieivability of exposure data for analysis, litigation, and employee request involves extensive labor and is generally incomplete.

CONCERN: There is no common data base for records of the collection, (PP.5-1) analysis and reporting of occupational exposure information.

- FINDINGS:
- o The importance of developing a reliable analytical quality control program is recognized by the Health, Safety and Environment Laboratory Manager. A quality control program for industrial hygiene samples is being developed. American Industrial Hygiene Association (AIHA) accreditation is anticipated by 1989.
 - * An RI Industrial Hygiene quality control program does not exist for samples sent to other RI Laboratories or off-site contract laboratories.

CONCERN: Uniform quality control procedures for all industrial hygiene (PP.5-2) type samples do not exist.

PP.6 HAZARD EVALUATION

PERFORMANCE OBJECTIVE: An evaluation of potential exposures to chemical, physical, and biological agents should ensure effective implementation and control of personnel protection activities within the facility.

- FINDINGS:
- o The program for evaluating potential health hazards is described in the Industrial Hygiene Procedures Manual and the Health Safety & Environment Manual.
 - o The appropriate standards, DOE directives, and resource materials are available for review.
 - o Bldg. 776/777 are included in a plantwide special-emphasis program to identify, assess, prioritize, and abate asbestos containing building materials.
 - o The industrial hygiene staff regularly communicates their evaluations, opinions, and recommendations to operating supervision in the form of narrative reports and memoranda on a case-by-case basis.
 - o The glovebox containment nature of process operations in Bldgs. 776/777 limits potential hazards from chemical exposure.
 - o The industrial hygiene representative is an active member of the area Health, Safety and Environment Area Management Team.
 - o The Industrial Hygiene Department has the technical capability, and access to additional necessary resources, to adequately access potential hazards in which no assigned or commonly accepted permissible exposure limits exist.

PP.7 OCCUPATIONAL SAFETY

PERFORMANCE OBJECTIVE: All workplaces of the facility should be as free as possible from occupational safety hazards so that employees are effectively protected against accidental death or injury.

- FINDINGS:
- o Safe work practices and procedures are well developed and adequately documented in the Rocky Flats Policy Manual (RFPM), the Health, Safety and Environment (HS&E) Manual, individual Operational Safety Analyses (OSAs), and Plant Standards and Operating Procedures.
 - o The RI statistical safety performance showed significant improvement in FY 1987 as compared to FY 1986. The overall performance is better than comparable industries of similar risk.
 - o There were no lost work day injuries/illnesses in Bldgs. 776/777 during FY 1987.
 - o Plant policies and procedures clearly state employee responsibility to strictly adhere to safety rules.
 - o Multi-discipline based facility inspections are conducted annually; Operational Safety Analyses (OSAs) are reviewed annually; and operating, support, and research areas are inspected monthly.
 - o There are well developed procedures for the notification and reporting of occupational hazards, injuries, accidents, and complaints (Reference Rocky Flats Policy Manual MHS 1-001, 8-100, and 16-20; Health, Safety and Environment Manual 3.01). A review of safety-related employee concerns filed through the Joint Company/Union Safety Committee indicated it to be an effective mechanism for prompt resolution of safety issues.
 - o Policies and procedures exist to ensure accidents and/or incidents are promptly and thoroughly investigated in accordance with DOE directives.
 - o Safety suggestions are included in the criteria for the Plant Employee Suggestion Program.
 - o Safety disciplines review and sign off on maintenance work orders, work permits, OSAs, and engineering design packages. Review of selected projects indicate the system is effectively implemented.
 - o Adequate tools, safety-related equipment, and material resources appear available to perform work tasks safely.
 - o The safety aspects of construction projects appear to be well managed, frequently inspected, and safely performed.

- o Employees receive general core safety training, supplemented by job-specific training at the work site. Included is a craft-specific facility safety indoctrination conducted by the supervisor within three days of job assignment.
- * The January 1988 Master Schedule for preventive maintenance on hoist equipment indicated the majority of such equipment was from two to nine months overdue for scheduled preventive maintenance. However, tags on equipment did indicate essentially all hoist equipment received a preventive maintenance inspection in January 1988.
- * A 1/2 ton hoist was observed suspended from a 1/4 ton hanger at the electron beam welder in Bldg. 777 (near post J-21).
- * A domestic type electrical extension cord was observed to have been utilized as a sling (Bldg. 777, Room 453).
- * There is no formal personnel training or certification program for the use of hoisting apparatus; however, such a program had been available in the past.

CONCERN: The hoisting/rigging program is ineffective in that it does not include as a minimum, regular inspection, preventive maintenance, training in, and certification of equipment and accessories.

- FINDINGS:
- o The Industrial and Safety Systems Engineering Department (I&SSE) has developed and presented supervisory safety training programs; frequently distributes safety bulletins on special emphasis topics and/or "alerts" on unique hazards; regularly provides statistical safety performance information and trend analyses; conducts, reviews, and reports accident investigation and analysis information; regularly participates in unit safety meetings; and provides input for routine Plant publications.
 - * There is little evidence that supervision and/or management regularly utilize the available resources to promote safety awareness in the workplace.
 - * The following examples of failure to follow basic safety rules were noted: failure to wear safety glasses in posted shop areas, poor housekeeping in the Hot Machine Shop, failure to observe traffic signs, exposed electrical conductives, and failure to heed posted warnings.
 - * Supervision and management were observed to fail to follow and enforce safety rules.
 - * Interviews with personnel in Bldgs. 776/777 consistently indicated their concerns of a lack of management commitment to safety.

CONCERN: An aggressive safety awareness and promotion program to achieve a positive safety attitude in facility personnel does not exist.
(PP.7-2)

N. FIRE PROTECTION

The fire protection program in Bldgs. 776/777 meets DOE requirements with several exceptions. The demonstrated performance of one fire with low monetary loss in 1987 is commendable. The fire protection water supply is adequate. The program for inspection, test, and maintenance of fire protection and water supply is very good. The demonstrated performance of the facility emergency support organization and the fire department was satisfactory. Facility management are generally supportive of the fire protection program but lack "ownership" of problems and responsibility for their correction. There were no cases where life safety was compromised by security measures.

To assist RI in reducing the risk of loss and/or programmatic impact from fire, six areas of concern were identified. Compliance with the requirements of the Life Safety Code and "improved risk" criteria are not met in several areas. There are plant areas where egress routes were not adequately identified. A formal program to review the integrity of fire separations and assume responsibility for maintenance and corrective action is necessary. Fire protection for ventilation ducts that pass through fire separation walls is another significant deficiency. The expedited replacement of an unreliable emergency response vehicle with questionable operating safety is another significant concern. Earthquake bracing for the automatic sprinkler system needs to be evaluated. The replacement of the antiquated fire detector/alarm systems in the buildings is also an urgent need.

FP.1 LIFE PROTECTION

PERFORMANCE OBJECTIVE: The facility should not present an unacceptable hazard to life from the results of accidental fire.

- FINDINGS:**
- o Rockwell International Policy RFPM MHS 1-001 requires that all RFP facilities meet the requirements of the National Fire Protection Association (NFPA) 101, Life Safety Code.
 - o Except as noted in this section, Bldgs. 776/777 either meet the requirements or the intent of NFPA-101, Life Safety Code.
 - o Review of physical conditions disclosed that security requirements/procedures at Bldgs. 776/777 do not jeopardize safety provisions.
 - o Emergency lighting in Bldgs. 776/777 is adequate to allow safe egress. Proper operation and coverage is verified monthly.
 - * There were several areas where exit routes were not adequately identified as required by NFPA-101, Life Safety Code. The size and use occupancy of Bldgs. 776/777 make well defined egress routes very important. (Considerable improvements have been made in identifying egress routes since the start of this appraisal).
 - * Findings in Section SS.3 also support this concern.

CONCERN:
(FP.1-1)

There is no management system to assure that egress routes in Bldgs. 776/777 are identified adequately, that they ensure rapid personnel egress, and are maintained current.

FP.2 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: The facility should not pose an added threat to the public as the result of an onsite fire permitting the release of hazardous materials beyond the site boundary.

- FINDINGS:**
- o Rockwell International Policy PFPM MHS 1-001 requires all Rockwell International Rocky Flats facilities meet the requirements of the "improved risk" criteria.
 - o The impairment of fire protection systems is minimized by established inspection and preventive maintenance procedures. Results of inspections are documented.
 - o The Fire Department conducts monthly and in-depth annual fire protection surveys to ensure that hazards are identified and either corrected, adequately controlled or protected.
 - o There is a fire department which is manned 24 hours a day located on-site, within one mile of Bldgs. 776/777. The department's demonstrated response time to Bldg. 777 was six minutes.
 - o Firefighters are trained and qualified to the requirements of the State of Colorado which are the same as the requirements of National Fire Protection Association (NFPA) Standard-1001. All meet the Firefighter I or II qualification level. One person has qualified at the Firefighter III level. All firefighters receive training specific to Bldgs. 776/777.
 - o There is a Building Emergency Support Team which provides first-aid fire suppression response, evacuation direction and assistance to responding fire department personnel. Their performance during the emergency drill was adequate.
 - o There are considerable amounts of toxic chemicals and radioactive materials in both buildings.
 - o Both buildings are constructed of noncombustible materials and are protected by automatic sprinkler systems. The sprinklers have separate dual water supplies.
 - * Fire separations and glove box enclosures with installed heat detectors are marginally satisfactory to eliminate the potential for an off-site release of toxic chemicals and radioactive materials. See Concerns FP.5-2 and FP.5-3.
 - * There is no earthquake bracing for the sprinkler systems in Bldgs. 776/777. Failure of the automatic sprinkler system is credible due to the lack of earthquake bracing.

- * Failure of the sprinkler system would prevent it from controlling incipient fires which are expected to occur during earthquakes, which could result in large losses, programmatic delays, and release of toxic chemicals and radioactive contamination to the environment.
- * Fires can be expected in Bldgs. 776/777 during earthquakes because of the large number of ignition sources in the building.

CONCERN:
(FP.2-1)

There is no analysis of the need for earthquake bracing of the automatic sprinkler system in Bldgs. 776/777.

FP.3 IMPAIRMENT OF OPERATIONS

PERFORMANCE OBJECTIVE: The facility should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

- FINDINGS:**
- o A property loss and risk evaluation of Bldgs. 776/777 was done in February 1987 and updated in October 1987 by the RI Fire Protection Engineer. Both of the RI analyses disclosed that there would be no unacceptable program delays because of fire.
 - o The RI evaluation was reviewed during the annual Fire Protection Appraisal done by DOE/AL during August 1987. There are no findings or recommendations in the DOE/AL appraisal report concerning the conclusions of the RI evaluation of Bldgs. 776/777 property loss and risk.

FP.4 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A credible fire should not result in an unacceptable property loss.

- FINDINGS:**
- o Areas in Bldgs. 776/777 where there is a concentration of high value equipment and product were considered in the analysis of unacceptable property loss by fire. They included the first and second floors and the basement of Bldg. 776 and the first floor of Bldg. 777.
 - o The values used in this analysis were taken from the property loss and risk evaluation done by the RI Fire Protection Engineer in February 1987 and updated in October, 1987. The updated values for Bldg. 776 did not change. The values for Bldg. 777 increased slightly in the updated version.
 - o The RI property loss and risk evaluation of Bldgs. 776/777, using the February, 1987 values, were reviewed during the annual Fire Protection Appraisal done by the DOE/AL during August 1987. There were no findings or recommendations in the DOE/AL appraisal concerning the conclusions of the RI evaluation.
 - o The installed automatic fire protection features in these buildings should preclude property damage from fire from exceeding \$1 million.
 - o Assuming the loss of one automatic fire protection system or feature, the maximum credible property loss in these buildings would not exceed \$50 million because values are maintained below that amount by fire separation barriers. Other features that would preclude a fire of this magnitude are glove box enclosures with heat detectors, a trained building fire/emergency response cadre, and the proximity of the fire department.
 - o The maximum property loss from a credible fire would not exceed \$75 million because the value of the facilities and equipment are less than that value.
 - o The evaluation done by the RI Fire Protection Engineer in October 1987 support the three previous findings.
 - * Vital record storage facilities must conform to the requirements of National Fire Protection Association (NFPA)-232 (a DOE mandatory standard implemented by Rockwell International Policy RFPM MHS 1-001) and the two hour fire rating in the preferred standard ANSI NQA-1-1986.

- * Inspection of three of the five record vaults related to operations in Bldgs. 776/777 disclosed that none of the three met the above stated requirements. Examples of deficiencies noted included sanitary waste, domestic water, steam and condensate piping and electrical conduit not related to the vault pass through the vault space; ventilation ducts that pass through the vault walls do not have fire protection dampers; and a significant fire loading (paper, cloth, plastics) exists in room 402 in Bldg. 777 under the ventilation duct leading into the 402 vault.

CONCERN:

The above matters are addressed by Concern OA.6-2.

FP.5 IMPROVED RISK

PERFORMANCE OBJECTIVE: The facility should qualify as an "improved risk" or "highly protected risk" as commonly defined by the property insurance associations specializing in such coverage.

- FINDINGS:**
- o Rockwell International Policy RFPM MHS 1-001 requires all Rockwell International Rocky Flats facilities meet the requirements of the "improved risk" criteria.
 - o Fire loss records are analyzed, maintained, and reported as required by DOE 5484.1. There was one fire resulting in a loss of \$14,300 during 1987 in Bldgs. 776/777.
 - o Fire Protection Basic Data Reports which describe construction, fire protection features and special hazards are completed for each building and are updated periodically to reflect changes.
 - o The Fire Protection Engineer reviews all project designs and work orders.
 - o Fire Department Pre-Plans are completed for selected programs or areas within Bldgs. 776/777. There are no pre-plans which cover the complete building.
 - o Bldgs. 776/777 are included in the DOE Independent Fire Protection Survey Program. The last survey was done in 1979. All recommendations concerning Bldgs. 776/777 have been closed.
 - o Fire suppression water for Bldgs. 776/777 is provided by the domestic water supply system through looped 10-inch mains. The raw water is purchased from an outside reliable source. It is treated on-site and supplied to the various site facilities. 500,000 gallons of water are dedicated for fire protection purposes. This supply is connected to one each 2500-gallon electric and diesel pumps to assure water supply to fire protection systems during power outages. The water supply for Bldgs. 776/777 is adequate.
 - * The Fire Department mini-pumper/rescue truck has been removed from active service many times because of concern for the safety of the vehicle and its unreliability. The truck has been available for use only 70 percent of the time compared to a norm of 99+ percent for emergency vehicles. It has also failed on several occasions during each of the past three years while responding to an emergency. Its reliability is continuing to worsen and causes primary response apparatus to be committed to emergencies and fires outside the plant security area. The truck has been very expensive to maintain.

- * The need for the replacement mini-pumper/rescue vehicle was identified in a previous DOE Technical Safety Appraisal (Rocky Flats Bldg. 707, Recommendation FP.5-17, September 1986).
- * A replacement mini-pumper/rescue vehicle which will meet emergency fire service requirements is on order. The purchase order is in the normal procurement process tracks which does not reflect the urgent need for this emergency response truck. Delivery is expected in 24 to 36 months.

CONCERN: (FP.5-1) The emergency need for the replacement of the mini-pumper/rescue vehicle is not being emphasized in the procurement process.

- FINDINGS:
- * Bldgs. 776/777 are compartmentalized into fire zones by walls which appear to have a two-hour rating.
 - * There were several defective fire doors in the walls separating the fire zones in Bldgs. 776/777. The majority of the defective doors were missing latching mechanisms or had oversized windows which invalidated their fire protection integrity and rating. Several new doors were in the process of being installed.
 - * The Final Safety Analysis Report for Bldgs. 776/777 (page 7-11) discusses automatic fusible-link fire dampers which are to be provided for all fire-barrier ventilation penetrations. It was observed that many of the ventilation ducts which pass through fire barriers do not have this feature, thus voiding the 2-hour fire rating.
 - * Blocked fire doors are a repetitive finding in Bldgs. 776/777 Fire Department monthly inspections. Also, see Section AX.4 regarding this finding.
 - * Fire separations and glovebox enclosures with installed heat detectors are marginally satisfactory to eliminate the potential for an offsite release of toxic chemicals and radioactive materials.

CONCERN: (FP.5-2) There is no program which assigns responsibilities, requires periodic review of the integrity of the fire separations, and assures prompt correction of deficiencies.

- FINDINGS:
- * The fire detector/alarm systems in Bldgs. 776/777 are from 16 to 35 years old. Spare parts are not available.
 - * The installation does not meet the current requirements for fire detector/alarm systems as they do not have the

- * The installation does not meet the current requirements for fire detector/alarm systems as they do not have the certification of an independent testing laboratory and a large amount of the wiring is exposed to damage.
- * There is a lack of drawings for some of the heat detector circuits making maintenance difficult and expensive.
- * A project to provide fire detector/alarm systems which meet the facility need and DOE 5480.7 requirements is included in the Facility Capability Assurance Program budget for 1993 and beyond. The total budget item which covers plant-wide fire/security alarm system upgrades is \$60.9M.
- * Fire separations and glovebox enclosures with installed heat detectors are marginally satisfactory to eliminate the potential for an offsite release to toxic chemicals and radioactive materials.
- * A five plus year delay to replace a deficient plant protection system causes the DOE to assume a large amount of unnecessary risk. An additional delay of longer than one year is not justifiable.

CONCERN:
(FP.5-3)

A wait of 5 years to replace the fire detector/alarm systems in Bldgs. 776/777 is excessively long.

FINDINGS:

- * There is no requirement to prevent unnecessary facility fire loading in the form of equipment or structural components, as called for by the "improved risk" criteria.
- * There is combustible shielding installed near the Control Room on the second floor of Bldg. 776. It appears to be covered with fire retardant paint which is subject to wear and damage.
- * The installation of combustible shielding is in progress near the Control Room on the second floor of Bldg. 776.
- * There are established criteria and designs for encapsulating combustible shielding materials in metal jackets which essentially eliminates their contribution to a fire.
- * There are a large number of wooden crates stored in Room 134, Bldg. 776 and other locations in Bldgs. 776/777. There were many cardboard boxes throughout the facility. These combustibles represent a significant fire loading which increase the fire severity potential in these areas.

CONCERN:
(FP.5-4)

There is no management control system that prohibits the unnecessary use or storage of combustible materials in Bldgs. 776/777.

III. NOTEWORTHY PRACTICES

Five practices were identified during the course of this appraisal that were felt to be especially good ways of accomplishing some aspect of a Performance Objective, and consequently worthy of emulation by other DOE facilities. These practices are presented under the subject area to which they pertain.

D. TRAINING & CERTIFICATION

NOTEWORTHY PRACTICE: Rockwell International's Screening/Assessment/Remediation Program to assist those employees with learning deficiencies or difficulties is commendable, and a practice which would be of interest to other contractors.

Individuals may be referred for program assistance when any of the following are present:

- 1) Failed a core safety training test on two separate consecutive occasions.
- 2) Experiencing difficulty learning and/or understanding new materials.
- 3) Basic reading or mathematics skill levels need improvement.
- 4) Experiencing difficulties with job performance.

Individual participation is voluntary. However, employees must still fulfill their applicable training requirements. If an employee accepts remediation, the individual is tested and evaluated by a third party professional, and an individually designed program established. Of the 31 individuals referred to date, 25 have elected to participate in the program.

E. AUXILIARY SYSTEMS

NOTEWORTHY PRACTICE: The Nuclear Material Safeguards Measurement Control group has developed a Confirmatory Measurements Counter that has been approved by DOE as the instrument to be used by all sites in the United States. It will be used as the interim method to provide effective and credible safeguards measurements to establish shipper-receiver differences within the 10-day time limit required by DOE 5630. This will replace the current method that requires opening each shipping container and verifying contents by approved chemical or non-destructive analysis which is so time consuming for many types of materials that the 10-day limit cannot be met.

G. TECHNICAL SUPPORT

NOTEWORTHY PRACTICES: At RFP, three different transport and material handling systems are in use, ie., building operations, on-site operations, and off-site operations.

RI's On-Site Transportation Manual, prepared 2 years ago, has quickly gained attention of the DOE weapons program. This manual bridges a procedural gap between the system used at most DOE sites which have only a set of building procedures and a set of off-site transportation procedures.

Especially noteworthy in this manual is the use of pictorial flow sheets for packaging of radioactive materials. An example of one of these flow sheets is attached. These flow sheets are very useful to a packaging crew as a supplement to verbal instructions. Combined with use of a checklist, this system has produced an exemplary record of high quality packaging operations, free of regulatory and safety violations.

III-5

TABLE I
ON SITE APPROVED

1. ANY CONTAINER OF MATERIAL AND SHIPPING CONTAINER APPROVED FOR OFF-SITE SHIPMENT MAY BE USED FOR OFF-SITE SHIPMENT.
2. USE APPLICABLE OFF-SITE SHIPMENT DOCUMENT FOR APPROVED NUCLEAR MATERIALS SAFETY LIMITS.
3. PLASTIC BAGS MAY BE USED FOR A CONTAMINATION BARRIER WHEN REQUIRED.
4. ANY PACKAGES CONTAINED FOR OFF-SITE SHIPMENTS MUST BE 4-1/2" (4" DIAMETER, NUMBER 3-1/2" (4-1/2" x 4-1/2") CAN PREFERRED.
5. REFER TO ROCKWELL INTERNATIONAL HEALTH, SAFETY AND ENVIRONMENT MANUAL, WHERE DETAILS FOR THE TRANSFER AND STORAGE OF EACH MATERIAL TYPE ARE GIVEN.

NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	4 L POLY BOTTLE	1	EA	
2	30 GAL PLASTIC DRUM	1	EA	
3	55 GAL PACKAGE	1	EA	
4	55 GAL PACKAGE	1	EA	
5	10-GAL DRUM	1	EA	
6	MODEL 2000-1	1	EA	
7	STORAGE CONTAINER	1	EA	
8	PARTS & SUBASSEMBLY UNITS	1	EA	
9	CONTAMINATED LIQUID WASTE	1	EA	
10	4 L POLY BOTTLE	1	EA	
11	30 GAL PLASTIC DRUM	1	EA	
12	55 GAL PACKAGE	1	EA	
13	55 GAL PACKAGE	1	EA	
14	10-GAL DRUM	1	EA	
15	MODEL 2000-1	1	EA	
16	STORAGE CONTAINER	1	EA	
17	PARTS & SUBASSEMBLY UNITS	1	EA	
18	CONTAMINATED LIQUID WASTE	1	EA	
19	4 L POLY BOTTLE	1	EA	
20	30 GAL PLASTIC DRUM	1	EA	
21	55 GAL PACKAGE	1	EA	
22	55 GAL PACKAGE	1	EA	
23	10-GAL DRUM	1	EA	
24	MODEL 2000-1	1	EA	
25	STORAGE CONTAINER	1	EA	
26	PARTS & SUBASSEMBLY UNITS	1	EA	
27	CONTAMINATED LIQUID WASTE	1	EA	
28	4 L POLY BOTTLE	1	EA	
29	30 GAL PLASTIC DRUM	1	EA	
30	55 GAL PACKAGE	1	EA	
31	55 GAL PACKAGE	1	EA	
32	10-GAL DRUM	1	EA	
33	MODEL 2000-1	1	EA	
34	STORAGE CONTAINER	1	EA	
35	PARTS & SUBASSEMBLY UNITS	1	EA	
36	CONTAMINATED LIQUID WASTE	1	EA	
37	4 L POLY BOTTLE	1	EA	
38	30 GAL PLASTIC DRUM	1	EA	
39	55 GAL PACKAGE	1	EA	
40	55 GAL PACKAGE	1	EA	
41	10-GAL DRUM	1	EA	
42	MODEL 2000-1	1	EA	
43	STORAGE CONTAINER	1	EA	
44	PARTS & SUBASSEMBLY UNITS	1	EA	
45	CONTAMINATED LIQUID WASTE	1	EA	
46	4 L POLY BOTTLE	1	EA	
47	30 GAL PLASTIC DRUM	1	EA	
48	55 GAL PACKAGE	1	EA	
49	55 GAL PACKAGE	1	EA	
50	10-GAL DRUM	1	EA	
51	MODEL 2000-1	1	EA	
52	STORAGE CONTAINER	1	EA	
53	PARTS & SUBASSEMBLY UNITS	1	EA	
54	CONTAMINATED LIQUID WASTE	1	EA	
55	4 L POLY BOTTLE	1	EA	
56	30 GAL PLASTIC DRUM	1	EA	
57	55 GAL PACKAGE	1	EA	
58	55 GAL PACKAGE	1	EA	
59	10-GAL DRUM	1	EA	
60	MODEL 2000-1	1	EA	
61	STORAGE CONTAINER	1	EA	
62	PARTS & SUBASSEMBLY UNITS	1	EA	
63	CONTAMINATED LIQUID WASTE	1	EA	
64	4 L POLY BOTTLE	1	EA	
65	30 GAL PLASTIC DRUM	1	EA	
66	55 GAL PACKAGE	1	EA	
67	55 GAL PACKAGE	1	EA	
68	10-GAL DRUM	1	EA	
69	MODEL 2000-1	1	EA	
70	STORAGE CONTAINER	1	EA	
71	PARTS & SUBASSEMBLY UNITS	1	EA	
72	CONTAMINATED LIQUID WASTE	1	EA	
73	4 L POLY BOTTLE	1	EA	
74	30 GAL PLASTIC DRUM	1	EA	
75	55 GAL PACKAGE	1	EA	
76	55 GAL PACKAGE	1	EA	
77	10-GAL DRUM	1	EA	
78	MODEL 2000-1	1	EA	
79	STORAGE CONTAINER	1	EA	
80	PARTS & SUBASSEMBLY UNITS	1	EA	
81	CONTAMINATED LIQUID WASTE	1	EA	
82	4 L POLY BOTTLE	1	EA	
83	30 GAL PLASTIC DRUM	1	EA	
84	55 GAL PACKAGE	1	EA	
85	55 GAL PACKAGE	1	EA	
86	10-GAL DRUM	1	EA	
87	MODEL 2000-1	1	EA	
88	STORAGE CONTAINER	1	EA	
89	PARTS & SUBASSEMBLY UNITS	1	EA	
90	CONTAMINATED LIQUID WASTE	1	EA	
91	4 L POLY BOTTLE	1	EA	
92	30 GAL PLASTIC DRUM	1	EA	
93	55 GAL PACKAGE	1	EA	
94	55 GAL PACKAGE	1	EA	
95	10-GAL DRUM	1	EA	
96	MODEL 2000-1	1	EA	
97	STORAGE CONTAINER	1	EA	
98	PARTS & SUBASSEMBLY UNITS	1	EA	
99	CONTAMINATED LIQUID WASTE	1	EA	
100	4 L POLY BOTTLE	1	EA	

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K. NUCLEAR CRITICALITY SAFETY

NOTEWORTHY PRACTICE: The Criticality Engineering Department has developed and documented a "Certification Program for Criticality Engineers" (May 31, 1985) which provides an excellent traceable indoctrination program for newcomers to the field of nuclear criticality safety engineering. The program is judged to be useful for application and further development by other DOE Facilities' criticality safety organizations.

M. PERSONNEL PROTECTION

NOTEWORTHY PRACTICE: The Rocky Flats Plant (RFP) Filter Test Facility has developed a unique modification for respirator face-piece test units that permits testing of pressure drop concurrent with challenge test aerosol in-leakage. This design potentially results in a significant labor savings for facilities quality control testing large numbers of air purifying type respirators. The respirator face-piece test units are available commercially, and the modification can be assembled from commercially available parts.

APPENDIX A

TECHNICAL SAFETY APPRAISAL ROCKY FLATS PLANT, BLDGS. 776/777

TEAM COMPOSITION

<u>Area of Responsibility</u>	<u>Name/Organization</u>
Team Leader	Herbert Field Department of Energy Office of Nuclear Safety
Coordinators	Nancy Sanderson Rockwell International Rocky Flats Plant Deana Butler Sandia National Laboratory- Livermore
Advisor to the Team	John Condelos Private Consultant
Liaison with the Team	A. John Ahlquist (part-time) LANL/Office of Defense Programs Earl Cleveland (part-time) SAIC/Office of Defense Programs Dana Beaulieu DOE/Albuquerque Operations Candice Jierree DOE/Rocky Flats Area Office
Organization and Administration	Phillip Lowe Viking Energy Systems
Experimental Operations Activities	Leon Meyer Private Consultant Ernest Johnson Private Consultant
Maintenance Security/Safety Interface	Fred Carlson Viking Energy Systems

<u>Area of Responsibility</u>	<u>Name/Organization</u>
Training and Certification	Tom Barron Martin-Marietta Energy Systems
Auxiliary Systems	Eldon Christensen Private Consultant
Technical Support	Waldo Rall Private Consultant
Technical Support [Transportation]	William Brobst Private Consultant
Emergency Readiness	Robert Hadley Hanford Environmental Health Foundation
Criticality Safety	Calvin Hopper Oak Ridge National Laboratory
Radiological Protection	Jack Selby Pacific Northwest Laboratory
	Carl Stroud Pacific Northwest Laboratory
Personnel Protection	Robert Gilmore Environmental Health Sciences, Inc.
Facility Safety Review	David Schweller Private Consultant
Fire Protection	William Taylor Westinghouse Hanford Co.

APPENDIX B

Biographical Sketches of Rockwell International, Rocky Flats Plant Building 776/777 Technical Safety Appraisal Team Members

NAME: Herbert C. Field [Team Leader]

ASSOCIATION: U.S. Department of Energy, Headquarters

EXPERIENCE: 33 Years

- o Team Leader for six earlier Technical Safety Appraisals
- o U.S. Department of Energy
 - Technical Advisor to Director, Office of Nuclear Safety
 - Senior Executive for development of safety policy and safety performance measurement system
 - Senior Reactor Safety Specialist
 - Consultant to U.S. Navy on safety of PM-3A reactor
- o Atomics International
 - Experimental reactor physics research
 - Physicist-in-charge, critical experiment facilities
 - Member, space reactor safety review committee
- o Lawrence Livermore National Laboratory
 - Neutron cross-section measurements
 - Experimental shock hydrodynamics

EDUCATION: B.S., Physics, Case Institute of Technology
M.S., Applied Mathematics, Purdue University

OTHER: American Nuclear Society
Sigma Xi, Tau Beta Pi
New York Academy of Sciences
American Association for the Advancement of Science
American Men of Science, "Who's Who"

NAME: Tommy L. Barron (Training and Certification)

ASSOCIATION: Martin Marietta Energy Systems, Inc.
Plant Training Manager, Paducah Gaseous Diffusion Plant

EXPERIENCE: 20 Years

- o Participant in 4 earlier Technical Safety Appraisals
- o Westinghouse Hanford Company
 - 200 Areas, Training Manager
- o Rockwell Hanford Operations
 - Operations Training Manager
 - Maintenance Training Coordinator
 - Senior Training Specialist - Tank Farm Surveillance and Operations
 - Program Specialist - Tank Farm Surveillance
 - Manager, Remote Visual Imagery
 - Radiation Monitor Journeyman, Tank Farms, B-Plant, Purex and Plutonium Finishing Plant
- o Ingalls Nuclear Shipbuilding
 - Radiation Control Technician-Submarine Overhaul and Re-Fueling
 - Nuclear Materials Analyst
- o Marist School, Atlanta, GA.
 - Teacher and athletic coach
- o DeKalb County Board of Education, Decatur, GA.
 - Teacher and athletic Coach

EDUCATION: B.S., Education/Business Administration, Delta State University, Cleveland, MS
Ph.D., Business Administration (expected completion winter, 1989)

NAME: William A. Brobst (Technical Support-Transportation)

ASSOCIATION: The Transport Environment, Inc.

EXPERIENCE: 36 Years

- o The Transport Environment, Inc., President
 - Technical and management consulting in the field of hazardous materials transportation safety
- o Department of Energy, Director of Transportation Management
 - Developed and managed the agency program for R&D and risk management in energy/fuels transportation
 - Set policy and managed transportation operations
- o Atomic Energy Commission, Chief of Transportation
 - Developed and directed AECs first centralized transportation management and R&D program
 - Set up a major package, vehicle, and safety system testing and risk analysis program
- o Department of Transportation, Deputy Director, Office of Hazardous Materials
 - Directed the DOTs technical program for hazardous materials safety regulatory development
- o Atomic Energy Commission, Radiological Physicist
 - Technical staff work in health physics, criticality control, and waste management
- o U.S. Navy, Nuclear Weapons Officer
 - Radiological physics and dosimetry

EDUCATION: B.S., Chemistry, Northwestern University
Graduate work in Nuclear Engineering, University of Nevada
Graduate work in Mathematics, University of Chicago

OTHER: Certified by American Board of Health Physics
National Academy of Sciences' Committee on Transportation of Hazardous Materials [former chairman]
Past Chairman, Transport Advisory Group, IAEA
DOE Independent Review Committee Member, TRU Waste Program

NAME: Fred N. Carlson (Maintenance, Security/Safety Interface)

ASSOCIATION: Private Consultant

EXPERIENCE: 27 Years

- o Consultant to the Department of Energy including:
Participant in 9 earlier DOE Technical Safety Appraisals
- o Consultant to the NRC including:
 - Emergency preparedness appraisals and exercises
 - Detailed Control Room Design Reviews
 - Review of Safety Parameter Display Systems
 - Review of Standard Technical Specifications
 - Established data base for NRC safety programs
 - NRC resident inspector assistance
 - Prepared Chernobyl accident scenarios for NRC report prior to release of information by the Soviets
- o Consultant to FEMA for Nuclear Plant Exercises
- o Westinghouse Bettis Atomic Power Laboratory
 - Manager, two reactor plants
 - Manager, Administrative Services
 - Staff Consultant, Laboratory Performance Evaluation
 - Manager, Engineering
 - Manager, Operations
 - Manager, Training
 - Shift Supervisor
- o Aerojet Nuclear Company
 - Loss-of-Fluid Test Plant operations experience
- o Phillips Petroleum Company
 - Reactor operator and fuel handler on Special Power Excursion Test Reactors
- o Hercules Powder Company
 - Materials Development Engineer and Test Engineer

EDUCATION: B.S. and M.S., Mechanical Engineering, University of Idaho
Ph.D. [ME] to be completed winter 1987-1988

NAME: Eldon L. Christensen (Auxiliary Systems)

ASSOCIATION: Private Consultant

EXPERIENCE: 36 Years

- o Participant in DOE Safety Reviews for:
 - FAST Facility at Idaho
 - Building 371 at Rocky Flats
 - Buildings 9212 and 9206 at Y-12, Oak Ridge
 - F Canyon at Savannah River
- o Participant in DOE project to develop performance objectives for Technical Safety Appraisals
- o Consultant to Los Alamos National Laboratory for:
 - Safety review of the New Plutonium Facility, TA-55
 - Review of plutonium processing parameters
 - Review and investigation of nuclear and hazardous waste practices at TA-21, the old plutonium facility dating back to 1945
- o Los Alamos National Laboratory
 - Research and development of aqueous and pyrochemical methods for purifying plutonium and preparing plutonium compounds and metal
 - Manager, plutonium recycle operations
 - Manager, plutonium research and development group
 - Developed and supervised data processing system for the accountability and management of Special Nuclear Materials
- o U.S. Chairman, JOWOG-30, a joint working group with Britain, dealing with all aspects of recycling weapons materials
- o Program manager, plutonium metal production, FFTF oxide production, Am purification and plutonium recycle
- o Participant in numerous technical and safety reviews

EDUCATION: B.S. AND M.S., Physical Chemistry, North Dakota State University

NAME: Robert D. Gilmore (Personnel Protection)

ASSOCIATION: Consultant, Environmental Health Sciences, Inc. [EHS]

EXPERIENCE: 15 Years

- o Participant in 6 earlier DOE Technical Safety Appraisals
- o Environmental Health Sciences, Inc.
 - Principal in firm providing consulting and technical services in safety, health, and environmental protection areas
- o Hanford Environmental Health Foundation
 - Director of Operations and Planning - Firm provides comprehensive occupational and environmental health services including programs in occupational medicine, nursing, psychology, research, and environmental sciences
 - Department manager for industrial hygiene services, environmental monitoring, and analytical chemistry
- o Union Carbide Corporation
 - Corporate Staff, Headquarters; Health, Safety and Environmental Affairs staff providing technical direction and program guidance to operating components
 - Manager of Industrial Hygiene, Oak Ridge Gaseous Diffusion Plant
- o U.S. Atomic Energy Commission
 - Safety and Industrial Hygiene Engineer, Richland Operations Office

EDUCATION: B.S., Environment Health/Chemistry, University of Washington
M.S., Industrial Hygiene, University of Washington

OTHER: Certified in Comprehensive Practice of Industrial Hygiene by the American Board of Industrial Hygiene

NAME: Robert T. Hadley (Emergency Readiness)

ASSOCIATION: Hanford Environmental Health Foundation

EXPERIENCE: 13 Years

- o Participant in 3 earlier DOE Technical Safety Appraisals
- o Hanford Environmental Health Foundation, Environmental Health Sciences Department
 - Manager, Hazardous Materials Program
 - Manager, Emergency Preparedness
 - Hazardous Materials Emergency Response and Planning
 - Industrial Hygiene surveys and reviews
 - Safety/Security interface appraisals, NRC licensees
- o Battelle Pacific Northwest Laboratories
 - Research Scientist, Occupational Health Physics
 - Emergency preparedness appraisals and exercises
 - Radiation dosimetry and instrument research
 - Computer modeling and code development
- o University of Utah
 - Health research and epidemiology
 - Computerized data analysis and statistics
- o Veterans Administration Hospital
 - Research in neurobiology and toxicology

EDUCATION: B.S., Life Sciences, Massachusetts Institute of Technology
M.S., Medical Biophysics and Computing, University of Utah

OTHER: Certified in the Comprehensive Practice of Industrial Hygiene by the American Board of Industrial Hygiene

NAME: Calvin M. Hopper (Criticality Safety)

ASSOCIATION: Oak Ridge National Laboratory

EXPERIENCE: 20 Years

- o Participant in 2 earlier DOE Technical Safety Appraisals
- o Martin Marietta Energy Systems, Inc.
 - X-10 Laboratory Criticality Safety Officer
 - Y-12 Plant Emergency Response Team
 - Head of Y-12 Plant Nuclear Criticality Safety
 - Head of Y-12 Plant Health Physics
 - Nuclear Criticality Safety Engineer for Oak Ridge Y-12 and K-25 Plants
 - Health Physics Special Projects at Y-12 and K-25
 - Health Physics Technician for Y-12 Plant Development Division and Oak Ridge Criteria Experiments Facility
- o Texas Instruments, Inc.
 - Manager, Nuclear Safety [Health Physics and Nuclear Criticality Safety]
 - Manager, Nuclear Materials Accountability
 - Manager of U.S. NRC Special Nuclear Materials Licensing for the HFIR Project
 - Assistant Project Manager
- o Consultant to U.S. Nuclear, Inc., Research Reactor Fuel Fabrication Facility on nuclear materials licensing
- o University of Tennessee - AEC Agricultural Research Farm
 - Health Physics Technician
 - Medical Isotopes dispensing, disposal

EDUCATION: B.S., Physics, University of Southern Colorado
Post Graduate Physics Studies, University of Tennessee

OTHER: American Nuclear Society, Nuclear Criticality Safety Division [Councilman, Treasurer, Secretary, Vice-Chairman/Chairman Elect],
Chairman of ANSI/ANS 8.7
Member DOE/AL Weapon Criticality Committee
Consultant to DOE/ONS Nuclear Criticality Technology and Safety Project

NAME: Ernest W. Johnson (Operations, Experimental Activities)

ASSOCIATION: Technical Consultant, Oak Ridge Associated Universities

EXPERIENCE: 23 Years

- o Participant on 5 earlier Technical Safety Appraisals
- o Consultant to DOE in Aerospace Nuclear Safety and SP-100 Technology Monitoring
- o Monsanto Research Corporation, Mound Facility
 - Aerospace and Terrestrial Heat Source Design, Testing and Safety Areas
 - Plutonium -238 and -239 technical studies for NRC, MA, and NE
 - SAR and SARP generation for various Plutonium-238 systems
 - Project Manager for numerous heat source projects
 - Building Manager for plutonium facilities at Mound

EDUCATION: B.S., Chemistry/Mathematics, Wisconsin State College
M.S., Physical Chemistry, Iowa State University
Ph.D., Physical Chemistry, State University of Iowa

OTHER: American Chemical Society
American Society for Metals [ASM International]
Phi Lambda Upsilon
Alpha Chi Sigma

NAME: Phillip A. Lowe (Organization and Administration)

ASSOCIATION: INTECH, Inc.

EXPERIENCE: 27 Years

- o Participant in technical reviews of:
 - Hanford Plutonium Finishing Plant, Doublet Fusion Reactor, Idaho Calcining Facility, Hanford Production Reactor Repairs, Clinch River Breeder Reactor, and other non-nuclear DOE facilities
- o Consultant to DOE, Electric Power Research Institute, and Gas Research Institute
 - Defense Programs construction projects
 - Quality assurance
 - Power generation and pollution control
 - Advanced technology evaluation
- o DOE - ERDA - AEC
 - Deputy Assistant I.G. for Inspections
 - Assistant Director for Inspections
 - Chief, Thermal Energy Storage Branch
 - Chief, Steam Generator Development
- o Combustion Engineering
 - Manager for Experiments in support of nuclear steam supply system development
- o Westinghouse Bettis Atomic Power Laboratory
 - Senior Engineer Thermal/Hydraulic Design
- o U.S. Navy, Civil Engineer Corps, Officer

EDUCATION: B.S., Mechanical Engineering, University of Utah
M.S., Mechanical Engineering, University of Rhode Island
Ph.D., Mechanical Engineering, AEC/Westinghouse Fellowship, Carnegie Mellon University

OTHER: Professional Engineer, Pennsylvania
Fellow, American Society Mechanical Engineers (ASME)
Chairman of Advanced Energy Systems Division, ASME
Board Member, Research Planning, ASME

NAME: Leon H. Meyer (Operations, Experimental Activities)

ASSOCIATION: The LHM Corporation

EXPERIENCE: 35 Years

o LHM Corporation

- Technical expert under contract to Oak Ridge Associated Universities
- Served on DOE/ONS Management Appraisal Team for AL
- Served on 12 Technical Safety Appraisal Teams for DOE Facilities
- Edited Five-Year Plan for DOE/ONS Nuclear Criticality Safety Outlay Program
- Currently assisting SAN in review of Safety Analysis Reports

o Savannah River Plant, DuPont

- Program Manager - Safeguards & Security, Long Range Planning, Budget Coordination, Quality Assurance, Environmental Control, Energy Conservation and, Away-From-Reactor Spent-Fuel Storage

o Atomic Energy Division, DuPont

- Program Manager, Technical Division - Defense Waste Processing Facility and LWR Fuel Reprocessing Design Project

o Savannah River Laboratory, DuPont

- Assistant Director
- Director, Separations Chemistry & Engineering
- Research Manager, Separations Chemistry
- Research - chemical separations; plutonium, uranium, and thorium processing; and tritium technology

EDUCATION: B.Ch.E, Georgia Institute of Technology
M.S., Chemistry, Georgia Institute of Technology
Ph.D., Physical Chemistry, University of Illinois

NAME: Waldo Rall (Technical Support)

ASSOCIATION: Private Consultant

EXPERIENCE: 41 Years

- o Independent Research Management Consultant
 - Clients include: U.S. Steel, American Iron & Steel Institute, DOE, and Unconventional Energy Systems
- o U.S. Steel Corporation
 - Director, Contract Research, managed 25% of the research budget
 - Manager, Analysis and Planning, managed technical support functions, specifically, Physics and Analytical Chemistry, Mathematics, and Process Analysis Divisions, laboratory planning and budget
 - Assistant Division Chief and Division Chief, Physics and Analytical Chemistry Division
- o Yale University
 - Instructor and Assistant Professor, experimental nuclear physics, teaching, research
- o Manhattan District
 - St. Louis, Chicago, Oak Ridge, and Los Alamos, cyclotron production of fission products, beta-ray spectroscopy, initiator development, and weapons critical assemblies

EDUCATION: B.S., Physics, Washington University
M.S., Nuclear Physics, Indiana University
Ph.D., Nuclear Physics, Indiana University

OTHER: ASTM Committee, early member, radiation effects on steels
Advisor, Advanced Test Reactor Technical Safety Appraisal
Fellow, American Physical Society
American Association for the Advancement of Science
American Society for Metals
National Contract Management Association
Sigma Xi

NAME: David Schweller (Facility Safety Review)

ASSOCIATION: Private Consultant, DBS Associates, Inc.

EXPERIENCE:

- o President, DBS Associates, Inc. Private consultants in organization, management, safety and security
- o Participant in 3 earlier DOE Technical Safety Appraisals
- o DOE management appraisal of High Flux Isotope Reactor and Oak Ridge Research Reactor
- o Reviewer of the Technical Safety Appraisal program
- o Manager and Contracting Officer, DOE Brookhaven Area Office
 - Senior Government official responsible for all activities at Brookhaven National Laboratories
 - Region I coordinator for DOE's Radiological Assistance Program
 - Director, Safety Division, DOE, Brookhaven Area Office
- o Reactor Safety Specialist, Atomic Energy Commission
 - Assisted in establishment of AEC's reactor safety program subsequent to SL-1 accident
- o Chief, Experimental Physics, Martin Nuclear Division
 - Designed, built and operated 2 critical activities
- o Reactor Physicist, Combustion Engineering - Nuclear Division
 - Designed, built, operated 3 critical facilities
 - Performed neutronic analysis for naval reactor cores

EDUCATION: B.S. Engineering Physics, New York University

NAME: Jack M. Selby (Radiological Protection)

ASSOCIATION: Battelle Pacific Northwest Laboratory

EXPERIENCE: 34 Years

- o Participant in 5 earlier DOE Technical Safety Appraisals
- o Member, two DOE Nuclear Safety Program Appraisal Teams
- o Manager, DOE Health Physics Research Outlay Program
- o Manager, technical assistance team to the NRC in Health Physics and emergency preparedness appraisals of operating power reactors
- o Manager, Hanford Radiological Calibration Facility
- o Manager, Battelle Radiation Protection Group
- o Manager, Hanford exposure evaluation and occupational exposure records
- o Technical contributor in radiation and environmental monitoring programs and Health Physics research
- o Member and/or Chairperson of ANSI N42, IEC TC 45B, NEA, ISO, and IAEA Standards Committee
- o Certified by the American Board of Health Physics, 1962

EDUCATION: B.S., Chemistry, Kansas State University
Graduate studies, University of Washington
Faculty appointment, Harvard School of Public Health

NAME: Carl M. Stroud (Radiological Protection)

ASSOCIATION: Battelle Northwest Laboratories

EXPERIENCE: 31 Years

- o Staff Scientist, Health Physics Department
 - Manager, Personnel Neutron Dosimetry Evaluation and Upgrade Project
 - Contributor, Hanford Defense Waste Environmental Impact Statement
 - Contributor, Three-Mile Island Programmatic Environmental Impact Statement
 - Technical Liaison, Department of Defense
 - Executive Secretary, Joint Radiation Protection Group
- o U.S. Army Corps of Engineers
 - Civil Engineer, Combat Engineer, Unit Commander
 - Defense Nuclear Agency, Health Physicist and Contracting Officer Technical Representative
 - Chairman, Joint DOD/DOE Intrinsic Radiation from Nuclear Weapons [INRAD] Committee
 - DOD Representative, Interagency Radiation Research Committee [IRRC]
 - DOD Representative, Committee on Interagency Radiation Research and Policy Coordination [CIRRPC]
- o Savannah River Plant, DuPont
 - Research Analytical Radiochemist
 - Shift Supervisor

EDUCATION: B.S., Chemistry, The Citadel
M.S., Nuclear Engineering, University of Maryland

NAME: William E. Taylor (Fire Protection)

ASSOCIATION: Westinghouse-Hanford

EXPERIENCE: 31 Years

o Westinghouse Hanford

- Manager, Fire Protection and Program Integration, managing fire protection program and integration of four DOE contractor's safety, fire protection engineering, and health programs into a comprehensive safety program
- Senior Engineer, Industrial Safety and Fire Protection

o Washington Public Power Supply System

- Manager, Health and Safety Programs. Directed fire protection, health physics, industrial safety, medical, industrial hygiene, and emergency preparedness programs for five nuclear power reactors under construction, and one thermal, and one hydroelectric generating facility, respectively
- Manager, Industrial Safety and Fire Protection. Developed and managed company-wide industrial safety, industrial hygiene, and fire protection engineering programs.

o Westinghouse Hanford

- Manager, Fast Flux Test Facility Health and Safety. Provided nuclear, radiological, fire protection, and industrial safety programs during construction, start-up, and operation.

o Battelle Northwest Laboratories

- Senior Specialist, Industrial Safety. Provided industrial safety, industrial hygiene, and fire protection guidance to management and staff

EDUCATION: Certificate of Completion, College of Advanced Traffic, Chicago, IL

OTHER: Member, National Fire Protection Association
American Society of Safety Engineers
American Industrial Hygiene Association

APPENDIX C
LIST OF CONCERNS

All of the concerns identified in the body of this report are summarized here for the convenience of the reader. The user of this Appendix is cautioned to read the asterisked findings immediately preceding a concern before drawing any conclusion about the nature of the problem. By striving to keep the statement of the concern succinct, the exact intent of any concern can often be understood only upon reading its basis.

A. Organization and Administration

- CONCERN: Many persons charged with oversight responsibilities also have
(OA.1-1) programmatic responsibilities for the actions they oversee; and
 persons with programmatic responsibility for the safety do not
 always have the authority and resources to carry out these
 responsibilities.
- CONCERN: There is no management system which assures continuously
(OA.1-2) effective performance of all safety-related activities.
- CONCERN: There are no visibly promoted measurable annual safety-related
(OA.2-1) objectives and managerial follow-up that go beyond those in the
 assigned Cost Plus Award Fee Goals and Objectives.
- CONCERN: The RI incident and unusual occurrence evaluation and
(OA.4-1) reporting policies and procedures are not in full compliance
 with DOE 5000.3 "Unusual Occurrences Reporting System," and
 DOE 5484.1, "Environmental Protection, Safety, and Health
 Protection Information Reporting Requirements."
- CONCERN: A plant-wide Non-War Reserve quality assurance program bringing
(OA.4-2) together all organizational elements of RI activities of the
 Non-War Reserve programs does not currently exist.
- CONCERN: Rockwell International lacks a complete and effective site-wide
(OA.6-1) document control system.
- CONCERN: The vital records storage vault system is not in full compliance
(OA.6-2) with the DOE Orders, NFPA-232, and NQA-1.

B. Operations

CONCERN: The lockout and tagging program requirements do not comply
(OP.3-1) with ANSI Z244.1-1982, American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements (especially Appendix regarding "Procedure Involving More than One Person").

CONCERN: The "... general and specific building practices pertaining
(OP.4-1) to personnel safety and housekeeping practices..." (per Building Management, RFPM ONM 7-304, Item 1) are not being followed.

C. Maintenance

CONCERN: There is no system to indicate that deficiencies have
(MA.2-1) been identified and entered into the work control system.

CONCERN: There is no process that ensures the quality of maintenance
(MA.3-1) work, cleanliness, cleanup, testing, and restoration of normal facility configuration.

CONCERN: There is no system for independent receipt inspection
(MA.5-1) commensurate with the quality or safety level of equipment and material orders.

CONCERN: There is no system to identify material or equipment which
(MA.5-2) does not conform with standards to prevent its uncontrolled use in the plant.

CONCERN: There is no detailed work scheduling system which provides, on a
(MA.6-1) time-line basis, each job to be worked with assigned crafts and other support groups.

CONCERN: The systems to assure proper preparation of parts and materials
(MA.7-1) and to assure appropriately detailed work instructions for each maintenance task are inadequate.

D. Training & Certification

- CONCERN:
(TC.1-1) An appropriate resource mix to more quickly implement and effectively maintain the new qualification standard training programs, and at the same time be able to maintain existing training programs is needed.
- CONCERN:
(TC.3-1) Alternative strategies are needed that would lessen the current impact of less qualified personnel "bidding" in to fissile material handler classifications.
- CONCERN:
(TC.3-2) DOE annual training and examination requirements for emergency and abnormal conditions are not incorporated into fissile material handler training programs and other progression/certification programs as required.
- CONCERN:
(TC.3-3) The certification program for foremen and supervisors does not meet the requirements of DOE 5480.5.
- CONCERN:
(TC.4-1) Training delivery dates for the new radiation worker training program are too lax.

E. Auxiliary Systems

- CONCERN:
(AX.1-1) Readily usable instructions to operators on how to safely combine chemicals used in Bldgs. 776/777 are not available.
- CONCERN:
(AX.2-1) The 1992-1993 time frame to reach "current" status for the "Actions to Reduce Drum Backlog" plan for removal of the backlog of scrap stored in Bldgs. 776/777 is excessive.
- CONCERN:
(AX.3-1) Criteria and procedures for determining when, where, and for how long drums, may be stored need to be established.
- CONCERN:
(AX.4-1) There is insufficient ventilation in each room to assure that all areas have a safe atmosphere. Air sampling does not comply with the ANSI Standards N13.1-1969 and N13.10-1974.
- CONCERN:
(AX.4-2) The storage of hazardous chemicals on the second floor of Bldgs. 776/777 needs safety review.

CONCERN: There are no positive non-mechanical pressure relief devices on
(AX.4-3) inert recirculating atmosphere gloveboxes that can be isolated from the conveyor by a door.

CONCERN: Operating conditions in Bldgs. 776/777 are not in compliance
(AX.7-1) conditions with the requirements of Chapter Seven of the Final Safety Analysis Report for Bldgs. 776/777.

CONCERN: All engineered safety systems that provide protection to the
(AX.7-2) facility are not identified.

F. Emergency Readiness

CONCERN: There is no method to track and verify correction of
(ER.1-1) emergency response deficiencies and improvement items.

CONCERN: Initial training for all new cadre members and annual
(ER.3-1) training for all members is inadequate and undocumented.

CONCERN: Emergency exercises and drills that are challenging and
(ER.3-2) effective learning tools are not being conducted.

CONCERN: Appropriate backup facilities for the Emergency Operations
(ER.4-1) Center and the support satellites have not been identified.

CONCERN: DOE-required emergency classification categories for all
(ER.5-1) communications with DOE/AL and DOE/Headquarters are not being followed.

CONCERN: The personnel accountability system does not provide
(ER.6-1) positive control of casual building occupants.

G. Technical Support

CONCERN: There is no system for independent audits of facilities
(TS.1-1) modification projects that span the range from project initiation to final project close-out.

CONCERN: The systems and procedures for drum handling, marking, storage
(TS.7-1) and loading/unloading, and for independent audits and quality assurance, do not comply with DOE 5480.3, DOE 5480.5, and ANSI Standard NQA-1-1986.

CONCERN: The safety implications of hydrogen gas generation in all drums
(TS.7-2) and drum storage areas has not been reviewed in order to determine the magnitude of the problem, and determine whether changes in the current procedures are required.

CONCERN: There is no safety analysis of the present system for drum
(TS.7-3) movement into and out of the basement of Room 127.

I. Experimental Activities

CONCERN: The system that requires formal approval does not cover all
(EA.3-1) experimental tests performed in plant facilities.

J. Facilities Safety Review

CONCERN: New safety committees have not been formally established and
(FR.1-1) existing committee charters are out of date.

CONCERN: Stated Rockwell International policy that safety committees are
(FR.1-2) to be advisory to management is not being complied with.

CONCERN: There is a lack of timely safety committee review of accidents,
(FR.2-1) incidents, and Unusual Occurrence Reports to assure root cause analysis, corrective actions, and implementation of lessons learned.

CONCERN: There is no independent safety committee reviews of experiments
(FR.2-2) and major modifications of safety significance prior to their implementation.

CONCERN: Annual audits of facilities which cover all areas required by
(FR.4-1) DOE 5480.5 are not performed.

CONCERN: The scope of the triennial review does not include all safety
(FR.5-1) disciplines, nor does it determine the adequacy and performance
of the management systems established for independent safety
review.

K. Nuclear Criticality Safety

CONCERN: The staffing requirements for a nuclear criticality safety
(CS.1-1) organization as specified in ANSI/ANS-8.1-1983 are not being
met. The root cause(s) of the collective deficiencies needs to
be determined with the help of qualified experts independent of
the HS&E.

L. Radiological Protection

CONCERN: Realistic, understandable and enforceable operating requirements
(RP.1-1) and rules related to radiological protection are lacking.

CONCERN: There is no management system which provides continuous and
(RF.1-2) effective enforcement of radiation protection requirements,
including clear assignment and responsibilities.

CONCERN: The resources required to conduct an effective Radiation
(RP.1-3) Protection Program are not available.

CONCERN: The requirement of DOE 5482.1B, Section 10 to assign individual
(RP.2-1) to the audit team who are independent of the Bldgs. 776/777
operations is not being complied with.

CONCERN: Posting of radiation type and levels at the entrance to all
(RP.3-1) radiation zones and on waste containers and gloveboxes is
inadequate.

CONCERN: There are no procedures to ensure that: smear counters are
(RP.3-2) properly calibrated, calibration data are recorded and
maintained; and defective counters are removed from service and
repaired.

CONCERN: There is a need to verify wrist badge-to-finger dose equivalent
(RP.5-1) conversion factors for the various jobs and document the response of personnel dosimeters and wrist dosimeters to photon and neutron dose in the workplace.

CONCERN: Dosimeters are not being worn correctly to ensure proper
(RP.5-2) measurement.

CONCERN: The program to measure and document the radiation energy levels
(RP.5-3) in the workplace is incomplete.

CONCERN: Emergency dosimeters are not located strategically throughout
(RP.5-4) the facility and are not calibrated.

CONCERN: The alpha air-sampling/air-monitoring capabilities in Bldgs.
(RP.6-1) 776/777 are inadequate.

CONCERN: The program to ensure that contamination in the work-place
(RP.6-2) is promptly removed is ineffective.

CONCERN: A method to track routine and special bioassay requests
(RP.7-1) is needed.

CONCERN: There is no independent audit program for internal
(RP.7-2) dosimetry.

CONCERN: The program to compare in-vitro and in-vitro results for
(RP.7-3) employees with air contamination in their workplace is inadequate.

CONCERN: The portable-instrument calibration program does not meet
(RP.8-1) the requirements of DOE-prescribed standard ANSI N323.

CONCERN: Combo's, Alphamets, and SAAMS are not calibrated as needed to
(RP.8-2) assure continued effective operation.

CONCERN: The health physics instruments used for personnel protection
(RP.8-3) do not all conform to appropriate performance requirements of applicable standards.

CONCERN: There is no effective quality control program for radiation
(RP.8-4) protection instrumentation.

CONCERN: Effective procedures for self-monitoring by personnel using
(RP.11-1) the Combo instruments and survey instruments (Alphamets) have not been developed and personnel have not received training in their use.

CONCERN: The survey and inspection of washed clothing at laundry is
(RP.11-2) inadequate.

CONCERN: Documentation of the Health Physics ALARA program for Bldgs.
(RP. 12-1) 776/777 is non-existent and the responsibilities of the ALARA Coordinator and other staff are not specified.

CONCERN: The automated data entry and trend analyses program for air
(RP.12-2) air samples and personnel exposure is not operational.

CONCERN: Contamination/radiation survey results are not provided to the
(RP.12-3) supervisor/foreman responsible for each area for their review and posting.

CONCERN: The occupational exposure record program does not meet
(RP.13-1) the requirements for maintaining complete records.

M. Personnel Protection

CONCERN: There is no routine monitoring program to confirm the
(PP.2-1) effectiveness of control measures for chemicals utilized in the workplace.

CONCERN: A quality assurance program is needed to minimize and
(PP.2-2) routinely identify and correct deficiencies in the respiratory protection program.

CONCERN: Vessels/tanks/containers containing chemical mixtures are not
(PP.3-1) labeled with appropriate hazard ratings.

CONCERN: The current utilization and availability of staff resources may
(PP.4-1) be adversely affecting the quality of the industrial hygiene program.

- CONCERN: There is no common data base for records of the collection,
(PP.5-1) analysis and reporting of occupational exposure information.
- CONCERN: Uniform quality control procedures for all industrial hygiene
(PP.5-2) type samples do not exist.
- CONCERN: The effective hoisting/rigging program is ineffective in
(PP.7-1) that it does not include as a minimum; regular inspection,
preventive maintenance, training in, and certification of
equipment and accessories.
- CONCERN: An aggressive safety awareness and promotion program to achieve
(PP.7-2) a positive safety attitude in facility personnel does not exist.

N. Fire Protection

- CONCERN: There is no management system to assure that egress routes
(FP.1-1) in Bldgs. 776/777 are identified adequately, that they
ensure rapid personnel egress, and are maintained current.
- CONCERN: There is no analysis of the need for earthquake bracing of the
(FP.2-1) automatic sprinkler system in Bldgs. 776/777.
- CONCERN: The emergency need for the replacement of the mini-pumper/
(FP.5-1) rescue vehicle is not being emphasized in the procurement
process.
- CONCERN: There is no formal program which assigns responsibilities,
(FP.5-2) requires periodic review of the integrity of the fire
separations, and assures prompt correction of deficiencies.
- CONCERN: A wait of 5 years to replace the fire detector/alarm systems
(FP.5-3) in Bldgs. 776/777 is excessively long.
- CONCERN: There is no management control system that prohibits the
(FP.5-4) unnecessary use or storage of combustible materials in
Bldgs. 776/777.

APPENDIX D-1

System For Rating Concerns

- A. Each concern presented in this report has been categorized for SERIOUSNESS by the following criteria:

CATEGORY I: Addresses a situation for which a "clear and present" danger exists to workers or members or the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. At this point, consideration shall be given to whether a clear and present danger exists such that facility shutdown authority by the Assistant Secretary (EH-1) should be exercised. If so, the Assistant Secretary or his designee is informed immediately.

CATEGORY II: Addresses a significant risk (but does not involve a situation for which a clear and present danger exists to workers or members of the public) or substantial non-compliance with DOE Orders. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed with the preparation of a formal report and the routine development of an action plan.

Any issues surrounding the concern or the suggested response should be addressed during the appraisal or immediately thereafter. Again, consideration should be given to whether facility shutdown is warranted under the circumstances.

CATEGORY III: Addresses significant non-compliance with DOE Orders, or suggests significant improvements in the margin of safety, but is not of sufficient urgency to require immediate attention.

- B. Each concern presented has also been characterized by its POTENTIAL HAZARD CONSIDERATIONS and by the significance of its COMPLIANCE CONSIDERATIONS. The criteria used were:

HAZARD POTENTIAL CONSIDERATIONS

- Level 1. Has the potential for causing a severe injury or fatality, a fatal occupational illness, or loss of the facility.
- Level 2. Has the potential for causing minor injury, minor occupational illness, major property damage, or has the potential for resulting in, or contributing to, unnecessary exposure to radiation or toxic substances.
- Level 3. Has little potential for threatening safety, health, or property.

COMPLIANCE CONSIDERATIONS

- Level 1. Does not comply with mandatory DOE requirements (DOE Orders), prescribed policies or standards, or documented accepted practice (the latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements).
- Level 2. Does not comply with DOE reference standards, guidance, or good practice (as derived from industry experience, but not based on national consensus standards).
- Level 3. Has little or no compliance considerations; these recommendations are based on professional judgment in pursuit of excellence in design or practice (i.e., these are improvements for their own sake - not deficiency-driven).

APPENDIX D-2
CATEGORIZATION OF CONCERNS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
OA.1-1	H1	C2
OA.1-2	H1	C2
OA.2-1	H3	C2
OA.4-1	H3	C1
OA.4-2	H2	C2
OA.6-1	H3	C2
OA.6-2	H3	C1
OP.3-1	H1	C2
OP.4-1	H3	C3
MA.2-1	H2	C2
MA.3-1	H2	C2
MA.5-1	H2	C2
MA.5-2	H2	C2
MA.6-1	H2	C2
MA.7-1	H2	C2
TC.1-1	H2	C2
TC.3-1	H2	C2
TC.3-2	H2	C1
TC.3-3	H2	C1
TC.4-1	H2	C1
AX.1-1	H3	C1
AX.2-1	H2	C3
AX.3-1	H2	C2
AX.4-1	H3	C1
AX.4-2	H2	C2
AX.4-3	H2	C1
AX.7-1	H3	C2
AX.7-2	H3	C1
ER.1-1	H2	C1
ER.3-1	H2	C1
ER.3-2	H2	C1
ER.4-1	H2	C1
ER.5-1	H3	C1
*ER.6-1	H1	C1
TS.1-1	H2	C2
TS.7-1	H2	C1
TS.7-2	H2	C1
TS.7-3	H1	C2

Appendix D-2 (Cont.)

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
EA.3-1	H3	C3
FR.1-1	H2	C1
FR.1-2	H2	C1
FR.2-1	H3	C3
FR.2-2	H2	C1
FR.4-1	H2	C1
FR.5-1	H2	C1
CS.1-1	H1	C1
*RP.1-1	H2	C2
*RP.1-2	H2	C2
RP.1-3	H3	C3
RP.2-1	H3	C1
RP.3-1	H2	C2
*RP.3-2	H2	C2
RP.5-1	H3	C2
RP.5-2	H3	C2
RP.5-3	H3	C2
RP.5-4	H2	C2
*RP.6-1	H2	C2
RP.6-2	H2	C2
RP.7-1	H3	C3
RP.7-2	H3	C1
RP.7-3	H3	C2
*RP.8-1	H2	C1
*RP.8-2	H2	C1
RP.8-3	H2	C1
RP.8-4	H3	C2
RP.11-1	H2	C2
RP.11-2	H2	C2
RP.12-1	H2	C1
RP.12-2	H3	C3
RP.12-3	H2	C2
RP.13-1	H3	C1
PP.2-1	H2	C1
PP.2-2	H2	C1
PP.3-1	H2	C1
PP.4-1	H2	C3
PP.5-1	H2	C2
PP.5-2	H2	C1
PP.7-1	H2	C1
PP.7-2	H2	C3

Appendix D-2 (Cont.)

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
*FP.1-1	H1	C1
FP.2-1	H2	C1
FP.5-1	H2	C1
*FP.5-2	H2	C1
FP.5-3	H2	C1
FP.5-4	H2	C1

* These concerns are Category II. All other concerns are Category III.

APPENDIX B

INTERIM RESPONSE TO THE

TECHNICAL SAFETY APPRAISAL

BUILDINGS 776/777, ROCKY FLATS PLANT

memorandum

Albuquerque Operations Office

DATE: FEB 26 1988

REPLY TO
ATTN OF: SPDSUBJECT: Interim Response Plan to the TSA Appraisal at Building 776/777, Rocky
Flats PlantTO: Richard W. Starostecki, Deputy Assistant Secretary for Safety, Health, and
Quality Assurance, EH-30, HQ

The subject response plan is attached. As agreed among AL, RFAO and EH staff at the TSA closeout meetings on February 12, 1988, the interim response plan is being provided within two weeks from the TSA closeout. It provides an immediate response to the nine Category II findings; it also provides an overall management assessment of all of the 85 findings. Rockwell has initiated actions on each of the nine Category II findings. AL has reviewed these actions and the schedules for completion. We agree that these actions and dates are appropriate and timely.

AL HQ and RFAO personnel will continue to work closely with RI to expedite the planned actions and resolve the concerns. Periodic meetings and work sessions will be held to assure that the schedules are being met and that concentrated efforts by the contractor continue. We will keep your staff informed concerning this progress.

Dennis L. Krenz
Assistant Manager for
Environment, Safety & Health

Attachment

cc:
T. E. Wade, DP-1, HQ (w/Atch)
A. E. Whiteman, RFAO (w/o Atch)

United States Government

Department of Energy

memorandum

Albuquerque Operations Office

Rocky Flats Area Office

DATE: February 26, 1988

REPLY TO
ATTN OF:

SUBJECT: Interim Response to the Technical Safety Appraisal (TSA) of Buildings 776/777, Rocky Flats Plant

TO: R. G. Romatowski, Manager, AL

The attached interim response plan was prepared by Rockwell International, to address the nine category II findings that resulted from the HQ TSA of Buildings 776/777 at the Rocky Flats Plant. We have reviewed and concur with the response plan, the actions taken and planned, and the root causes identified to date. The proposed actions when fully implemented will adequately address the TSA concerns and demonstrates a positive approach on the part of Rockwell International to addressing the safety concerns of the RFP. Please note that responses RP-1 and RP-8 each address two category II findings.

Albert E. Whiteman
Area Manager

Attachment

cc w/Att:
Richard Sterostecki, EH, HQ

Rocky Flats Plant
Aerospace Operations
Rockwell International Corporation
P.O. Box 464
Golden, Colorado 80402-0464
(303) 866-7000
Contractor to U.S. Department of Energy

Rockwell
International

February 26, 1988

88-RF-0663

Albert E. Whiteman
Area Manager
DOE/RFAO

ROCKY FLATS' BUILDINGS 776/777 TSA RESPONSE

REF: J. P. KNIGHT'S LETTER DATED 2/19/88 TO D. L. KRENZ - ALO

The DOE TSA conducted during the period of February 1 through February 12, 1988 resulted in a report which included 85 findings. Of these findings, nine were considered to be of a nature that required a response within two weeks of the presentation of the report (February 12) to Rockwell Management, the Plant operator under contract to DOE.

This response is organized to present an overall management assessment of the TSA findings and the immediate and near term actions that have been taken on the nine selected findings.

Part I

Rockwell Management Assessment of the Findings

A Rockwell Management review of the 85 findings disclosed a pattern of management and labor behavior that is best summarized as follows:

- (1) Satisfaction with a radiological protection safety program approach and performance on the basis that it had not resulted in a major insult to personnel or the environment over the Plant's 35 year history.
- (2) Allocation of resources to improving safety equipment that is related primarily to resources availability rather than need.
- (3) A management and labor tolerance of an internal working environment that resulted in a blockage of the safety problems natural feedback loop.

- (4) Procedures and policies that are not totally integrated and an updating system that is slow to respond to improvements and changing requirements. Elective enforcement of policies viewed as unrealistic, resulted in employee uncertainty as to management's approach to discipline.
- (5) Limited attempts to research and learn from study of related operations at other DOE laboratories and plants, as well as other nuclear operations including DOD and commercial.

Rockwell Management Response to the Findings

To firmly implant Rockwell Policy at the Rocky Flats Plant, that safety will not be compromised for any reason; these patterns can and will be changed. To achieve this change, senior management is outlining a program aimed at a Rocky Flats Plant adjustment in both personnel attitude and discipline. The program elements will include:

- (1) The presence of a radiological executive reporting directly to the Rocky Flats President is being evaluated. This addition would provide the executive support required to establish safety as a prime goal. Significant organizational changes have already been made (February 12) in HS&E and further reviews of existing structures are underway and will be completed by March 22, 1988.
- (2) The development of a new radiological protection program that is traceable to existing DOE Orders and Policies and cognizant of potential changes. This program will be developed by the Rocky Flats Plant's Health, Safety & Environment (HS&E) Organization after a thorough investigation and analysis of other plant's programs and with consultant help. Final approval of the program will be granted after complete review by the Rocky Flats Plant President, who will be assisted by senior consultants in firms recognized as eminent specialists in the field of radiation protection. The program will be subjected to an independent Rockwell Corporate Systems Safety Executive review, aided by specialists they will employ.

- (3) A plan for implementation of a Quality Program in the Non-WR area, that meets the requirements of NQA-1, has been under development since July, 1987. A preliminary version of this plan was released for staff review in December 1987. Implementation schedules and required resources will be identified and provided to DOE Management by March 15, 1988.
- (4) Further improvements will be outlined and presented as a SELF IMPROVEMENT PROGRAM aimed at making the Rocky Flats Plant a weapons complex leader in safety, as we have in production hardware schedules and quality. Elements of this plan will include:

Interpersonal relations training to improve management/labor relations, reinforce discipline and improve the existing problem feedback loop.

Operator training programs that will stress improvement in operating practices and recognize the importance of both currency and planned, continuous review.

Revised procedures and policy review and configuration control systems that will assure integration across the organization, establish clear lines of authority and responsibility and avoid unenforcible requirements.

An integrated Rocky Flats Plant audit program that will consider functional HS&E and Executive audits. Also included will be a planned external and independent Rockwell Corporate audit plan.

These items, plus others presently being considered, will be included in a draft review copy by March 31, 1988. It is planned to conduct both Rockwell Corporate review and DOE Management review prior to issuing a final proposal by May 31, 1988. The quality of this program is expected to be greatly enhanced by our review with noted external specialists, some of which are identified in Attachment 1.

A. E. Whiteman
Page 4
February 26, 1988

Rocky Flats Management is taking the initiative to prepare a proposal for a safety award fee incentive that will reward significant performance improvements. This technique has and is being applied successfully in WR production and quality areas and has resulted in an excellent contractor awareness and motivational tool for the Government.

Part II

Response to the nine significant findings identified by the TSA is included in Attachment II. In each case, we have documented the immediate action taken, planned actions in the near terms (1-2 months) and potential future actions that may become part of the Self Improvement Program.

In summary, the TSA findings clearly identified symptoms of basic problems that Rockwell will resolve not only on a case by case basis, but also at the systemic source level.

Dominick J. Sanchini
President

Orig. and 1 cc Mr. Whiteman
Enc.

ATTACHMENT 1

Rockwell International

Proposed Consultants

Outside Support

Individual

Dr. R. A. Petrone,
Rockwell International
Dr. M. Miles, Beta
Dr. J. Auxier, IT Corp.
S. Clark, IT Corp.
Dr. J. Frazier, IT Corp.
R. Huxton, LASL
J. Gallimore, LASL
D. Trombino, LLNL
Dr. L. Faust, Battelle
Dr. J. Selby, Battelle
T. Lynch, Battelle
D. Fleming, Battelle
J. McDonald, Battelle
C. Corbit, Battelle
J. Corley, Consultant
D. Garland, Consultant
A. Benjamin, Consultant

Specialty

Independent Corporate Overview

Overall Program Plan
Overall Program Plan
Health Physics
Health Physics
Health Physics
Health Physics
Instrument Calibration
Overall Program Plan
Radiation Protection
Air Sampling
Instrumentation
Instrumentation
Criticality Safety
Overall Program Overview
QA and NQA-1
Overall Program Coordinator

Interface

Jacobellis/Jeffs/Sanchini

Sanchini/Petrone
Sanchini/Petrone
Meyers
Meyers
Meyers
Meyers
Langsted
Sanchini/Meyers
Sanchini/Meyers
Frick
Langsted
Langsted
McCarthy
Sanchini/Meyers
Sanchini/Kirby
Sanchini

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Facility organization and administration should ensure effective implementation and control of radiological protection activities within the facility.

FINDINGS:

1.0 Positive Control

Positive control was not established for monitoring within and upon departure from work areas. Workers were observed leaving the process area and exiting the building without being surveyed by a monitor.

Workers, management, and monitors were observed leaving a room without surveying themselves for contamination.

2.0 Rules and Enforcement

Observations of worker behavior by all appraisal team members leads to the conclusion that radiological protection requirements are not actively administered by management and supervision and adhered to by plant personnel.

Building and individual managers tolerate repetitive violations of building radiation and contamination control requirements and good radiation protection practices.

Personnel were observed working on potentially contaminated items without wearing surgeon's gloves as required. One worker was observed machining uranium in an open glovebox without surgeon's gloves. Two maintenance workers were working on top of a glovebox without wearing required surgeon's gloves.

Workers and managers were observed chewing gum in the work area.

Enforcement of requests to clean-up and to change ruptured and/or contaminated gloves has become a duty of radiation protection rather than line management.

3.0 Management and Organization

Management of operations is divided among a number of organizational components, individual managers, and Building Managers defer to the HS&E organization for implementation of radiation protection practices within the building. Radiation Protection personnel have been trying to solve many safety problems identified during previous appraisals, which is actually the responsibility of line management.

The As Low As Reasonably Achievable (ALARA) coordinator responsibilities are not documented.

ACTIONS:

1.0 Positive Control

Radiation monitors stationed at exits from Pu radiation areas for 100% assurance of complete monitoring control of personnel. 02/06/88 complete

New instructions for combo self-monitoring were tested, prepared, printed, installed, and verified. 02/10/88 complete

2.0 Establish Clear and Enforceable Rules

A team headed by Health Physics, Operations & Maintenance personnel was formed to review, rewrite, and publish new personnel protection requirements for plutonium, uranium, and other non-plutonium areas (HSE 18.02 & 18.03) 02/24/88 complete

-Drafts reviewed and comments incorporated from outside specialists (PNL, LANL, SNLA, DOE ALO/RFAO)

Develop plan (completed 2/9/88) and review all safety related procedures at Rocky Flats. ECD 03/04/88

All management informed that compliance is mandatory and disciplinary action will be taken. 02/05/88 complete

Video message by President to all employees followed by 02/11/88 letter. 02/05/88 thru 02/08/88 complete

Floor check by management (building self-audit) for compliance started 02/05/88 with written verification required 02/12/88. complete

New training video covering current way to self-monitor using alpha-mets and combos prepared. 02/18/88 complete

Training program for all employee to cover revisions to all safety procedures 02/18/88 to 03/04/88. ECD 03/04/88

2.0 Establish Clear and Enforceable Rules (continued)

Established 24-hour Rockwell audits with detail safety-related checklists. complete
Scheduled to cover each building, all operating shifts, every 3 days. Started 02/08/88.

Refined program for permanent year-round audit schedule and staff. ECD 3/1/88

Glovechange requirement specified the following in revision to HS&E 18.02. complete
"Gloves with punctures, cuts, or tears shall be changed immediately, and deteriorated gloves must be changed within 3 days or before use."

3.0 Management and Organization

HS&E reorganized to provide more direct focus on Health Physics, Radiation Safety, and special HS&E programs. 02/12/88 complete

Continued evaluation of underlying causes may require additional modifications in the HS&E organization. ECD TBD

DISCUSSION:

1.0 Positive Control

The positive control was implemented immediately to contain the underlying problem of personnel not following administrative procedures. This approach provided immediate assurance, while other actions to evaluate root causes and corrective actions for permanent solutions are being developed.

2.0 Rules & Enforcement

The underlying cause is that rules in contamination control and radiological protection over the thirty-five year period have resulted in documents which were unclear, now uniform, and not consistently enforced. Actions to resolve and enforce revised clear rules is under way with the first aimed at two most comprehensive procedures, HSE 18.02 and HSE 18.03, for both plutonium and uranium. Surveys of other DOE and NRC controlled sites are being performed as safety procedures are modified to assure that Rocky Flats is meeting or exceeding industry standards in revised safety policies. Training on clarified rules is under way with enforcement on current and new rules stressed. Audits are being continued to assure effectiveness of these changes.

3.0 Management and Organization

Many of the actions that have resulted from the TSA findings were planned as a result of an intensive review conducted from November, 1987 to January, 1988, at Rocky Flats of the NAS report on reactors. However, the action items scheduled to resolve the identified deficiencies were not being aggressively pursued. An additional underlying cause has been an attitude of accepting real or perceived resource limitations and not carrying the urgency forward.

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generation devices should provide for safe operations and for clearly identifying areas of potential hazards.

FINDINGS:

Smear sample counters receive only one ten-minute source count every 24 hours. Adjustments are made as necessary in the source position. The source is recounted to achieve the desired counting level. During a re-check at 2000 hours on February 2, 1988, three of the five channels were outside calibration parameters.

One ten-minute count does not constitute a good statistical (CHI-squared) test of the counter operation.

No statistical control chart is maintained for the counter.

No records are maintained as to the count that is obtained for each channel. Only an indication of the efficiency of each channel is written on the instrument (a new log book was instituted; however, the data recorded was inadequate to justify the quality of the counter).

MILESTONE SCHEDULE:

<u>ACTION</u>	<u>SCHEDULE</u>
Revise and implement smear sample counter source check procedure. 02/07/88	complete
Begin developing control charts of counter performance. 02/24/88	complete
Perform statistical analysis of data from daily source checks and control charts.	03/15/88
Institute quality control program to ensure smear sample counters are adequately calibrated and maintained for proper functioning.	03/30/88

ACTION

SCHEDULE

Review smear technique procedures and training provided to radiation monitors via progression program. Incorporate upgrades to ensure proper procedures are being followed.

02/29/88

Expedite final design for prototype of new smear counters.

ECD 3/01/88

Construct and evaluate .

03/15/88

DISCUSSION:

The underlying problem with the smear counters is a subset of the overall radiation instrumentation program not keeping pace with current technology and requirements. Improving the calibration quality control and statistical evaluation of the current smear counters is only an intermediate step toward a longer-term solution of bringing site-wide radiation protection up to current and future standards.

An HS&E Quality Program Plan with accompanying procedures is being developed which will include radiation instrumentation. Strict adherence to program requirements will be enforced with proper documentation and reporting to top management to ensure data obtained from health protection instrumentation is accurate, defensible, and reliable.

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

1.0 Selective Alpha Air Monitoring (SAAM's)

Selective Alpha Air-Monitoring equipment (SAAM's) do not receive an ANSI type calibration. They are only doing a one point check. (They are now being calibrated.) NOTE: Moved from RP.8

Radon compensation calibration procedures for the SAAM's are not uniformly applied by the Instrument Technicians. A carefully calibrated instrument will experience few false alarms.
NOTE: Moved from RP.8

Many false alarms occur because of high radon levels. This tends to reduce employee confidence in the monitor.

During the past few weeks, several SAAM's were turned off without notifying either Radiation Monitoring or the Instrument Technicians. These instruments were operational when turned back on. There is no electronic method to automatically display their operational status in the monitoring office.

A line item budget of \$4.5M to upgrade the air monitoring system to include 450 of the new RFP and 50 of the new Lawrence Livermore National Laboratory (LLNL) designed alpha air monitors for stack monitoring was defended and approved in FY85 and early FY86. This line item was deleted by DOE/HQ at mid-year FY86. RFP has continued to attempt to gain this funding.

New alpha air monitors developed by RFP have a detection level of about three MPC-hrs and have passed a portion of the performance test criteria contained in Draft ANSI N42.17B.

More complex air monitors developed by LLNL to meet RFP requirements have a detection limit of -0.5 MPC-hrs. These are scheduled in FY88 for a complete test against Draft ANSI N42.17B performance criteria.

RFP has a design for a new alpha air monitor data logger that will permit transmission of air-monitoring data to a remote location such as the EOC.

2.0 Fixed Air Monitoring (added by Rockwell)

Air sampling and air monitoring is inadequate in Bldg. 776/777. The location of the samplers and monitors, in many instances, are neither representative of the breathing zone contamination levels nor the contamination levels at the air exhaust from the room.

ACTIONS:

<u>ACTION</u>	<u>DUE DATE</u>
1.0 <u>Selective Air Monitors (SAAM's)</u>	
New two point NBS traceable SAAM calibration procedure prepared and approved.	complete
Pu effluent & recycle stack SAAM's (36) calibrated.	complete
Priority established for calibrating remaining approximately 450 room SAAM's.	02/29/88
Perform daily operations checks of SAAM's and record status.	ongoing
Evaluate design and purchase of new SAAM's (36) & iso-kinetic stack probe for effluent monitors.	complete
Evaluate performance/maintenance of prototype units.	ECD TBD
2.0 <u>Fixed Air Monitors</u>	
Plan prepared to perform air flow pattern study, establish needs, and schedule corrective actions for additional air sampling heads at work places in Buildings 776/777.	complete
Initial plan requires addition of approximately 180 air sample heads.	complete
Project cost and estimate to DOE.	03/15/88
In parallel, an alternative interim solution is being evaluated. (Personnel label monitors)	03/16/88
Review existing plan for air head locations in all Pu buildings including outside consultants for verification.	ECD TBD

DISCUSSION:

1.0 SAAM's

The immediate stop-gap solution to the SAAM's was to perform two point NBS traceable calibration for the Pu effluent and recycle stacks. The underlying cause is not moving aggressively to perform the best calibration possible on existing equipment pending approval of the proposed replacement of ~486 SAAM's to latest technology.

2.0 Fixed Air Monitoring

The need for additional fixed air head monitoring in Pu buildings has been identified and projects have been submitted for funding since 1985. This need is becoming more urgent. Projects are in place to correct the deficiencies in Building 771 in FY89 and Building 776/777 in FY90.

RP.8 FIXED AND PORTABLE INSTRUMENTATION (NORMAL AND EMERGENCY USE).

PERFORMANCE OBJECTIVE: Radiological protection instrumentation used to obtain measurements of radioactivity or personnel dosimetry should be calibrated, used, and maintained so that results are accurately determined.

FINDINGS:

1.0 Portable Instruments

The current written calibration procedures for portable dose rate and contamination survey instruments do not meet the requirements contained in the DOE-prescribed calibration standard ANSI N323.

One procedure for Ludlum model 12 alpha survey instruments that had been prepared to meet the requirements of ANSI N323 had not been approved and was incomplete since source calibration was not required. (The procedure has now been completed and approved.)

Radiation sources used by electronic technicians are of different strengths and are not traceable to the NBS.

Some instrument technicians were using the old procedure and some were using the new unapproved one. (All now use the same, approved procedure.)

An ANSI N323-type annual calibration is not performed on routine and emergency instruments used for establishing dose rates. (Also covered in Emergency Preparedness)

2.0 COMBO's

The electronics package in all combos of a certain model were replaced in FY87 to improve the quality and standardize the instruments throughout the plant. However, the appraisal team found old models that had not been upgraded. (Subsequently the old ones have been removed.)

One technician using the same source, checked 12 combos. The instrument response varied substantially. Response time and maximum response also varied.

Hand and shoe counters (combos) and fixed survey instrumentation (alpha-mets) do not receive a calibration, only a one point check. (Combos and alpha-mets are now being calibrated.)

3.0 Dose Rate Instruments

No central facility is available where radiation sources traceable to NBS are operated in a fixed geometry. (The contractor identified a building to be used as an interim facility during the appraisal.)

Neutron and photon instruments are calibrated in seven facility instrument-repair locations, including one in Bldg. 776. No fixed-geometry and well-characterized radiation field calibrators are used. This could lead to differences in calibration between various instrument laboratories.

The source used at the calibration facility, is inadequate to calibrate the high range instruments and to provide the tests for overload response for all instrumentation. This is of particular concern for emergency radiation protection instrumentation such as the Radector III's.

An NBS-traceable transfer instrument is not currently being used to establish uniformity between multiple laboratories and to establish linearity of source fields in the photon source calibrator.

ACTIONS:

1.0 Portable Instruments

New four point NBS traceable calibration procedure for Ludlums prepared, implemented, and verified. 02/05/88	complete
All Ludlums check-calibrated using these procedures prior to use. 02/05/88	complete
Establish formal QC verification plan of all Ludlum action items. 02/10/88	complete
Perform formal QC verification.	02/29/88
Statistical analysis of daily Ludlum calibration data.	02/29/88
New Ludlums model 12.1 with positive calibration protection and latest electronics purchased.	DELIVERY 03/30/88 Complete Phase in 04/30/88

2.0 COMBO's

New two point NBS traceable calibration for combos and alpha-mets prepared and approved.

complete

Calibration of 340 combos and 1700 alpha-mets on priority basis.

combos
2/27-3/4/88
alpha-mets
3/5-25/88

Complete design and construct new prototype combo with improved efficiency and positive timing for use.

03/07/88

Prepare evaluation plan and complete evaluation of new combo design for procurement recommendation.

04/07/88

3.0 Dose Rate Instrumentation

No instrument will be used without source check.

complete

Interim measures and procedures to calibrate dose rate instruments established.

complete

NBS Photo transfer standard recalibrated and returned.
02/12/88

complete

Additional onsite transfer standards. 02/18/88

complete

Additional NBS traceable sources purchased 2/15/88 with 3-week expedited delivery.

03/07/88

Established accelerated schedule for new neutron/photon calibration.

complete

Proposal to DOE to accelerate construction schedule.

02/26/88

DISCUSSION:

1.0 Portable Instruments

The findings on the portable instruments illustrates the underlying problem of lack of aggressive approach to implementing new DOE requirements into plant operations. It also illustrates acceptance of past practices and lack of independence in calibration and no Quality Assurance Program equivalent to NQA-1. The longer-term solution is the aggressive application of NQA-1 started a year ago to all HS&E activities including instrumentation.

2.0 COMBO's

In addition to the basic problem for all instrumentation, the combos also have the problem identified under the NAS Report section on "aging facilities & equipment."

3.0 Dose Rate Instruments

Funding for design of the calibration facility project has been received. A plan to accelerate this project has been proposed. This facility will give Rocky Flats the capability to comply with DOE requirements.

FP.1 LIFE PROTECTION

PERFORMANCE OBJECTIVE: The facility should not present an unacceptable hazard to life from the results of accidental fire.

There were several areas where exit routes were not adequately identified as required by NFPA-101, Life Safety Code. The size and use occupancy of Bldg. 776/777 make well defined egress routes very important. (Considerable improvements have been made in identifying egress routes since the start of this appraisal).

Findings in Section SS.3 also support this recommendation (as follows):

Bldg. 776/777 is quite a complicated maze of rooms, areas, and corridors. In event of emergency, all outside doors provide quick egress from the building. In most cases, small arrows are provided on the floor to provide guidance to the exits. These arrows, where installed, would be helpful to evacuate the people. Some areas, such as the entire second level (freshly painted), do not include these arrows. Other freshly painted areas had the same problem.

Exit signs are provided at each exit, but "EVACUATION" or "ASSEMBLY AREA" directional signs to guide an evacuation or assembly are not routinely provided.

Exit signs have required considerable work to maintain them operable as evidenced by review of work requests over the past year.

Consistently adequate markings for personnel evacuating from the facilities and to assembly areas are not provided in all cases.

MILESTONE SCHEDULE:

<u>ACTION</u>	<u>SCHEDULE</u>
Review Building 776/777 for additional signs and marking.	complete
Complete installation and verification.	03/14/88
Establish priority review of other Pu buildings to assure site-wide incorporation of exit markings.	03/14/88
Complete installation & verification.	04/30/88
Institute verification control mechanism.	04/30/88

ACTION

SCHEDULE

Establish computer-based facility floor plan system to locate all emergency exits and routes in all buildings.

ECD 3/21/88

Extend building study to include exterior emergency routes and assembly. Areas and place in computer-base program for maintenance checklist.

ECD TBD

DISCUSSION:

The underlying cause for the deficiencies in emergency marking is the lack of a system to track when improvements such as repainting of floors or moving of equipment occur in buildings covering or changing emergency routes. As part of the corrective actions a system showing up-to-date floor markings and exits on a computer building floor plan base for all buildings and a checklist for all maintenance activities to consider effect on emergency exits is being developed.

The system will be extended to the exterior of the buildings which will include security input as well as contamination control requirements.

NOTE: A similar response is included under ER-6 personnel protection due to a similar finding in that area.

FP.5 IMPROVED RISK

PERFORMANCE OBJECTIVE: The facility should qualify as an "improved risk" or "highly protected risk" as commonly defined by the property insurance associations specializing in such coverage.

FINDINGS:

- 1.0 Bldgs. 776/777 are compartmentalized into fire zones by walls which appear to have a two-hour rating.
- 2.0 There were several fire doors in the walls separating the fire zones which were defective in Bldg. 776/777. The majority of the defective doors were missing latching mechanisms or had oversized windows which invalidated their fire protection integrity and rating. Several new doors were in the process of being installed.

Blocked fire doors are a repetitive finding in Bldg. 776/777 Fire Department monthly inspections.

- 3.0 Many of the ventilation ducts which pass through fire barriers do not have features which provide the same fire separation rating as the basic wall assembly. This condition voids the two-hour rating.
- 4.0 Fire separations and glovebox enclosures which installed heat detectors are marginally satisfactory to eliminate the potential for an offsite release to toxic chemicals and radioactive materials.

MILESTONE SCHEDULE:

<u>ACTION</u>	<u>SCHEDULE</u>
1.0 <u>Fire Walls</u>	
All walls encompassing fire zones in Bldgs 776/777 verified to extend from floor to ceilings and constructed of materials to meet two-hour rating.	Completed
Review and update by current inspection as required, the Fire Department/Plant Operations data for all buildings containing walls which encompass fire zones.	Pu Facilities 03/11/88 All Facilities 04/22/88

ACTION

SCHEDULE

2.0 Fire Doors

Review to confirm prior Building 776/777 survey finding to verify doors for repair and replacement.

complete

02/18/88

Repair and replace inadequate fire doors in 776/777 as required on an expedited basis; twelve doors have been replaced and are operational (2/15/88).

03/31/88

Evaluate establishing warehousing of fire rated doors
02/19/88

complete

Inspect all site-wide fire doors (1,090) and establish condition, priority, and repairs required. 02/21/88

complete

Replace/repair fire doors and/or hardware as necessary in remainder of buildings.

04/30/88

Review Fire Department building inspection procedures and revise as necessary to ensure identification of fire door violations and timely definitive follow-up to correct deficiencies.

completed

Develop:

- Video for fire door & wall training.
- Letter notifying all Building Managers of a training class on fire doors and their responsibilities.
- Provide training sessions to Building Managers.

03/10/88

03/05/88

03/14 to
03/16/88

3.0 Ventilation Ducts

Perform a technical review of fire protection for ventilation ducting at Rocky Flats and compare to other DOE plutonium facility installations.

Completed

<u>ACTION</u>	<u>SCHEDULE</u>
<u>3.0 Ventilation Ducts (continued)</u>	
Evaluation by DOE/ALO Fire Protection Engineer familiar with all DOE sites. 02/25/88	complete
Contract with an independent fire professional expert to validate and confirm technical evaluation.	ECD TBD
<u>4.0 Heat Detection</u>	
The aging heat detection in Building 776/777 is being maintained in an operational condition.	Ongoing
The need to replace this system has been identified in a proposed FCAP project.	Completed
A letter restating the need for this system will be sent to DOE.	ECD 3/7/88

DISCUSSION:

1.0 Buildings Walls

The TSA inspector's comment was related to the fact that he did not have time to physically verify the floor to ceiling walls in Bldg. 776/777 and had to depend on Fire Department records. However, this illustrates the underlying problem of having current configuration control of facilities that have been modified several times over a 35-year period, and maintaining assurance that fire wall integrity has been retained.

2.0 Fire Doors

The underlying cause for lack of fire door maintenance is that over the last several years they have not been placed on the safety priority list. Contributing to this problem is the length of time to obtain specially built, UL approved, two-hour rated fire doors. Several years ago Rocky Flats unsuccessfully attempted to obtain a permit to fabricate onsite. It should be noted that as a result of the recent internal RI plant-wide survey, 53 doors will be replaced. Several options for expedited procurement (e.g., several vendors) and warehousing of standard sizes are being pursued.

2.0 Fire Doors (continued)

A plan has been established to re-inspect all fire doors within the Rocky Flats Plant and provide for their expedited replacement and/or repair. The existing procedure will be revised to provide improved inspections and prompt repair of fire doors throughout the plantsite.

3.0 Ventilation Ducts

A technical review of fire protection for ventilation ducting has been conducted as well as contacts made of other DOE nuclear/plutonium facilities. Further evaluation is being conducted to establish a technically supportable position.

4.0 Heat Detection

The underlying cause of the glovebox heat detection problem in Building 776/777 is a change in requirements since the system was installed and the age of the system. A replacement system has been reported to DOE. Replacement is currently proposed as part of a 20 million dollar Facility Capability Assurance Program line item to replace all emergency annunciation systems.

ER.6 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: Personnel protection procedures should control and minimize personnel exposure to hazards during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

FINDINGS:

- 1.0 Radiation monitoring instruments are available in emergency supply cabinets and surrounding facilities to handle emergency events. These instruments have calibration stickers, but their calibration is inadequate.
- 2.0 Exit routes are generally marked by arrows on the floor. Arrows are not visible from all areas and the second floor is not marked.
- 3.0 A manual system for personnel accountability is in place and past criticality drills indicated that it has worked effectively. During the appraisal it was noted that visitor or employees with unescorted access (casuals) were requested to sign in and out of the building in the Building Manager's office. This procedure is not enforced and thus, there is no positive control. Casuals would be difficult to locate or account for during emergencies.
- 4.0 Accountability was not demonstrated during the February 5, 1988 exercise.

MILESTONE SCHEDULE

<u>ACTION</u>	<u>SCHEDULE</u>
1.0 <u>Emergency Radiation Instruments</u>	
Prepare new calibration procedure that requires two point calibration to NBS traceable sources. 02/04/88	complete
Calibrate emergency response instruments.	03/30/88
Institute Quality Control program with formal verification supported by statistical analysis to determine recalibration internals.	ECD 02/29/88
Implement upgraded instrument calibration program and associated Quality Control program.	ECD 02/29/88

ACTION

SCHEDULE

2.0 Exit Routes and Markings

Review Building 776/777 for additional signs and markings. complete

Complete installation and verification. 03/11/88

Establish priority review of other Pu buildings to assure site-wide incorporation of exit markings and institute verification control mechanism. 03/14/88

Develop a plan, install, and verify for all Pu buildings. 04/30/88

Establish computer-based system to locate all emergency exits and routes for all buildings to allow tracking of maintenance and building changes. 03/21/88

3.0 Personnel Accountability

Establish an entrance log for visitors as part of the security control system. complete
02/18/88

Conduct additional studies to evaluate improvements/refinements from manual to automated tracking system. 03/07/88

Prepare plan for implementing automated accountability system. 03/15/88

Examine and re-establish the manual accountability system emphasizing recordkeeping and chain of custody responsibility. 04/02/88

Establish a partially automated accountability system. ECD TBD

Establish a fully automated accountability system. ECD TBD

ACTION

SCHEDULE

4.0 Accountability Demonstration

Demonstrate new routes, exit markings, and personnel accountability at next scheduled building exercise.

ECD TBD

DISCUSSION:

1.0 Emergency Radiation Instruments

The underlying causes for calibration of the emergency radiation protection instruments is a subset of the entire site-wide problem of instrument calibration to NBS traceable standards. Actions taken for alpha, neutron, and photon instruments on a site-wide basis will be incorporated into all emergency instruments. The schedules for these activities are consistent with solving the site-wide problem.

2.0 Exit Routes & Markings

The underlying cause for the deficiencies in emergency marking is lack of a system to track when improvements such as repainting of floors or moving of equipment occur in buildings covering or changing emergency routes. As part of the corrective actions a system showing up-to-date floor markings and exits on a computer-based floor plan for all buildings and a checklist for all maintenance activities to consider effect on emergency exits is being developed.

3.0 Personnel Accountability

The underlying causes for the problem with casual visitors is a antiquated system requiring signing in at the Building Manager's office which depends on administrative procedures. An interim solution implemented was to place manual logs at the guard stations at each of the 17 entrances to radiation controlled areas throughout the plantsite. A more automated solution is being evaluated as a potential near-term solution. A long-range solution will be accomplished with the installation of the security system which requires positive identification into each of these areas for every person.

4.0 Accountability Demonstration

Due to weather conditions in Colorado in February, and with approval of the TSA Team leader, the planned exercise did not include a complete building evacuation.