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Tiger Team Assessments Seventeen through Thirty-Five: A Summary and Analysis

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1.0 INTRODUCTION

On June 27, 1989, the Secretary of Energy, Admiral James D. Watkins, U.S. Navy (Retired), announced a 10-Point Plan to strengthen environmental, safety, and health (ES&H) programs and waste management activities at the U.S. Department of Energy (DOE). The third initiative called for establishing an independent audit (the Tiger Teams) to assess DOE's major operating facilities and laboratories. As of November 1992, all 35 Tiger Team Assessments were completed and formally reported to the Secretary.

In May 1991 a report providing an analysis and summary of the findings and root causes identified by the first 16 Tiger Team Assessments was completed and submitted to the Secretary of Energy and to all DOE program managers (*Analysis of Findings from the First Sixteen Tiger Team Assessments*, DOE/EH-0191). In May 1992 a report that described the noteworthy practices from the first 31 Tiger Team Assessments was published (*Noteworthy Practices, as Identified by the U.S. Department of Energy Environmental, Safety, and Health First 31 Tiger Team Assessments*, DOE/EH-02690). These noteworthy practices are practices, activities, or programs that clearly exceed the acceptable level of performance and that can be documented and supported by findings of fact. Noteworthy practices have general application to other DOE programs or operations, either by design or execution, and result in more effective and improved management and operational performance.

This document is intended to provide an easily used and easily understood summary and analysis of the information contained in Tiger Team Assessments numbers 17 through 35 to help DOE achieve ES&H excellence.

1.1 SCOPE

This report includes the analysis of key findings and key concerns, individual findings and concerns, root causes, and noteworthy practices from Tiger Team Assessments numbers 17 through 35, which were performed from October 1990 to July 1992. The sites are listed below in chronological order of their assessments:

- Argonne National Laboratory
- Oak Ridge National Laboratory
- Lawrence Berkeley Laboratory
- Princeton Plasma Physics Laboratory
- Energy Technology Engineering Center
- Sandia National Laboratories - Albuquerque

1.2 APPROACH

This document was designed to present the data from the Tiger Team Assessments in the most usable and informative format to assist DOE management and technical personnel in achieving ES&H excellence.

The first step in the approach was to develop a user survey to solicit input from the DOE management community who will use the document. The purpose of the user survey was to enhance the analysis effort for the last 19 site evaluations and to provide more useful, predictive, and readily accessible information to DOE policy makers, line management, and Field Offices. The survey was designed to determine how each DOE office could best use the assessment information contained in the 19 Tiger Team reports, in terms of data cross-sections, information content, and presentation format.

The next step in developing the approach was a Project Planning and Implementation meeting (brainstorming session), involving appropriate DOE staff and contractors with Tiger Team experience, to develop the methodology for analyzing and presenting the Tiger Team data.

As a result of the user survey and the Project Planning and Implementation meeting, the following methodology was developed. The report would focus on the findings and concerns. The severity of the findings and concerns would be considered in order to maintain the perspective of the data. Narratives would be used as the primary method to convey the data to provide more insight into issues than can be gained from tabulations of findings and concerns. To consolidate the data and identify trends, individual findings would be placed into groups of findings that had similar characteristics. This would be done within PSOs and then subsequently rolled up into groupings of like findings across PSOs.

2.0 SYNOPSIS OF CROSSCUTTING ISSUES

Crosscutting issues are those that appear across the 19 sites with sufficient frequency to be of particular interest to management. When segregated into the perspectives of Management and Organization (M&O), Environment, Safety and Health (S&H), and Self-Assessment, crosscutting issues can serve as focal points where management attention could be effectively concentrated and the scope of each issue placed into a DOE complex-wide perspective.

In order to identify overall trends in the Tiger Team Assessment data, it was necessary to condolidate the data. In order to accomplish this, the findings from each discipline, within each subject area, were consolidated into groups of similar issues. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the groupings of similiar issues that they addressed. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the similar issues identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

Because of variations in size and mission of the sites, gross numbers of key findings, findings, key concerns, or concerns between sites and PSOs should not be compared. For example, the absence of a program at a site might have resulted in a single concern that the program did not exist, while an emerging program lacking 3 specific elements might have resulted in 3 concerns at another site. In this example, the single concern could be more serious than the 3 concerns together, so a numerical comparison would be misleading. An examination of the trends among the performance areas can, however, be instructive in determining the areas with the most risk to the safety and health of employees. The manner in which root causes and key findings were developed in the Tiger Team Assessments accounted for some of these differences, but the reader is cautioned against using simple number counting for comparisons.

2.1 MANAGEMENT AND ORGANIZATION (M&O) CROSSCUTTING ISSUES

The M&O deficiencies identified for the 19 sites have been segregated into root causes, key findings, and findings and then tallied by the disciplines and performance areas identified for use in this analysis. Reaggregations of the deficiencies for various management and organizational analyses are presented in Tables 2.1 through 2.3.

Root Causes. The sites reviewed had not fully committed to a change from the program orientation of the past to the emphasis on ES&H excellence of the present. Fifty-eight root causes were identified for the deficiencies at the

TABLE 2.2. Summary of Management and Organization Key Findings

PSO	SITE	PE	PL	FO	RT	PC	OS
ER	Argonne East	6	4	2	1	5	1
	Oak Ridge National Laboratory	1	1	1	1	1	0
	Lawrence Berkeley Laboratory	0	1	1	1	1	0
	Princeton Plasma Physics Laboratory	2	0	2	2	4	2
	Stanford Linear Accelerator Center	0	1	0	1	0	0
	Ames Laboratory	1	1	1	1	0	0
	Fermi National Accelerator Laboratory	0	1	1	0	1	0
FE	Morgantown Energy Technology Center	1	0	1	0	1	0
	Pittsburgh Energy Technology Center	1	1	0	1	0	0
	Naval Petroleum Reserves, CA	1	2	1	1	0	0
	Strategic Petroleum Reserve	1	1	0	0	0	1
	National Institute for Petroleum Reserves	1	1	1	1	0	0
	Naval Petroleum Oil Shale Reserves	1	1	0	1	0	0
DP	Sandia, Albuquerque	2	1	1	1	0	0
	Los Alamos National Laboratory	1	1	0	1	1	0
EM	K-25 - Oak Ridge	1	1	2	1	0	0
NE	Energy Technology Engineering Center	2	0	1	0	1	1
	Idaho National Engineering Laboratory	2	1	1	1	1	0
CE	National Renewable Energy Laboratory	0	0	1	1	1	1
	TOTAL	24	19	17	16	17	6

KEY

PE = Program Evaluation
PL = ES&H Planning
FO = Formality of Operations
RT = Resources and Training
PC = ES&H Program Commitment
OS = Organizational Structure

Twenty-four key findings from 15 sites were in program evaluation. Most were in the audit, appraisal, and surveillance program, with the major issue being deficiencies in the design of the current oversight programs.

Nineteen key findings at 15 sites were in the ES&H planning discipline. These focused on the lack of comprehensive integration of ES&H issues into the site area planning process and indicated needs for better planning and budgeting guidance as well as programs and tools.

Seventeen key findings were identified in formality of operations. Most concentrated on the lack of, or inadequacies in, current ES&H programs and procedures. The lack of written ES&H guidance, policies, procedures, and total programs was a recurrent theme in this discipline.

Sixteen key findings from 15 sites addressed resources and training. Eight of the key findings noted the lack of strong, comprehensive, and well-integrated training programs.

In formality of operations, the Tiger Team findings indicated that all sites needed to ensure that required ES&H programs were in place and that these programs were comprehensive and high quality. In addition, the sites needed to improve dissemination of information through formal programs and to incorporate ES&H DOE Orders and regulatory standards into site procedures.

The greatest number of findings described programs that did not exist, inadequacies in existing programs and procedures, and design problems in one or more elements of programs. A smaller number of findings delineated inadequacies in regulatory tracking, including the lack of systems to disseminate regulations and DOE Orders from Headquarters to the sites.

In resources and training, a significant number of findings were associated with human resources management plans and ES&H training programs at all organizational levels. Sixteen of the sites had deficiencies in effectively implementing comprehensive ES&H human resources and management plans.

In organizational structure, findings related primarily to well-defined and clearly communicated individual and organizational roles, responsibilities, and authorities. Ten findings related to needs for organizational independence of ES&H audit, appraisal, and surveillance programs from the line organization and for the clear definition of ES&H goals and objectives.

In program evaluation, approximately half the findings were associated with the self-assessment programs at the sites. Many of the reviewed facilities had not yet implemented self-assessment programs or were operating with programs that had serious flaws in their design. The remaining findings were associated with ES&H audit, appraisal, and surveillance programs. Either the rigor of the audit was not adequate to meet program objectives or the auditors were not qualified. Self-assessment and audit, appraisal, and surveillance deficiencies were noted at most sites.

In ES&H program commitment, approximately two-thirds of the findings were associated with ES&H policy; the other third were associated with visible and tangible management support. Overall, management at most sites did not reflect DOE's priority on ES&H excellence.

In ES&H planning, most of the findings were associated with planning programs and integration of ES&H issues into strategic planning processes. Fifteen of the 19 sites had 1 or more findings related to the lack of integration of ES&H considerations into basic operational and strategic planning processes. About one-third of the findings were associated with inadequacies in budgeting programs.

In communications, findings cited a need to develop employee concerns programs to encourage employees to raise ES&H concerns and foster ES&H excellence.

Twenty-two key findings at 16 sites addressed environmental quality assurance (QA) and oversight. Environmental QA programs did not ensure an effective environmental monitoring and surveillance program because they lacked formal, documented guidelines and procedures that would have assisted environmental personnel in recognizing, understanding, and fully implementing laws, regulations, and DOE Orders.

As a whole, the sites lacked the effective oversight of operations necessary to implement programs for ensuring protection of the environment as well as regulatory compliance. Deficiencies in environmental program plans, procedures, and training were not being identified by environmental audits. A lack of comprehensive QA plans, qualified environmental personnel, and both internal and external audits at the sites contributed to deficiencies in delegation of staff responsibilities and errors in sampling and reporting.

Eight key findings at 7 sites addressed waste management. Programs at sites that managed hazardous, mixed, and/or radioactive wastes were not formalized or comprehensive enough to meet all regulatory requirements. Hazardous and solid waste streams were not well characterized or monitored. The sites did not have completed procedures to sample, analyze, and report waste. Many sites did not have procedures in place for the operation of hazardous and mixed waste facilities. The sites had not fully implemented waste management programs, including recordkeeping and appropriate staffing and training. Fourteen of the sites had not developed waste minimization plans. In many instances, hazardous waste management training programs, recordkeeping activities, audits, and oversight were ineffective.

Five key findings at 5 sites addressed compliance issues at inactive waste sites. IWS issues had not been consistently evaluated across the 19 sites. The potential for waste sites to result from research and development activities had not been evaluated; and sites had not fully identified, investigated, and remediated onsite and offsite IWSs.

Two key findings at 2 sites cited deficiencies in the management of toxic chemicals and materials. One site had developed several programs, plans and procedures that addressed TCM management. The documents were not well integrated, lacked elements for contractor oversight, and did not provide for written standards and procedures in some areas.

Findings. Environmental findings totaled 1,296 in 9 environmental disciplines, as summarized in Table 2.5. As in the M&O perspective, the common element found by the Tiger Teams was a lack of formal, written programs and procedures, particularly to comply with Federal laws and regulations such as the National Pollutant Discharge Elimination System (NPDES); the Resource, Conservation and Recovery Act (RCRA); Spill Prevention, Control, and Countermeasures (SPCC), and National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides. Often the result was procedures and operational activities that did not comply or could not ensure compliance.

by the Groundwater Protection Management Program (GPMP). Many sites did not have the programs, plans, and procedures to monitor soil, sediment, and biota. All sites had inadequate monitoring and surveillance programs.

In toxic and chemical materials, the findings showed that 18 of the sites exhibited inadequate, informal, and inconsistent procedures to effectively monitor and control toxic material including polychlorinated biphenyls (PCBs), pesticides, and asbestos. At some sites, findings related to fragmented line management and lack of facility oversight activities.

In radiation, findings showed that all sites lacked environmental surveillance and effluent monitoring activities and were unable to demonstrate compliance with NESHAPs. The sites had inadequate controls to ensure protection of public health and the environment.

In inactive waste site identification, investigation, and remediation, many sites had not developed adequate programs and procedures to consistently and thoroughly characterize identified waste sites in accordance with Federal, state, and local laws and regulations, and DOE Orders. The sites had not consistently evaluated identified, or inventoried their inactive waste sites, including offsite areas. Findings addressed identification and evaluation of inactive waste sites and releases of hazardous substances from site operations.

In National Environmental Policy Act (NEPA) programs, most of the sites had discrepancies in planning, integrating, and coordinating NEPA requirements.

2.3 SAFETY AND HEALTH (S&H) CROSSCUTTING ISSUES

The Safety and Health deficiencies prevalent throughout the 19 sites analyzed are identified below. Key concerns are summarized in Table 2.6. Concerns and Category I and II concerns are summarized in Table 2.7.

Key Concerns. A total of 165 key concerns were identified in the 4 designated performance categories.

Sixty-two key concerns noted missing, deficient or ineffective S&H programs and program documentation. In 18 of the 19 sites, weaknesses in program documentation was identified as a key concern. Program documentation often did not satisfy requirements of DOE Orders or mandatory requirements.

Sixty-one key concerns cited ineffective contractor management systems or organizational structure. Key concerns in this category address the ineffectiveness of contractor management in addressing S&H related issues such as organizational structure, employee communications, implementation of S&H programs, document control systems, and S&H resource allocation.

Thirty key concerns identified noncompliance with DOE Orders, OSHA requirements, consensus standards or site procedures. Compliance issues were of

TABLE 2.7 Total/Category I and II Safety and Health Concerns*

S&H DISCIPLINE	PSO (No. of Sites)						TOTAL
	ER (7)	FE (6)	DP (2)	NE (2)	EM (1)	CE (1)	
Organization & Administration	98/1[a]	77/3	60/2	66/0	10/0	8/0	319/6
Quality Verification	115/1	56/1	48/0	70/2	16/1	10/0	315/5
Operations	61/2	44/3	58/4	38/0	6/0	1/0	208/9
Maintenance	63/5	70/8	51/1	44/1	7/0	17/0	252/15
Training & Certification	58/0	31/0	40/1	39/1	8/0	3/0	179/2
Auxiliary Systems	36/0	14/0	57/1	27/0	5/0	6/0	145/1
Emergency Preparedness	97/4	56/8	38/4	60/2	19/0	6/0	276/18
Technical Support	46/0	32/1	25/0	35/0	3/0	7/0	148/1
Packaging & Transportation	79/1	55/1	59/4	47/0	3/0	N/A[b]	243/6
Nuclear Criticality	18/1	N/A	24/0	21/0	9/0	N/A	72/1
Security/Safety Interface	7/0	10/0	17/0	5/0	5/0	N/A	44/0
Experimental Activities	20/0	3/0	18/0	5/0	N/A	N/A	46/0
Site/Facility Safety Review	35/0	32/0	24/0	24/0	3/0	4/0	122/0
Radiological Protection	146/9	15/0	98/6	94/0	20/0	N/A	373/15
Personnel Protection	76/3	44/3	36/4	52/8	N/A	6/0	214/18
Worker Safety	87/16	73/27	35/14	57/23	6/2	12/0	270/82
Industrial Hygiene	27/3	19/0	13/0	N/A	14/1	N/A	73/4
Occupational Safety	7/1	32/7	12/0	N/A	8/1	N/A	59/9
Fire Protection	83/5	38/3	66/11	37/0	15/0	6/1	245/20
Medical Services	27/0	45/3	24/0	14/0	8/0	4/0	122/3
Explosive Safety	N/A	N/A	20/0	N/A	N/A	N/A	20/0
Natural Phenomena	N/A	N/A	14/0	N/A	N/A	N/A	14/0
Aviation Safety	N/A	7/0	16/0	4/0	N/A	N/A	27/0
Firearms Safety	N/A	6/0	22/0	18/0	N/A	N/A	46/0
TOTAL	1186/52	759/68	875/52	757/37	165/5	90/1	3,832/215

(a) Total concerns are presented first, then total Category I and II concerns (example: 98/1 = 98 total concerns and 1 Category I or II concern).
(b) N/A = Not Applicable.
*Note: This chart is supplied for reference only and should not be used for making comparisons among PSOs.

disposition of materials, and equipment testing. Also lacking were QA audits, self-assessments, and independent evaluations of both DOE and contractor activities. Formal operating procedures also needed to be developed.

In emergency preparedness, concerns were associated with a lack of emergency preparedness programs or with programs that had sufficient deficiencies to render them ineffective. More management support was needed in order to maintain the level of preparedness, including annual appraisals, effective site-wide hazard assessments, and an ability to track and quickly resolve emergency response deficiencies. Drills, training programs, and communications systems and alarms needed to be put in place or improved.

In worker safety and health (OSHA) compliance, the Tiger Teams found that many programs were only partially implemented; and evaluation, monitoring, verification, and surveillance activities needed to be established and effectively conducted. Of almost equal importance, S&H programs did not exist or did not comply with applicable Federal regulations, DOE Orders, or industry best management practices. Management systems and S&H training also were cited as needing improvement. Concerns in the disciplines of industrial hygiene (73 concerns) and occupational safety (59 concerns) echoed the types of concerns in worker safety and health.

In maintenance, the Tiger Teams found that programs and policies could not ensure that facilities were operated in a safe and healthy manner. Lack of programs and procedures and lack of implementation were coupled with a need for improved predictive and preventive maintenance. In addition, planning and controlling systems were inadequate to ensure proper, effective maintenance; moreover, poor work practices characterized some maintenance activities.

In fire protection, 2 major areas of focus were the lack of annual and triennial fire hazard and fire safety reviews and the lack of equipment or sufficient equipment to ensure the protection of DOE resources. Thirteen sites needed to establish or implement formal fire protection policies and procedures and manuals. Seventeen sites needed Life Safety Code programs, needed to improve existing programs, or had instances of noncompliance with the Code.

In packaging and transportation, concerns ranged from noncompliant operations (including labeling, placarding, recordkeeping, testing, and marking) to ineffective management systems. Relevant information was not always disseminated, and evaluation of practices vis a vis Department of Transportation (DOT) and DOE requirements could not ensure safe practices. Quality assurance programs for this discipline were missing or inadequate, and some employees needed training.

In personnel protection, compliance issues focused on incomplete site safety manuals and procedures and programs with missing or deficient elements, such as hazard communication, occupational exposures to hazardous chemicals, and

Issues in program design and scope were widespread. The second most frequently identified category was performance analysis and issues management, occurring at 12 sites and consisting of more than one-quarter of the element totals. The category of evaluations and administrative support requirements accounted for the remaining one-quarter of the elements.

Approximately half of the sites did not meet ES&H objectives for conducting formal self-evaluations. Approximately half of the sites had not institutionalized a self-assessment program independent of contractor and subcontractor support or had not assigned personnel independent of the ES&H activities being assessed.

Almost two-thirds of the sites lacked a formal process to identify root causes, trends, and lessons learned or to derive benefit from identified issues. The Tiger Teams observed few mechanisms to communicate the information throughout the organization or to incorporate it into daily operations and planning.

Approximately one-third of the sites had findings in the corrective action process; consequently, timely, proactive, and prioritized actions by staff and management were impeded.

Analysis of the self-assessment findings identified by the Tiger Teams indicated that approximately three-fourths of all findings could be grouped into the following programmatic weaknesses:

1. Site self-assessment programs had not been institutionalized via formal program charters and program implementation plans.

2. A formal process needed to be developed to identify trends, perform root causes, and communicate lessons learned.

3. Management and/or personnel at different organizational levels did not adequately communicate on self-assessment.

4. Site self-assessment programs lacked comprehensive scope in that they did not address all ES&H functional areas and management responsibilities.

5. Site self-assessment programs lacked formal written procedures to define and document their activities.

Taken in the aggregate, sites lacked either a formal charter or a formally instituted Self-Assessment Program Plan.

3.0 CROSSCUTTING ISSUES

This chapter will analyze findings and concerns that have common elements in the 19 Tiger Team Assessments conducted from December 1990 through July 1992. Of the 19 Tiger Team Assessments considered in this review, most of the evaluations (13 sites) were conducted at the facilities of 2 Program Secretarial Offices (PSOs): Energy Research (ER) (7 of 19 sites) and Fossil Energy (FE) (6 sites). Other PSOs included Defense Programs (DP) (2 sites), Nuclear Energy (NE) (2 sites), Environmental Restoration and Waste Management (EM) (1 site), and Conservation and Renewable Energy (CE) (1 site).

Following the Tiger Team methodologies and categories, this analysis discusses the reports from the 3 perspectives (M&O, Environment, and S&H). Within each perspective, findings and concerns are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 21 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, findings and root causes are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns, Category I and II concerns, and concerns are discussed. Category I concerns are those that address a "clear and present" danger to people or significant risk; Category II concerns address substantial noncompliance with DOE Orders.

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The "rollups" of the individual PSO evaluations appear in this chapter. Data are presented by perspective, discipline, and performance area. The numbers in parentheses after each discipline or performance area give 2 sets of information. The first set of numbers indicates the number of sites having a finding(s) or concern(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (15 of 19 sites, 22 of 46 concerns) means that 15 of the 19 total sites had a concern and 22 of the 46 total concerns identified by the Tiger Team Assessments are discussed in that subsection. For the overall discussion of each discipline, the total number of findings or concerns is shown in the heading.

SNL, Albuquerque, communicated ES&H information to the Laboratory staff through Radio Sandia, available in the vicinity of the Laboratory. The station used a daily news/interviews format to provide the community with timely, candid information about ES&H issues.

Oak Ridge K-25 Site. The K-25 site's self-assessment program was noteworthy both in terms of its innovative approaches to total personnel involvement and its institutionalization at the site.

National Renewable Energy Laboratory (NREL, formerly SERI). The CE site had established a broad-based and exemplary program to introduce under-represented minorities to the science and engineering fields. The Area Office used the Award Fee process to provide incentive for this program. The program included education and training for students and teachers, work opportunities, career exploration, and awareness components. CE and Midwest Research Institute (MRI) provided support for the program. There were 3 aspects of the program that were noteworthy.

Taking corporate-level initiative and using its own internal funding, NREL's management and operations contractor, MRI, established the Technical Review Group (TRG) to perform an independent and comprehensive review of the site's ES&H program beginning in December 1989. The group consisted of an MRI-managed team of ES&H experts assembled from MRI offices located across the nation. Their mission was to independently verify that NREL is in compliance with ES&H regulations and to further examine the NREL ES&H program to highlight areas that could be improved.

3.1.2 Root Causes (total: 58 root causes)

DOE used root cause analysis for Tiger Team Assessments to identify the fundamental reason(s) why facilities had deficiencies within their respective ES&H programs. In conducting the root cause analysis, the M&O team reviewed all findings and causal factors and discussed the findings with other Tiger Team Assessment members. This process identified the essence of the problems at any particular site, which, if corrected, will prevent recurrence of the problems.

For this summary and analysis, the root causes were first listed by sites within a PSO. Each cause was then reviewed and placed into an M&O discipline based on the perceived overriding issue being communicated. To conduct the rollup of the root causes, the results of the PSO analyses were combined to provide an integrated perspective to ES&H root causes at the 19 sites.

ES&H program commitment (culture and attitude) was the overriding issue for root causes (32 of 58). Root causes from each of the 19 sites indicated that flaws in the site's commitment to ES&H excellence contributed to a number of ES&H findings. The sites were thought to not yet be fully committed to a change in priorities away from the program orientation of the past and toward the ES&H orientation of the present.

this discipline was the issue of taking on ES&H responsibilities within line management. Oversight and day-to-day ES&H direction were not exercised at almost one-third of the sites reviewed.

Resources and Training (15 of 19 sites, 16 of 99 key findings). One-half of the key findings in resources and training were associated with the lack of strong, comprehensive, and well-integrated training programs to introduce workers to their ES&H responsibilities and teach them how to best address ES&H obligations. Another recurring issue was inadequate numbers of qualified staff to fully address the ES&H commitments and obligations. The sites lacked the ES&H professionals needed to fully address regulatory realities.

Organizational Structure (5 of 19 sites, 6 of 99 key findings). The key findings in this discipline all focused on the lack of clearly defined, well-communicated and understood roles, responsibilities, and authorities. The changing mission of DOE had been a contributing factor to these problems with the shift towards ES&H excellence and away from a program orientation.

The following sections summarize and analyze M&O findings across the 19 sites.

3.1.4 Organizational Structure (total: 59 findings)

For this discipline, the Tiger Teams reviewed issues related to roles, responsibilities and authorities in a wide range of functional areas.

For this analysis, 3 performance areas were identified: roles, responsibilities, and authorities; organizational independence; and ES&H goals and objectives.

Most of the findings in this discipline were related to a lack of well-defined and clearly communicated individual and organizational roles and responsibilities in a wide range of functional areas. More formality was required to ensure proper coordination among the various organizations and functions, to achieve resulting efficiencies and to minimize the likelihood of gaps in ES&H performance versus established DOE objectives. A number of findings also related to organizational independence, where both line and staff responsibilities were performed by professionals within the same organizational unit. These deficiencies compromised the integrity of the oversight function. Finally, several findings related to a lack of specific goals and objectives to provide meaningful direction to individuals and organizational units in meeting site/program-wide goals.

Roles, Responsibilities, and Authorities (17 of 19 sites, 49 of 59 findings). Many findings indicated a lack of defined roles, responsibilities, and authorities among the various organizational groups associated with individual sites, including the Field Office, the site contractors, and functional groups within these organizations. Memoranda of Understanding or other programmatic documentation were inadequate. Many findings also indicated a lack of defined and understood roles, responsibilities, and authorities for individuals, as reflected in inadequate job descriptions, performance standards, program plans, and policies and procedures. From a functional perspective, recurring

ES&H Policy (13 of 19 sites, 19 of 46 findings). The findings focused on deficiencies in ES&H policy guidance at all levels for applicability and implementation of ES&H policies and programs. Failing to provide effective ES&H policy guidance resulted in a lack of widespread understanding of ES&H policies, roles, and responsibilities.

Cooperative Attitude (1 of 19 sites, 1 of 46 findings). The finding concerned the lack of third-party safety reviews. Research staff did not feel encouraged by management to seek outside review.

3.1.6 Resources and Training (total: 71 findings)

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at the sufficiency of environmental staffing resources and the completeness of the organization's systems for identifying and satisfying employees' needs for ES&H training and opportunities for career development. The assessment also included the adequacy and maintenance of facilities and equipment.

For this analysis, 4 performance areas were identified: human resources, training, facilities and equipment, and information systems.

Analysis of the data indicated the broad-based need to develop and effectively implement comprehensive ES&H human resources management plans and training programs.

Human Resources (16 of 19 sites, 37 of 71 findings). The findings were associated with deficiencies in human resources management plans at all organizational levels. The findings focused on the lack of comprehensive human resources management plans and deficiencies in implementation. The major attributes missing from the plans included ES&H job performance indicators, systems to ensure the adequate number and mix of ES&H staff and experience, and ES&H career tracks and staff development.

Training (18 of 19 sites, 30 of 71 findings). The findings were associated with deficiencies in ES&H training programs at all organizational levels. All findings focused on developing and effectively implementing comprehensive ES&H training programs. The major attributes missing from the programs included training needs identification, professional development, subcontractor and visitor training, training evaluation, and recordkeeping.

Facilities and Equipment (2 of 19 sites, 3 of 71 findings). One finding addressed the lack of an ES&H program for the disposal and/or cleanup of DOE-owned buildings and facilities that were not included in site contractor responsibilities and contractual agreements. The other 2 findings identified inadequate facilities and maintenance.

Information Systems (1 of 19 sites, 1 of 71 findings). The 1 finding in this area addressed inadequate implementation of the ES&H management information system.

Analysis of the data indicated a widespread need to ensure that required ES&H programs were in place and that these programs were comprehensive and high quality. Other needs were for improved dissemination of information through formal programs and incorporation of DOE ES&H Orders and regulatory standards into site procedures.

Programs and Procedures (18 of 19 sites, 93 of 111 findings). The findings focused on the lack of programs or the lack of complete programs to carry out the ES&H missions. Findings cited deficiencies in tracking of commitments, QA programs, review of engineering projects, implementation of regulations and DOE Orders, conduct of operations, contractor oversight, control of work for others, document control, management communication systems, ES&H planning, funded work, and implementation of NEPA. The number of findings and the wide range of programmatic findings indicated serious program-wide deficiencies. The total of 93 findings in 1 area indicated that many programs did not exist and many of the existing programs had design flaws in 1 or more areas. A lack of formality in the way that sites addressed ES&H obligations was apparent.

Regulatory Tracking (12 of 19 sites, 16 of 111 findings). The findings included the lack of directive systems for disseminating regulations and DOE Orders to sites, inadequate or lack of communication of new regulations or DOE Orders to personnel responsible for implementing them, and the lack of incorporation of regulations or DOE Orders into existing programs. The prevalence of these inadequacies strongly suggested the need for a system to ensure that regulations and DOE Orders were disseminated to all required personnel in a timely manner to ensure compliance.

Recordkeeping and Reporting (1 of 19 sites, 2 of 111 findings). The findings focused on the lack of an adequate closure system for appraisal findings and the lack of a formal incident reporting system. While the 2 findings did not represent a program-wide deficiency, they indicated a need to create comprehensive systems to ensure proper reporting of incidents and closing out of open items from audits and appraisals.

3.1.9 Communications (total: 12 findings)

For this discipline, the Tiger Teams reviewed the existence and effectiveness of internal and external communications systems. The effectiveness of internal communications was assessed by evaluating the understanding of roles and responsibilities and the awareness of ES&H policies, procedures, and programs throughout the organization. The extent and effectiveness of external communications were assessed by evaluating the relationship the site had with oversight agencies and citizen and environmental groups.

For this analysis, 2 performance areas were identified: internal communications and external communications.

Analysis of the internal communications findings indicated the need to develop comprehensive communications programs to ensure the effective communication of ES&H information. In addition, employee concerns programs, which would encourage employees to raise ES&H concerns and would foster ES&H excellence,

needs in capital and operating budgets. The findings strongly suggested that ES&H needs were not given higher visibility, priority, attention, and effort when site budgets were being developed.

3.2 ENVIRONMENT

The purpose of this section is to summarize the crosscutting key findings and findings for the 9 environmental disciplines normally appraised in the Tiger Team Assessments.

Findings are divided into compliance findings (CFs) and best management practice findings (BMPFs). CFs represent conditions that, in the judgment of the subteam, may not satisfy the requirements of environmental regulations, DOE requirements (including Orders, SENs, and internal DOE directive memoranda, where referenced), consent orders, and directives/procedures/action plans. BMPFs represent situations where, in the judgment of the subteam, sound and generally accepted industry management practices were not being employed.

The subdivisions of this section begin with noteworthy practices (3.2.1) and key findings (3.2.2). The subdivisions that follow (3.2.3 through 3.2.11) discuss findings from the 19 assessments by discipline.

The Environment perspective includes 9 disciplines: air (3.2.3), surface water/drinking water (3.2.4), groundwater/soil, sediment, and biota (3.2.5), waste management (3.2.6), toxic and chemical materials (3.2.7), environmental QA and oversight (3.2.8), radiation (3.2.9), inactive waste sites (3.2.10), and NEPA (3.2.11).

3.2.1 Noteworthy Practices

Noteworthy practices are listed in this section. Since noteworthy practices are, by definition, "exceptional practices," and would therefore usually be unique to a single DOE site, no further analysis is provided here for these items. An indepth analysis of noteworthy practices within the DOE site system can be found in *Noteworthy Practices* (DOE 1992).

One noteworthy practice was identified at SNL, Albuquerque: a wall chart and a summary of DOE ES&H Orders to help enhance ES&H awareness.

The environmental subteam identified 1 noteworthy practice at NREL involving the site's toxic gas program.

3.2.2 Key Findings (total: 66 key findings)

Key findings for each of the 19 Tiger Team Assessments were reviewed, analyzed, and sorted to determine whether common trends existed. Because environmental key findings typically represented common issues from several of the environmental disciplines, a determination was made as to the overriding issue being communicated. Based on that determination, the key finding was

3.2.3 Air (total: 151 findings)

For this discipline, the Tiger Teams assessed the current operating practices with regard to regulations promulgated under the Federal Clean Air Act, pertinent state statutes, DOE Orders and guidance, Secretary of Energy Notices (SEN) requirements, best management practices, and internal policies and procedures.

For this analysis, 5 performance areas were identified: permit management, ambient air impact surveillance, compliance with permit and regulatory conditions, emissions tracking, and appropriate emission controls. Five findings were determined to not be related to these performance areas. Lack of adequate emission controls was occasionally documented.

Many of the large operating sites had elements of the required air programs, but were weak in implementation. The environmental air management programs at the laboratories were particularly weak in understanding their emissions, the impact of those emissions, and the regulations that applied to the site. Although the sites appeared to be small emission sources, the sites needed better emission management and tracking programs and more formalized baseline impact assessments because of the variety of hazardous air pollutants and potentially large site-wide inventories of hazardous materials.

Permit Management (14 of 19 sites, 70 of 151 findings). Fourteen of the 19 sites had 11 CFs and 3 BMPFs in permit management programs. Certain site sources and activities, which needed preconstruction and/or operating permits, were operating without regulatory approval. A common deficiency was the lack of programs for determining and tracking permit applicability for existing and new sources.

Ambient Air Impact Surveillance (18 of 19 sites, 45 of 151 findings). Both air quality and meteorological data programs were identified in separate findings.

The sites had not implemented ambient impact surveillance program guidance effectively. They did not have adequate programs to assess their emission impacts or to compare these with nearby ambient baseline conditions. Meteorological monitoring programs were in place at key facilities, but often had deficiencies in resource and operating procedures. Also, the sites had a general, underlying lack of formal meteorological and air quality information/monitoring programs. Appropriate screening evaluations to ensure that the programs supported long-term and emergency impact surveillance were not functioning. Monitoring networks were not sited properly to produce data that represented facility conditions.

Compliance with Regulatory and Permit Conditions (17 of 19 sites, 42 of 151 findings). Compliance program deficiencies accounted for more than one-fourth of all findings in the air discipline. Only 2 of the 19 sites did not have findings in this area, and 5 sites had more than 2 findings.

At most of the sites, management of surface water/drinking water programs was not well-defined. As a result, systems of protective measures had not been developed to ensure compliance with regulatory requirements and DOE Orders.

In this discipline, 74 CFs and 82 BMPFs were identified.

NPDES Programs and Systems (17 of 19 sites, 83 of 189 findings). Nine sites had more than 1 finding in the NPDES category; only 2 sites had no findings. Overall, almost half of the total number of surface water/drinking water findings involved compliance with NPDES requirements.

NPDES programs and systems at the sites visited were not sufficiently developed and organized to ensure compliance with regulatory requirements. This was evidenced by findings involving incorrect or incomplete NPDES permit renewals or applications, improperly completed and/or signed Discharge Monitoring Reports, failure to meet effluent limitations, lack of administrative measures or controls to minimize the potential for uncontrolled discharges, and failure to prepare and implement procedures for proper treatment plant operation. Also cited were a lack of internal verification procedures and inadequate programs for training personnel. Sites in several states had not characterized storm water runoff to enable them to prepare NPDES storm water permit applications by the October 1992 deadline, should regulatory agencies in their states require singular permits.

SPCC Plan (18 of 19 sites, 38 of 189 findings). SPCC Plans are required at any facility storing more than 1320 gallons of oil (or more than 660 gallons in a single tank) above ground, or more than 42,000 gallons underground. Virtually all the findings identified deficiencies in preparing or implementing SPCC Plans. The review of assessment documentation indicated that 1 site did not require an SPCC Plan to be prepared. An additional, 38 findings indicated the SPCC Plans at the remaining sites did not fully meet regulatory requirements. Many of the findings addressed insufficient programs for managing petroleum products. Nine of the sites requiring SPCC Plans were identified as having either inadequate or missing secondary containment for tanks storing petroleum products. One of the major causal factors identified was the lack of appropriate design for the secondary containment. The major deficiencies observed were lack of proper plan preparation, plan updating as required, and plan implementation. The root causes identified for these deficiencies included lack of appraisals, audits, reviews, and implementation of policy.

Drinking Water (17 of 19 sites, 42 of 189 findings). Procedures for periodic reviews of DOE policy implementation and compliance with State Plumbing Codes for drinking water were not developed to ensure the safety of the potable water supply at 17 of the 19 DOE sites. No drinking water findings were identified for 2 sites.

Drinking water findings were identified in all 6 PSOs. The primary finding addressed inadequate or insufficient installation of backflow prevention devices to protect potable water systems (14 of 17 sites). This deficiency reflected a failure to implement DOE policies regarding programs to install,

Many of the findings were closely related, were common to multiple sites, and therefore were grouped for analysis into performance areas of related programmatic deficiencies.

Groundwater Monitoring and Surveillance (19 of 19 sites, 46 of 115 findings). Monitoring and surveillance deficiencies accounted for 46 of 101 groundwater findings. The sites had not developed groundwater monitoring and surveillance programs that met the requirements of DOE Orders; Federal, state, and local requirements and guidelines; and best management practice. The programs did not consistently provide for detecting and characterizing contamination or evaluating the impact of DOE operations on the environment. The findings most frequently identified included lack of an established groundwater monitoring program and plan to meet the requirements of DOE 5400.1, inadequate or informal groundwater sampling procedures that did not ensure consistent and reproducible data, insufficient monitoring well networks to provide coverage of the sites, and incomplete characterization of contaminant sources and impacts.

Well Construction, Maintenance, and Abandonment (17 of 19 sites, 34 of 115 findings). The sites did not consistently implement programs to ensure that wells (including groundwater monitoring wells, supply wells, and boreholes) were constructed according to Federal and state requirements, that they were inventoried and maintained to ensure their integrity, and that inactive wells were properly plugged and abandoned according to Federal and state requirements and guidelines. The findings identified deficiencies in well construction, maintenance, or inventory at 12 sites. Deficiencies in well abandonment programs were identified at 14 sites. These deficiencies could have negative impacts on the validity and accuracy of groundwater monitoring programs and could result in the introduction of contaminants into groundwater or cross-contamination between aquifers.

Hydrogeologic Characterization (18 of 19 sites, 8 of 115 findings). The sites had not performed site-wide hydrogeologic characterization as required by DOE 5400.1 and as required to identify baseline conditions in background groundwater quality and quantity, local and regional groundwater flow regimes, and aquifer characteristics. Findings related to inadequate hydrogeologic monitoring were identified at an additional 8 of the 19 sites and are tallied under groundwater monitoring and surveillance.

Soil, Sediment, and Biota Monitoring and Surveillance (11 of 15 sites, 19 of 115 findings). Ten sites had deficiencies in monitoring and surveillance programs, included informal or inadequate programs and plans, informal or inadequate sampling procedures to ensure consistency and reproducibility of data, and incomplete characterization of identified or suspected areas of contamination to meet the requirements of DOE 5400.1, Federal and state regulations and guidelines, and best management practices.

Ecological Impact Protection (4 of 15 sites, 8 of 115 findings. The sites did not have programs in place to mitigate the impact of the site on wetlands and ecological concepts.

(for radioactive waste). Procedures for characterizing waste were absent or did not adequately provide for representative sampling of all waste streams, QA, or appropriate analytical procedures and parameters. In particular, many sites did not provide guidelines on when and how to use process knowledge to characterize wastes. Many of the smaller sites were not maintaining waste characterization records that were adequate to allow their Resource Conservation and Recovery Act (RCRA) generator status to be determined. Large sites tended to have programmatic deficiencies in characterizing large, process-related waste streams. In general, procedures to characterize unidentified wastes were lacking.

3.2.7 Toxic and Chemical Materials (total: 124 findings)

For this discipline, the Tiger Teams evaluated compliance with regard to TSCA, FIFRA, HMTA, DOE Orders, applicable state regulations, internal policies and administrative memoranda, and best management practices. The use, storage, and disposal of PCBs and pesticides were compared to regulations promulgated under TSCA and FIFRA, respectively, as well as state requirements. The receiving, handling, and storage of chemicals were assessed for compliance with DOE Orders, Federal and state regulations, and best management practices.

For this analysis, 4 performance areas were identified: toxic and chemical materials management, PCB management, pesticide management, and Pollution Prevention Awareness Plans (PPAPs).

Two performance areas, toxic and chemical materials (TCM) management and PCB management, accounted for 103 findings and were observed throughout the sites assessed. PPAP Plan findings are of special concern because PPAP is a specific DOE program to promote awareness of the potential for releasing pollutants into the environment.

TCM Management (19 of 19 sites, 53 of 124 findings). In this performance area, the sites had not consistently implemented procedures that demonstrated comprehensive, integrative TCM management. The lack of a formal TCM management program specifically accounted for 11 findings, but was indicative of the management weaknesses implicated in a substantial number of additional findings observed at sites. The remaining findings included inadequate or informal storage practices; incomplete administrative controls to manage TCM; inconsistent management of stored, excess, or scrap equipment; and spill control procedures.

The broad, programmatic nature of the findings indicated that formal TCM administrative controls had not been consistently developed or implemented at the sites. Implemented programs that were informal or incomplete resulted in the findings related to TCM storage and administrative controls. The lack of programmatic controls and procedures inhibited consistent, environmentally sound TCM management and oversight of operations and, as a result, increased DOE's liability due to the potential for mismanagement or a release of TCM into the environment.

Oversight (17 of 19 sites, 40 of 162 findings). Only 2 sites had oversight activities that adequately monitored and measured the effectiveness of environmental programs. Over half of the findings dealt with deficiencies in audit, assessment, and corrective action programs. Inadequate programs prevented the early detection and remediation of programmatic deficiencies in environmental compliance. Generally, the frequency of audits and assessments was insufficient to detect degradation in program performance. Corrective action programs lacked adequate root cause analysis.

At 8 sites, DOE Field and Area Office oversight was found to be inadequate to effectively monitor environmental compliance, procurement qualification of contractors and subcontractors, or environmental program effectiveness.

Sampling and Analysis (13 of 19 sites, 32 of 162 findings). Deficiencies in sampling and analysis affected the validity and reliability of environmental monitoring and surveillance data. The findings covered various deficiencies, including inadequate chain of custody, insufficient workspace, inadequate QC samples, improper calibration using outdated standards, and inadequate data validation.

Reporting (6 of 19 sites, 8 of 162 findings). Deficient reports were found by the Tiger Team to be incomplete or to contain inaccuracies. Policy implementation was found to be causal.

3.2.9 Radiation (total: 122 findings)

For this discipline, the Tiger Team Assessments consisted of evaluating current operational practices and programs to determine compliance status with Federal, state, and local regulations, and DOE Orders. The programs were also reviewed against DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," and against commonly accepted best industry practices and standards of performance.

For this analysis, 6 performance areas were identified: protection of the environment, protection of the public, radioactive and mixed waste management, radiological reporting requirements, radiological emergency planning, and SARs.

Protection of the Environment (15 of 19 sites, 51 of 122 findings). The 49 CFs and 2 BMPFs findings included deficient or nonexistent effluent monitoring and characterization programs for air and liquid effluents; deficient environmental surveillance programs for surface water, groundwater, soil, sediment, biota, direct radiation, and ambient air monitoring; and deficient preoperational monitoring for new facilities. Also found were poor contamination control practices; lack of environmental ALARA programs; inability to demonstrate compliance with NESHAPs for radionuclides; failure to apply Best Available Technology (BAT) analysis for effluent discharges; and control of tritium in liquid effluent streams.

Protection of the Public (17 of 19 sites, 29 of 122 findings). The findings included 28 CFs and 1 BMPF. The findings included lack of or incomplete

For this analysis, 3 performance areas were developed: regulatory compliance, preliminary assessment and site characterization, and hazardous chemical reporting.

This discipline had 88 CFs and 32 BMPFs. Technical and administrative deficiencies existed in developing guidelines and procedures for preliminary assessments and site characterization studies. Guidelines and training programs to ensure regulatory compliance were inadequate in the areas of inventory, tracking, and reporting of hazardous chemicals.

Regulatory Compliance (16 of 19 sites, 56 of 120 findings). The sites had not developed or implemented comprehensive programs or policies to ensure that specific technical and administrative requirements of CERCLA, the NCP, and the Resource Conservation and Recovery Act (RCRA) were completed when inactive waste sites were evaluated. Ten of the sites had deficiencies in implementing community relations, and administrative record and natural resource damage assessment requirements. Two sites had not established adequate procedures in response to their RCRA Part B Corrective Action requirements.

Preliminary Assessment and Site Characterization (18 of 19 sites, 37 of 120 findings). The sites did not consistently identify, evaluate, inventory, and prioritize potential IWSs, including offsite areas under site management. Preliminary assessment and site characterization study procedures and guidelines were incomplete or nonexistent and hence did not ensure compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP), and DOE 5400.4. Often assessments were performed without adequate technical and management workplans, sampling and analysis plans, S&H considerations, and data management procedures. Sites did not routinely perform post-assessment monitoring to ensure that risk to the public health and the environment had been adequately contained.

Hazardous Chemical Reporting (17 of 19 sites, 27 of 120 findings). The sites did not adequately track, inventory, or report hazardous chemicals to state and local emergency planning agencies according to Emergency Planning and Community Right-To-Know [the Superfund Amendments and Reauthorization Act (SARA), Title III] requirements. Not all sites had formal programs and procedures to accurately determine quantities of hazardous and extremely hazardous chemicals present onsite. Not all sites had developed procedures to formally notify emergency planning agencies when new chemicals had been introduced or when old chemicals had been phased out. Many sites did not use integrated chemical tracking systems that can determine when hazardous or extremely hazardous chemicals exceed regulatory thresholds.

3.2.11 NEPA Programs (total: 106 findings)

For this discipline, the Tiger Teams assessed the NEPA management structure and NEPA review processes; NEPA procedures and documentation; compliance with

3.3 SAFETY AND HEALTH

The purpose of this section is to summarize noteworthy practices, key concerns, Category I and II concerns, and concerns in the S&H perspective when the final 19 Tiger Team Assessments were conducted.

The subdivisions of this section begin with noteworthy practices (3.3.1), key concerns (3.3.2), and Category I and II concerns (3.3.3). The subdivisions that follow (3.3.4 through 3.3.24) discuss findings from the 19 assessments by discipline.

The S&H perspective includes 21 disciplines: organization and administration (3.3.4), quality verification (3.3.5), operations (3.3.6), maintenance (3.3.7), training and certification (3.3.8), auxiliary systems (3.3.9), emergency preparedness (3.3.10), technical support (3.3.11), packaging and transportation (3.3.12), nuclear criticality safety (3.3.13), security/safety interface (3.3.14), experimental activities (3.3.15), site/facility safety review (3.3.16), radiological protection (3.3.17), personnel protection (3.3.18), worker S&H Occupational Safety and Health Administration (OSHA) compliance (3.3.19), industrial hygiene (3.3.20), fire protection (3.3.21), medical services (3.3.22), occupational safety (3.3.23), and miscellaneous (3.3.24) (aviation safety, explosives safety, natural phenomena, and firearms safety).

3.3.1 Noteworthy Practices

Noteworthy practices are listed in this section. Since noteworthy practices are, by definition, "exceptional practices," and would therefore usually be unique to a single DOE site, no further analysis is provided here for these items. An indepth analysis of noteworthy practices within the DOE site system can be found in *Noteworthy Practices* (DOE 1992).

Lawrence Berkeley Laboratory (LBL). One noteworthy practice was identified at LBL within the occupational safety discipline. The practice involved developing an outstanding high-voltage training program in the Cell and Molecular Biology Division. Because no standard or safety training material existed in this area, the Division developed an electrophoresis high-voltage safety training course and safety guidelines for selecting and using high-voltage equipment. As a result of the project, the Division identified the manufacturers and models of power supplies and electrophoresis cells that met its guidelines, and the Division distributed the information to users, purchasing, and other divisions.

Argonne National Laboratory (ANL). For medical evaluations, ANL developed a computer printout for patients that provided the physician with a compact and dramatic display of vital medical data for 10 previous visits. Blood counts, blood chemistries, audiometry data, urine tests, blood pressure, height, weight, chest x-ray, pulmonary functions, and EKG results were entered. This printout facilitated identification of changes and trends and provided a graphic tool to use for informing and motivating patients.

hazards were present. This greatly enhanced the protective force capabilities to safely and efficiently use live weapons in sensitive areas, should the need arise.

EG&G established a mandatory Unit Manager Development Program. This program helped to broaden overall knowledge of processes and equipment and developed supervisory and management skills. This program had strong top management commitment to and involvement in the program.

Oak Ridge K-25 Site. One noteworthy practice was identified at the K-25 site and related to a facility access information system. This system provided an easy-to-use method of identifying access requirements for specific facilities and areas within facilities, including those related to physical hazards, radiation hazards, personnel monitoring, security, personal protective equipment, medical evaluation, and training.

3.3.2 Key Concerns (total: 165 key concerns)

This section provides a summary of key concerns identified at the 19 sites. Each Tiger Team Assessment identified specific issues as key concerns in order to highlight those deficiencies considered to be the most important based on their overall contribution to site hazards or compliance. Many key concerns are broadly stated, while others address specific situations which significantly contribute to safety risks or serious compliance issues at the site.

S&H key concerns are grouped to provide a distillation of the total of 165 key concerns.

Identified Noncompliance with DOE Orders, OSHA Requirements, Consensus Standards or Site Procedures (17 of 19 sites, 30 of 165 key Concerns). These key concerns were written as compliance issues. Specific identified noncompliance issues were determined to be sufficiently important to be highlighted as key concerns at 17 of the 19 sites. Many of these key concerns address specific issues such as compliance with a specific OSHA section or regulation; others were written broadly citing, for example, the entire S&H program at a site as being deficient.

Missing, Deficient, or Ineffective S&H Programs and Program Documentation (19 of 19 sites, 62 of 165 key concerns). At each of the sites subject to the Tiger Team assessments covered, deficiencies in programs or program documentation was observed. Issues identified as key concerns in this performance area included failure to document programs, failure to implement programs and the failure to include all mandatory DOE requirements.

Ineffective Oversight by the DOE (17 of 19 sites, 12 of 165 key concerns). The ineffectiveness of DOE oversight and guidance was considered a key concern by the Tiger Teams at 17 sites.

Ineffective Contractor Management System or Organizational Structure (19 of 19 sites, 61 of 165 key concerns). Where the ineffectiveness of contractor management was determined by the Tiger Teams to contribute directly or indirectly

noted in the areas of overcurrent protection and 29 CFR 1926. Fall protection from ladders and scaffolding, and guarding of open pits were noted in 7 concerns. Machine guarding was also a deficiency in 6 concerns, and control of excavation sites was discussed in 3 concerns.

Fire Protection (7 of 19 sites, 20 of 215 Category I and II concerns). Ten of the Category I and II concerns were deficiencies in meeting the Life Safety Code. Other concerns noted the lack of adequate egress from buildings (2 concerns), and lack of complete oversight of fire protection programs by a site office and contractor management (2 concerns). The remaining concerns did not have common elements.

Emergency Preparedness (10 of 19 sites, 18 of 215 Category I and II concerns). Major issues discussed in the Category I and II concerns were incomplete or nonexistent emergency organizations, as defined in DOE Orders; incomplete or nonexistent emergency planning programs, as defined by DOE Orders; command and control concerns; and emergency plan, procedure, and policy issues.

Personnel Protection (7 of 13 sites, 18 of 215 Category I and II concerns). Confined space issues were noted in 3 concerns, lockout/tagout issues in 2 concerns, asbestos program deficiencies in 2 concerns, and laser safety program deficiencies in 3 concerns. The remaining concerns did not have common elements.

Maintenance (9 of 19 sites, 15 of 215 Category I and II concerns). Many of the concerns addressed lack of complete maintenance of equipment, and three referenced incomplete maintenance programs and procedures.

Radiological Protection (5 of 14 sites, 15 of 215 Category I and II concerns). Three concerns documented incomplete radiological posting programs, 2 identified contamination control issues, 2 identified dosimetry program deficiencies, and 2 identified documented radiation safety interlock controls deficiencies. The remaining concerns did not have common elements.

Operations (4 of 19 sites, 9 of 215 Category I and II concerns). Operations at some sites were not conducted in accordance with DOE requirements. Examples of deficiencies addressed included operating without a qualified shift supervisor and operating nuclear facilities in an informal manner. Procedures were not provided or were not followed at some sites, and operators and supervisors were not always able to recognize safety deficiencies which threatened safe and reliable operations.

Occupational Safety (5 of 6 sites, 9 of 215 Category I and II concerns). The principal issue was failure to manage confined spaces in accordance with requirements of DOE and OSHA.

Organization and Administration (3 of 19 sites, 6 of 215 Category I and II concerns). The prime issue was incomplete oversight of operations by contractor management and DOE.

Analysis indicated the need for significant improvement in management oversight and guidance of S&H functions. A need also exists to implement specific site safety programs.

Management Oversight (19 of 19 sites, 92 of 319 concerns). Most of these concerns were related to a widespread lack of management guidance, control, and oversight of S&H organizations. The lack of S&H goals and objectives and inconsistent operational self-assessment programs were also identified as key areas needing improvement. Additional concerns identified poor communication systems and a lack of sufficient administrative controls.

Site Safety Programs (18 of 19 sites, 91 of 319 concerns). The inadequate development and implementation of specific site safety programs resulted in most of these concerns. Among the specific program needs are specific safety goals and objectives, fitness for duty programs, substance abuse programs, line safety, worker safety, and communication of safety concerns. Additional concerns identified lack of oversight and poor use of safety meetings.

Recordkeeping and Reporting (19 of 19 sites, 50 of 319 concerns). The concerns were divided into two groups: document control and incident reporting. Most of the concerns related to document control, including the need for overall recordkeeping systems; a lack of adequate document storage facilities; and no assurance that documents are reviewed, revised, distributed, and implemented on a regular basis. Additional concerns related to incident reporting concerns that demonstrated inconsistent reporting, and the lack of assurance that proper incident reporting followup is conducted.

Policies and Procedures (16 of 19 sites, 43 of 319 concerns). Most of the concerns identified the need to better review, update, develop, distribute, and implement policies and procedures. Additional concerns identified problems with ensuring the integration of DOE and industry requirements into all aspects of site operations.

Formal Definition of Authority and Responsibility (14 of 19 sites, 43 of 319 concerns). Most of these concerns identified the need to improve the definition of roles, responsibilities, and authorities for many positions. In addition, interfaces among functional organizations are not clearly defined, hampering communication of such roles and responsibilities. Additional concerns identified a lack of formal job descriptions and qualifications across organizations.

3.3.5 Quality Verification (total: 315 concerns)

For this discipline, the Tiger Teams reviewed programs and controls for procurement and supplier control, receiving and pre-installation inspections, calibration of measuring and testing devices, control and use of hardware and materials, inspection procedures, and control of special processes. Consideration was given to documentation of adequate procedures and the qualifications of personnel, procedures, and equipment.

and abnormal facility operations; personnel knowledge of both operational status and the effect of non-operational systems and equipment; personnel ability to control systems and equipment; provision of proper equipment in a clean, orderly, well-designed environment; and effective and accurate transfers of information between shift personnel.

For this analysis, 7 performance areas were identified: policies, programs, and procedures; communication; documentation of operations; work practices; evaluation and analysis; worker qualifications and operation activities; and testing and verification. One concern did not fit into a performance area.

Analysis indicated a need to formalize ES&H procedures. In addition, sites needed to better develop methods and lines of communication between workers and management, and between sites and DOE.

Policies, Programs, and Procedures (18 of 19 sites, 94 of 208 concerns). The concerns primarily noted the lack of development or implementation of procedures. While the need for improved and more formal S&H policies and procedures cuts across all sites and operations, several specific areas accounted for most of these concerns. Specific areas included conduct of operations, lockout/tagout, preventive maintenance, and operator aids.

Communication (11 of 19 sites, 35 of 208 concerns). The 35 concerns related to the lack of communication between shift personnel, contractor management, and DOE site offices. Other concerns related to inadequate signs, labels, tags, alarms, and status control boards.

Work Practices (6 of 19 sites, 22 of 208 concerns). Work practices for some sites did not ensure safe operations and did not provide maximum available protection to workers. As an example, workers at 1 site performing operations near a hot shop were working without provisions for detecting leaks of radiation or radioactive materials.

Documentation of Operations (6 of 19 sites, 21 of 208 concerns). Documentation of operations was not performed at some sites. Timely and accurate records and logs were not always maintained. One site did not have a document control system.

Worker Qualifications and Operation Activities (7 of 19 sites, 20 of 208 concerns). Personnel were not always performing work in accordance with written operating procedures or DOE Orders. In some situations there was a lack of training or understanding of requirements or operational steps. Most concerns related to failure to execute specific requirements and responsibilities within written procedures or DOE Orders.

Evaluation and Analysis (4 of 19 sites, 14 of 208 concerns). Evaluations and analyses of operations at some sites were incomplete and did not satisfy DOE requirements. Deficiencies documented included the lack of evaluations and analyses, failure to consider human factors, improper assignment of hazardous classifications, and control panel design problems.

Worker Qualifications and Responsibilities (5 of 19 sites, 11 of 252 concerns). Inadequate training and certification, poor definition of responsibility, and insufficient staff resulted in concerns in this area.

3.3.8 Training and Certification (total: 179 concerns)

For this discipline, the Tiger Teams reviewed training organization and administration for the ability to identify training needs and ensure that needs are met; quality of training for reactor and nuclear facility operations (with nuclear criticality safety and simulator training/facility exercises), personnel protection, maintenance, quality control inspector, nondestructive examination technician, radiological protection, and supervisory and managerial skills; and the support provided by training facilities, equipment, and materials.

For this analysis, 6 performance areas were identified: training and certification programs, records, DOE/Field/Area/Site Office training and certification, examinations, management of programs, and facilities and equipment.

Analysis indicated a need to improve training and certification programs so that they fully met DOE and OSHA requirements. In addition, training and certification documentation of existing activities and facilities and equipment needed to be improved on across the 18 sites where this discipline was assessed.

Training and Certification Programs (18 of 18 sites, 121 of 179 concerns). Most of the concerns centered around the lack of all or some required elements of training and certification programs. These elements included the following: training plans based on job skills; classroom training; practical skill training; policies; goals and objectives of training programs; and program documentation and procedures. In addition, DOE Orders and OSHA regulations that required specific training programs were not fully implemented or were deficient in many areas.

Facilities and Equipment (11 of 19 sites, 14 of 179 concerns). Training facilities and equipment often did not meet the training needs of individual sites. Of particular note was the lack of sufficient classroom space.

Records (11 of 19 sites, 12 of 179 concerns). For some sites, records of employee training and certification were not maintained in a manner such that they could be used to verify compliance with DOE or other requirements. Examples of deficiencies included missing records for some employees, not recording examination scores, not maintaining records of on-the-job training, and not maintaining or requiring training records for subcontractors.

Examinations (7 of 19 sites, 12 of 179 concerns). Training and certification examinations were not always conducted as required. Where examinations were conducted, they did not always ensure that the desired level of proficiency was achieved. Records of both written and oral examinations were not maintained as required.

the potential to release hazardous material to clean areas, and at many sites no formal program was in place to monitor and record data for effluent pathways. Several operating facilities had been plagued with air balancing problems that created the potential for uncontrolled migration of contaminants into occupied clean areas. Many facilities were not being operated in accordance with established American Society of Mechanical Engineers (ASME) codes and standards, and did not have predictive and preventive maintenance programs.

Waste Systems (11 of 16 sites, 28 of 145 concerns). The monitoring, storage, and disposal of hazardous and radioactive effluents was not consistent with the requirements of DOE mandates. Effluent pathways were not continuously monitored for the presence of contaminated materials, and at various sites, programs to address the ALARA of radioactive waste had not been formally developed and implemented. In addition, personnel had not received proper training on the implementation of waste minimization policies, and annual waste reduction goals were not being utilized at various program sites.

Emergency Power Systems (6 of 16 sites, 15 of 145 concerns). Emergency diesel generators at various DOE program sites were not properly tested, and there was no assurance that emergency electrical power systems met full-load power requirements. In addition, tests to evaluate the quality of diesel fuel supplies and emergency generators had not been conducted at several sites, and programs to assess the need for power systems had not been evaluated.

3.3.10 Emergency Preparedness (total: 276 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the emergency plan and its implementing procedures; emergency response training; drills and exercises, emergency facilities, equipment, and resources; and personnel protection procedures. Organization and administration of emergency preparedness programs were evaluated for their ability to ensure effective planning for and response to site/facility emergencies.

For this analysis, 5 performance areas were identified: compliance, management support, drills, training, and facilities and resources. Three concerns did not fit into a performance area.

Compliance with Federal and DOE Requirements (19 of 19 sites, 119 of 276 concerns). Concerns were associated with sites with a lack of emergency preparedness programs or emergency preparedness programs with sufficient deficiencies to render them ineffective. Additional concerns noted personnel protection programs that were missing entirely or were not in compliance with DOE requirements.

Management Support for Programs (17 of 19 sites, 50 of 276 concerns). The concerns included the overall lack of management support for maintaining the level of preparedness. Specific deficiencies included lack of annual appraisals, ineffective site-wide hazard assessments, poor capability to track and resolve cited emergency response deficiencies in a timely manner, and the need

Safety-Related Issues (15 of 19 sites, 42 of 148 concerns). The concerns in this performance area focused on the lack of control over the Safety Analysis Review Process, especially in the development of documents. Additional issues included incomplete SARs; the lack of current SAR databases; and the lack of well-defined roles, responsibilities and authorities for the management of safety issues.

Policies and Procedures (12 of 19 sites, 28 of 148 concerns). The majority of the concerns related to the lack of procedures to control safety-related issues, and existing procedures were not followed.

Facilities Modifications (13 of 19 sites, 22 of 148 concerns). The focus of the concerns was on inadequacies in the current programs to manage safety-related issues associated with the modifications of existing structures. The issues included those related to modifications not being controlled; no formal, written procedures to control the modification process; and no emphasis on safety in the design of the modifications.

Documentation (12 of 19 sites, 13 of 148 concerns). Concerns in this performance area focused on the lack of documentation for as-built drawings of buildings, safety documentation not meeting guidelines, and the lack of checks and balances to ensure that documentation was appropriate and complete.

3.3.12 Packaging and Transportation (total: 243 concerns)

For this discipline, the Tiger Teams reviewed the adequacy of systems to implement Federal and state regulations, DOE Orders, and good industrial practices; appropriate training, qualification, and certification of personnel handling hazardous materials; effective QA checks and balances; the compliance and safety of intra-building movements, enroute storage operations, onsite and offsite shipments, and packaging and storage of hazardous materials; timely reporting of accidents and incidents; adequacy of records; and appropriate conduct of appraisals and internal audits.

For this analysis, 5 performance areas were identified: operations, management systems, QA/QC program, training, and pipeline safety. Twenty-one concerns relating to packaging and transportation did not fit into the 5 identified performance areas.

Analysis indicated significant deficiencies in most aspects of packaging and transportation systems.

Operations (13 of 14 sites, 73 of 243 concerns). Most of the concerns related to nonconformances in labeling, placarding, recordkeeping, testing, and marking. Additional concerns were related to procedures for declining incoming packages of radioactive materials.

Management Systems (14 of 14 sites, 71 of 243 concerns). Concerns identified poor or ineffective packaging and transportation management systems. These concerns related to poor dissemination of relevant information to employees;

Criticality Safety Procedures and Monitoring (6 of 6 sites, 34 of 72 concerns). All 6 sites had concerns and failed to meet DOE requirements relating to operating procedures and criticality safety limits. Many of these concerns were related to posting of areas with mass limits and review of operational procedures. Five sites had inadequate criticality safety emergency procedures or conducted emergency drills too infrequently. Four sites had criticality alarms that did not satisfy DOE requirements for calibration and maintenance and good industry practices.

3.3.14 Security/Safety Interface (total: 44 concerns)

For this discipline, the Tiger Teams reviewed safety aspects of security/safeguards improvements and modifications to ensure that safety is not compromised in such areas as emergency access and egress, and weapons and other protective force equipment. Safety authorities and responsibilities for security/safeguards emergencies were evaluated for clear definition and understanding among all involved parties.

For this analysis, 5 performance areas were identified: facility training and planning for security/safeguard emergencies, safety of security, review of security operations, safety of improvements, and emergency access and egress. There was 1 unique concern identified in this discipline relating to the safety of security equipment, specifically, poorly maintained security patrol vehicles.

Analysis indicated the need for improved planning for security/safety interactions in emergencies and the need to improve the safety of security activities and programs.

Facility Training and Planning for Security/Safeguards Emergencies (8 of 10 sites, 20 of 44 concerns). Safety authority and responsibility were neither well defined nor clearly understood. Most of the concerns dealt with the lack of preparedness of the system for emergencies. One concern focused on the lack of documented plans detailing roles and responsibilities; another focused on the lack of understanding by the staff in these roles.

Safety of Security Activities (6 of 10 sites, 9 of 44 concerns). The concerns focused on the appropriateness of the weapons used by the security forces at various stations within DOE sites.

Review of Security Operations (4 of 10 sites, 5 of 44 concerns). Concerns focused on the lack of reviews of security operations. The lack of a formal review process was noted at several sites.

Safety of Improvements (4 of 10 sites, 5 of 44 concerns). Concerns were related to improvements or modifications to Security Systems (Facility and Procedures) which were not formally reviewed for operational safety prior to implementation. Concerns focused on deficiencies associated with procedures for safety of improvements to the security system. In some cases, the review processes did not ensure a formal approval from all affected parties.

reviewed by the Committee; the degree of safety resulting from the Committee's reviews; and the performance of an annual operating review of each facility, triennial appraisal of the safety review system, and operating experience reviews to improve safety and reliability.

For this analysis, 4 performance areas were identified: program design, safety reviews/approval, lessons learned/trending, and corrective action program.

Program Design (18 of 19 sites, 49 of 122 concerns). The focus of the concerns in this area was on the lack of strong, comprehensive safety programs to ensure the identification of safety hazards before they become a problem.

Safety Reviews/Approvals (14 of 19 sites, 48 of 122 concerns). The concerns related to the lack of strong oversight programs to ensure that safety and health standards are being met. These activities included the annual and triennial appraisals, as well as safety reviews prior to initiating an activity.

Lessons Learned/Trending (11 of 19 sites, 19 of 122 concerns). The primary thrust of the concerns in this performance area was on the lack of programs to capture operational experiences and transfer them to other sites for their use and benefit.

Corrective Action Programs (5 of 19 sites, 6 of 122 concerns). The focus of the concerns was on the lack of strong followup on previously identified concerns in the safety and health arena.

3.3.17 Radiological Protection (total: 373 concerns)

For this discipline, the Tiger Teams reviewed the organization's ability to implement and control radiological protection activities; the adequacy of the performance assessments provided by internal audits and investigations; the ability of radiation protection procedures to provide for safe operations; the effectiveness of radiation protection programs, including external radiation exposure control, external and internal radiation dosimetry, internal radiation exposure control, radiation monitoring and contamination control, and ALARA; the accuracy of fixed and portable instrumentation and air monitoring systems; and the availability of records related to occupational radiation exposure.

For this analysis, 4 performance areas were identified: radiological protection procedures, radiological monitoring, oversight of radiological protection programs, and exposure control programs.

Analysis indicated that the sites have a widespread need to better manage most aspects of radiological protection programs, including procedures, organization, oversight and monitoring.

ineffective at identifying, controlling, enforcing, and the development of corrective action strategies for construction safety concerns such as electrical safe work practice, excavations safety, and operation of motorized vehicles.

Management of Occupational Hazards (13 of 13 sites, 50 of 214 concerns). Concerns were associated with maintaining worksites free from occupational hazards. Sites did not maintain technically based and effectively managed systems to identify, evaluate, control, and monitor chemical, physical, biological, and environmental hazards present in the worksite. The Tiger Teams identified several potentially significant risks of chemical exposure to toxic and carcinogenic chemicals, numerous deficient walking and working surfaces, and a variety of electrocution hazards, including unapproved electrical installations and damaged power hand tools. The sites also did not maintain or enforce a system of documented periodic safety inspections, audits, and reviews of facilities, operations, and procedures by technically qualified and adequately trained personnel. Effective, proactive systems were also lacking to respond to, correct, and develop strategies to prevent the recurrence of previously identified occupational hazards.

Program Implementation and Training (13 of 13 sites, 46 of 214 concerns). The Tiger Teams identified incomplete implementation of, or weak enforcement of, existing industrial hygiene monitoring programs for chemical, physical, biological, and environmental hazards as a primary concern at all of the PSOs. Industrial hygiene activities were often conducted by untrained, unqualified individuals; activities were being conducted infrequently and improperly.

S&H Management Systems (11 of 13 sites, 35 of 214 concerns). Sites had not allocated sufficient numbers of technically qualified individuals to key S&H positions. Roles and responsibilities were not well defined; authority (including stop work) and accountability were not clearly defined between and among line management, QA departments, and Environmental S&H Divisions. This resulted in a reactive rather than a proactive stance toward employee S&H. The Tiger Teams noted numerous programs that could not be effectively implemented because program administrators and supervisors had not been assigned, trained, or given authority over affected workers. Technical support was often available only on an as-needed basis. Systems were not in place to ensure that all S&H issues as well as all regulatory requirements were identified and addressed before potentially hazardous activities were initiated.

Data Management and Information Transfer Systems (5 of 13 sites, 5 of 214 concerns). Concerns were associated with compliance with Federal and DOE regulations and requirements for access to employee information. Data management systems and information transfer policies concerning standard operating procedures, medical monitoring records, accident reports, and industrial hygiene monitoring data were ineffective and created difficulty in accessing data, defending data, and reporting that information to employees, Federal agencies, and DOE in a timely manner. Undefined and unenforced policies for communication between line management and medical services resulted in delayed,

3.3.20 Industrial Hygiene (total: 73 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the industrial hygiene program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure industrial hygiene performance; compliance with DOE-prescribed standards for occupational health; and the adequacy of information communicated to site/facility personnel about chemical, physical, and biological stresses that may be encountered in the work environment.

For this analysis, 4 performance areas were identified: administrative programs; hazard identification, evaluation, and control; staffing, resources, administration, and oversight; and information management, records, and documentation. Nine concerns did not fit into these performance areas; they were identified with regard to information management, industrial hygiene review of new projects, and QA/QC programs. Seven concerns did not fit into a performance area.

Analysis indicated significant deficiencies with regard to specific industrial hygiene programs, hazard identification and control, and oversight of activities with industrial hygiene consequences.

Administrative Programs (8 of 8 sites, 31 of 73 concerns). Concerns were associated with the development and implementation of industrial hygiene programs to reduce S&H risks. Specific programs widely identified as concerns include respiratory protection, carcinogen control, laser safety, and chemical hygiene. Additional concerns regarded radiation protection and confined space entry programs.

Hazard Identification, Evaluation, and Control (8 of 8 sites, 19 of 73 concerns). Concerns were related to the identification and control of specific workplace hazards. These included lead, noise, asbestos, toxic chemicals, electromagnetic fields, and beryllium. Additional concerns related to reactive hazard monitoring and to chemical labeling and posting.

Staffing, Resources, Administration, and Oversight (6 of 8 sites, 14 of 73 concerns). Most of the concerns related to poor oversight, monitoring and corrective action programs. Additional concerns dealt with personnel training, reviews of hazard assessments by S&H professionals, and effective industrial hygiene links with medical staff.

Information Management, Records, and Documentation (2 of 8 sites, 2 of 73 concerns). Information systems were inadequate to evaluate industrial hygiene data, identify trends, or track exposures.

program; the appropriateness of procedures and documentation; the availability and adequacy of medical treatment and facilities and competency of staff; the effectiveness of reviews and audits; and the adequacy of information provided to personnel about the medical hazards that may be encountered and the medical services that are available.

For this analysis, 6 performance areas were identified: medical program design, staffing/training, procedures and documentation, medical facilities and equipment, review/audit, and management support.

Medical Program Design (17 of 17 sites, 45 of 122 concerns). The concerns in this performance area related to the lack of formal written programs which include all aspects of medical care required for the DOE community.

Staffing and Training Programs (16 of 17 sites, 22 of 122 concerns). The primary focus of these concerns was on the lack of minimum requirements of staff to implement proper medical services and the lack of continuing education and awareness programs for the medical professionals and the general DOE population.

Procedures and Documentation (12 of 17 sites, 18 of 122 concerns). The focus of the concerns in this performance area was on the lack of formal documentation to validate medical testing programs and the lack of written procedures to direct implementation of the programs.

Medical Facilities and Equipment (11 of 17 sites, 17 of 122 concerns). The concerns in this performance area focused on the lack of medical facilities (size of the clinics and the available equipment) to ensure that proper medical care is provided in a timely manner.

Review and Audit Programs (8 of 17 sites, 12 of 122 concerns). The focus of these concerns was on the lack of oversight programs to ensure that the medical service areas were conforming with all applicable standards.

Management Support (7 of 17 sites, 8 of 122 concerns). The concerns in this performance area related to the lack of top management support for the medical services area and the difficulty of the medical professionals to communicate to top level management.

3.3.23 Occupational Safety (total: 59 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the occupational safety program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure occupational safety performance; and the adequacy of information communicated to site/facility personnel about physical stresses that may be encountered in the work environment.

with DOE 5480.4 and Draft 29 CFR 1910.146. Another concern addressed deficiencies in an existing program in terms of content of the written program and permit and program implementation, and another concern indicated that 1 safe work permit system did not clearly establish safety requirements to ensure the implementation of appropriate hazard control measures.

Personal Protective Equipment (3 of 6 sites, 3 of 59 concerns). Two concerns specifically addressed eye protection. Deficiencies in the eye protection program included failure to wear industrial safety glasses in areas where eye hazards exist and a failure to clearly define the requirements for eye protection. The third concern dealt with the selection and use of personal protective equipment, including gloves, eye protection, and respirators.

Lockout/Tagout (2 of 6 sites, 2 of 59 concerns). In one case, the lockout/tagout procedure did not contain all of the elements required by OSHA 29 CFR 1910.147. The other concern dealt with a failure to comply with the procedure as written and a failure to modify the program and perform retraining following identification of lockout/tagout program deficiencies.

3.3.24 Miscellaneous (total: 107 concerns)

This discipline includes 4 sub-disciplines. Where appropriate at individual sites, the Tiger Teams reviewed the commitment to safety in the areas of aviation, explosives, natural phenomena hazards, and firearms. The existence and content of safety directives was evaluated, including issuance of safety orders that reflect management's commitment to attainment of S&H excellence, along with assessments of routine operations.

Within explosives safety, 3 performance areas were identified: explosives operations; explosives safety appraisal program; and transportation, handling, and storage of explosives. Within natural phenomena hazards, 3 performance areas were identified: seismic system interaction; natural phenomena hazards safety program; and natural phenomena hazards anchorage, structural integrity, and operability. Within firearms, 5 performance areas were identified: firearms safety programs and appraisals; firearms safety training, range operations, and storage of munitions; firearms procedures and documentation; firearms exercises; and firearms safety organization and administration. Within aviation safety, 3 performance areas were identified: organization and administration; maintenance safety; and operational safety.

Four areas were assessed: aviation safety (3 sites, 27 concerns); explosives (2 sites, 20 concerns); natural phenomena hazards (1 site, 14 concerns); and firearms safety (3 sites, 46 concerns).

Aviation Safety Organization and Administration (2 of 3 sites, 14 of 27 concerns). Concerns were related to Project Management/Field/Area Office having failed to provide aviation safety oversight as required in DOE 5482.1B.

Aviation Maintenance Safety (2 of 3 sites, 10 of 27 concerns). Required maintenance was not being completed as required.

Firearms Exercises (2 of 3 sites, 4 of 46 concerns). Control of firearms exercises did not fully comply with DOE requirements.

Firearms Safety Organization and Administration (1 of 3 sites, 4 of 46 concerns). Sites had not required firearms safety programs for all firearms users. This program was generally only for in-place or protective force personnel.

SYNOPSIS: ENERGY RESEARCH (ER)

The Office of Energy Research (ER) advises the Secretary on DOE's physical and energy research and development (R&D) programs; the use of multipurpose laboratories, education, and training for basic and applied research; and the financial and budgetary priorities for these activities. This report covers Tiger Team Assessments for 7 ER sites: Argonne National Laboratory, Princeton Plasma Physics Laboratory, Lawrence Berkeley Laboratory, Oak Ridge National Laboratory, Stanford Linear Accelerator Center, Ames Laboratory, and Fermi National Accelerator Laboratory.

This synopsis briefly describes the findings from the analysis of the 7 ER sites from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). These perspectives are discussed in more detail in the following chapter.

MANAGEMENT AND ORGANIZATION (ER)

Over half (12 of 23) root causes at ER sites focused on the need to increase management's commitment to ES&H excellence by providing vision, leadership, and guidance; needs were also identified for a more formal approach, qualified staff, and training programs.

The 49 key findings were distributed fairly even across 5 of 6 disciplines. The 12 findings in program commitment related to a lack of clear documentation of policy and guidance, and a lack of ES&H responsibility at the line management level. The 10 key findings in program evaluation included 5 in self-assessment at 1 site and 5 that cited inadequate oversight programs and activities. The 9 key findings in ES&H planning included 4 in budgeting at 1 site and 1 each at 5 sites that focused on a lack of integrated and comprehensive strategic planning documents. Needs were also identified for more formal, comprehensive ES&H programs with adequate, fully trained staff.

Almost one-fourth (46 of 163) of the findings were in formality of operations, indicating a need to establish programs and to complete existing programs in commitment tracking, oversight and quality assurance (QA), conduct of operations, and to implement DOE requirements. Four other disciplines contained 22-29 findings each: organizational structure, ES&H program commitment, resources and training, and program evaluation. Significant issues included lack of well-defined and well-understood roles, responsibilities, and authorities; inadequate implementation of ES&H guidance and lack of management support and "ownership"; human resources management plans and self-assessment programs that were not comprehensive; and lack of ES&H audit programs for oversight. Disciplines with relatively few findings were ES&H planning (12) and communications (2).

All 7 sites had deficient environmental surveillance and radioactive effluent monitoring activities and an inadequate demonstration of compliance with National Emission Standards for Hazardous Air Pollutants for radionuclides. All facilities lacked adequate controls to ensure protection of public health and the environment, complete public dose estimates, implementation of residual radioactive material requirements, formal contamination control programs, ALARA (as low as reasonably achievable) programs, and procedures to report a potential dose greater than 10 mrem. Safety reviews were not conducted as part of a formalized program.

SAFETY AND HEALTH (ER)

For the 7 ER sites, the Tiger Teams identified 54 key concerns. The majority of these concerns related to management and program documentation issues which the teams believed to be sufficiently important to highlight as key concerns. Remaining issues include both general and specific compliance issues. At 2 sites, DOE was cited as providing inadequate oversight.

For the 7 sites within ER, contractor management had not provided and communicated adequate policies, program descriptions, or procedures to address mandatory DOE requirements. Some sites were cited for not following their existing procedures. At one site, for example, one key concern addressed the failure of laboratory management to observe its own procedure relating to the preparation of procedures. Most key concerns, however related to failure of the contractor management to fully address applicable, important, and known requirements.

Almost one-third (16 of 52) Category I and II concerns were in the worker safety discipline, most frequently relating to compliance with electrical safety standards. Lockout/tagout issues were also cited under worker safety and under maintenance. Category I and II concerns is radiological protection most frequently were associated with noncompliant dosimetry programs. Fire protection programs at 2 sites did not comply with the Life Safety Code, and emergency preparedness programs at 4 sites were incomplete.

Radiological protection was the single discipline with the most concerns (146). Documented radiation procedures were incomplete, lacking, or inconsistent at all 7 sites, and 5 sites had not fully implemented external and internal radiation dosimetry programs with documented policies and procedures. Instrumentation to monitor radiation did not fully meet DOE requirements. Management at 6 of the 7 sites had not fully delineated authorities, responsibilities, and/or operating policies and procedures for radiological protection.

The related disciplines of personnel protection, worker safety and health, industrial hygiene, and occupational safety accounted for 197 concerns. Programs in these areas did not fully comply with Federal and DOE requirements and were not fully implemented or adequately staffed. Deficiencies existed in hazard identification, evaluation, and control and in hazard communication and S&H training.

4.0 ENERGY RESEARCH

This review and summary of the 7 Energy Research (ER) sites are part of a larger analysis focused on the final 19 Tiger Team Assessments. The 7 ER sites are as follows:

- Argonne National Laboratory (ANL)
- Princeton Plasma Physics Laboratory (PPPL)
- Lawrence Berkeley Laboratory (LBL)
- Oak Ridge National Laboratory (ORNL)
- Stanford Linear Accelerator Center (SLAC)
- Ames Laboratory (Ames)
- Fermi National Accelerator Laboratory (Fermi).

Following the Tiger Team methodologies and categories, this analysis discusses the findings from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 20 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, findings, and root cause analysis are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns, Category I and II concerns, and concerns are discussed. Category I and II concerns are those that either address (1) a "clear and present" danger to people or (2) significant risk or substantial noncompliance with DOE Orders.

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area given 2 sets of information. The first set of numbers indicates the number of sites having a finding(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (3 of 7 sites, 4 of 16 concerns) means that 3 of

would also be open to undergraduate students as a prerequisite to research, would require a grade of "B" or better.

4.1.2 Root Causes (total: 23)

DOE used root cause analysis for Tiger Team Assessments to identify the fundamental reason(s) why sites have deficiencies within their ES&H programs. In conducting the root cause analysis, the M&O team reviewed all findings and causal factors and discussed the findings with the Environment and S&H teams. This process identified the essence of the problems at any particular site which, if addressed, would prevent recurrence of the problems.

To evaluate the root causes for this report, they were first listed by sites within a Program Secretarial Office (PSO). Each root cause was then reviewed and placed into one of the M&O disciplines based on the perceived issue. A total of 23 root causes were noted for the 7 ER Tiger Team Assessments. Most (12 of 23) of the root causes focused on the need to increase management's commitment to ES&H excellence. Management did not provide the vision, leadership, and guidance to ensure that ES&H programs were successful. Management did not recognize its accountability for the status of ES&H affairs nor visibly demonstrate ownership of those programs. Three root causes noted that ER management had not embraced the ES&H initiatives of the Secretary or provided the level of leadership and guidance needed to ensure that the ES&H programs were being implemented. Four root causes also noted that ER's informal management approach was not effective in administering ES&H programs. Three root causes addressed the lack of qualified staff and poor design of training programs.

TABLE 4.1. Summary of M&O Key Findings for ER Sites

M&O Key Discipline	ANL	ORNL	LBL	PPPL	SLAC	Ames	Fermi	TOTAL
Program Evaluation	6	1	0	2	0	1	0	10
ES&H Planning	4	1	1	0	1	1	1	9
Formality of Operations	2	1	1	2	0	1	1	8
Resources & Training	1	1	1	2	1	1	0	7
ES&H Program Commitment	5	1	1	4	0	0	1	12
Organizational Structure	1	0	0	2	0	0	0	3
TOTAL	19	5	4	12	2	4	3	49

4.1.3 Key Findings (total: 49)

out the ES&H duties. At 2 sites, the information systems were inadequate to deliver ES&H information to senior management in a timely and reliable fashion.

Organizational Structure (2 of 7 sites, 3 of 49 key findings). Two of the key findings related to 1 site and focused on the lack of well-defined roles, responsibilities, and authorities for carrying out ES&H activities.

TABLE 4.2. Summary of M&O Findings for ER Sites

M&O Discipline	ANL	ORNL	LBL	PPPL	SLAC	Ames	Fermi	TOTAL
Organizational Structure	3	1	5	6	3	3	4	25
ES&H Program Commitment	3	4	4	5	1	3	2	22
Resources & Training	5	3	3	5	4	4	5	29
Program Evaluation	12	2	1	3	4	3	2	27
Formality of Operations	20	3	8	7	2	5	1	46
Communications	1	0	0	0	0	0	1	2
ES&H Planning	4	0	2	1	2	1	2	12
TOTAL	48	13	23	27	16	19	17	163

The following sections summarize and analyze M&O findings across the 7 ER sites, as shown in Table 4.2 above. Each of the following sections focuses on 1 M&O discipline and its performance areas.

4.1.4 Organizational Structure (total: 25 findings)

For this discipline, the Tiger Teams reviewed issues related to roles, responsibilities, and authorities in a wide range of functional areas.

For this analysis, 3 performance areas were identified: roles, responsibilities, and authorities; ES&H goals and objectives; and organizational independence.

The most significant issue was a lack of well-defined and understood roles and responsibilities at both the individual and organizational unit levels, and in a range of functional areas. More formality was required to meet DOE ES&H performance objectives.

Roles, Responsibilities, and Authorities (6 of 7 sites, 21 of 25 findings). Most of the findings indicated a lack of well-defined and understood roles, responsibilities, and authorities among the various organizational groups associated with individual sites, including the Field Office, the site, con-

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at the sufficiency of environmental staffing resources and the completeness of the organization's systems for identifying and satisfying employees' needs for ES&H training and opportunities for career development. The assessment also included the adequacy and maintenance of facilities and equipment.

Three performance areas were identified: human resources, training, and facilities and equipment. The ER findings clustered in the first two performance areas.

The findings indicated the need to develop fully comprehensive ES&H human resources management plans and training programs. In addition, a need existed to develop an ES&H program for disposal and/or clean up of DOE-owned buildings and facilities that were not included in site contractor responsibilities and contractual agreements.

Human Resources (6 of 7 sites, 15 of 29 findings). Thirteen findings addressed the lack of comprehensive ES&H human resources management plans and program deficiencies at all levels, and 2 findings addressed deficiencies in implementing the programs at the Area Office and site levels. The findings included lack of ES&H job qualifications and performance indicators, lack of career track and staff development, and inadequate number and mix of ES&H staff.

Training (7 of 7 sites, 14 of 29 findings). The findings focused on the development and full implementation of comprehensive ES&H training programs at all levels. Findings indicated a lack of training needs identification, professional development, recordkeeping, subcontractor and visitor training, and training evaluation.

4.1.7 Program Evaluation (total: 27 findings)

For this discipline, the Tiger Teams reviewed management programs and systems for their ability to provide DOE management with the information needed to make informed decisions on the status of its ES&H programs.

For this analysis, 3 performance areas were identified: self-assessment programs; audits, appraisals, and surveillance; and Cost Plus Award Fee (CPAF) programs.

New program evaluation programs, procedures, and tools needed to be developed and existing ones needed to be updated. Many sites needed to develop comprehensive ES&H program evaluation programs to ensure continued compliance with regulations and DOE Orders.

Self-Assessment Programs (6 of 7 sites, 14 of 27 findings). ER instituted a self-assessment program and issued broad guidance to its sites. However, ER had not scheduled or conducted self-assessments at any level of its organization. In general, the sites had not yet developed comprehensive self-

regulations or DOE Orders into existing programs. One finding focused on determining applicability of DOE Orders. Findings in this area were directed to sites, and Area and Field Offices.

Recordkeeping and Reporting (1 of 7 sites, 2 of 46 findings). The findings related to the lack of a formal incident reporting system and to the lack of an adequate closure system for appraisal findings. Findings in this area were directed to sites and Field Offices.

4.1.9 Communications (total: 2 findings)

For this discipline, the Tiger Teams reviewed the existence and effectiveness of internal and external communications systems. The effectiveness of internal communications was assessed by evaluating the understanding of roles and responsibilities and the awareness of ES&H policies, procedures, and programs throughout the organization. The extent and effectiveness of external communications were assessed by evaluating the relationship the site had with oversight agencies and citizen and environmental groups.

For this analysis, 2 performance areas were identified: internal communications and external communications. Both ER findings were in internal communications.

Internal Communications (2 of 7 sites, 2 of 2 findings). The findings addressed the need to develop employee concerns programs to encourage employees to raise ES&H concerns and to foster effective implementation of ES&H activities.

4.1.10 ES&H Planning (total: 12 findings)

For this discipline, the Tiger Teams evaluated management systems for their ability to ensure that ES&H issues, resources, and needs were systematically included, reviewed, and effectively prioritized in all budgetary, financial, and strategic planning efforts.

For this analysis, 2 performance areas were identified: budgeting systems and programs, and planning systems and programs.

Needs were identified to develop programs to prioritize ES&H issues in the budgeting process to more formally and completely include ES&H budgetary needs and to integrate ES&H issues and programs into strategic planning processes.

Budgeting Systems and Programs (3 of 7 sites, 7 of 12 findings). Two findings addressed the need to develop and implement criteria for setting ES&H priorities in the budgeting process. Two findings addressed the need to more fully incorporate ES&H issues into both short- and long-term budgeting processes. One finding addressed the need to capture ES&H investments in the capital budgeting process. Two findings addressed the need to better oversee the budgeting process to ensure adequate attention to QA and ES&H priorities in setting budgets. Overall, the findings indicated insufficient attention to incorporation of ES&H budget concerns and priorities at three sites.

4.2 ENVIRONMENT

This section summarizes noteworthy practices, key findings, and findings in the Environmental perspective for the 7 ER sites. The scope of the environmental analysis included all of the 9 disciplines normally appraised during a Tiger Team Assessment. When a discipline was not assessed at one or more of the sites, this fact is noted in the analysis.

Findings are divided into compliance findings (CFs) and best management practice findings (BMPFs). Compliance findings represent conditions that, in the judgment of the subteam, may not satisfy the requirements of environmental regulations, DOE Orders (including internal DOE directive memoranda, where referenced), consent orders, and directives/procedures/action plans. BMPFs represent situations where, in the judgment of the subteam, sound and generally accepted industry management practices were not being employed.

The subdivisions of this section begin with noteworthy practices (4.2.1) and key findings (4.2.2). The subdivisions that follow (4.2.3 through 4.2.11) discuss findings from the 7 ER assessments by discipline.

The Environment perspective includes 9 disciplines: air (4.2.3), surface water/drinking water (4.2.4), groundwater/soil, sediment, and biota (4.2.5), waste management (4.2.6), toxic and chemical materials (4.2.7), environmental QA and oversight (4.2.8), radiation (4.2.9), inactive waste sites (4.2.10), and NEPA (4.2.11).

4.2.1 Noteworthy Practices

No noteworthy practices for environmental issues were identified for the 7 ER sites.

TABLE 4.3. Summary of Environment Key Findings for ER Sites

Environment Key Discipline	ANL	ORNL	LBL	PPPL	SLAC	Ames	Fermi	TOTAL
Formality of Programs	1	1	1	1	2	1	2	9
Environmental QA/ Oversight	1	0	2	2	1	1	0	7
Inactive Waste Sites	1	1	0	1	0	0	0	3
Waste Management	0	0	1	0	0	1	0	2
Toxic & Chemical Materials	0	0	0	0	0	1	0	1
TOTAL	3	2	4	4	3	4	2	22[(a)]

(a) Two key findings did not fit into any key finding discipline.

inactive waste sites was inadequate to limit further spread of contamination from those sites. In addition, investigations at 1 site proceeded without required approval from the state regulatory agencies.

Waste Management Programs (3 of 7 sites, 3 of 24 key findings). Waste management programs at the ER sites were not adequate to ensure that hazardous, mixed, and radioactive wastes were handled according to DOE Orders and environmental regulations.

The ER site programs for managing wastes were not comprehensive; procedures were not formalized and some deficiencies existed in virtually all waste management activities at ER sites. Roles were not well defined, and responsibilities across site organizational lines for waste management were not clearly delineated. The lack of qualified personnel and sufficient resources was a contributing factor to the deficiencies in the site programs. Although there were specific instances of waste management noncompliance that had been identified in prior surveys and corrected, the continued existence of similar compliance issues indicated a failure by the sites to identify and correct the root causes.

Toxic and Chemical Materials (1 of 7 sites, 1 of 24 key findings). The site had not developed a comprehensive program to effectively manage toxic and chemical materials. This included hazard identification, storage of incompatible materials, provisions for secondary containment, and assessment of potential mechanisms for hazardous materials released.

TABLE 4.4. Summary of Environment Findings for ER Sites

Environment Discipline	ANL	ORNL	LBL	PPPL	SLAC	Ames	Fermi	TOTAL
Air	9	10	8	8	7	7	6	55
Surface/Drinking Water	18	11	9	11	8	4	6	67
Groundwater/Soil, Sediment & Biota	4	9	6	4	4	2	6	35
Waste Management	18	15	22	5	7	11	5	83
Toxic Chemicals & Materials	6	8	7	6	6	4	5	42
QA and Oversight	11	3	13	5	6	11	8	57
Radiation	11	4	6	3	3	4	8	39
Inactive Waste Sites	3	7	9	5	6	5	6	41
NEPA	4	3	6	7	6	5	5	36
TOTAL	84	70	86	54	53	53	55	455

and emissions sources complied with operating, performance, and recordkeeping requirements contained in state implementation plans (SIPs), regulations, and permits and Federal regulations.

Two common and serious air program deficiencies at the sites were the lack of procedures to maintain site activities and operations within regulatory limits and permit conditions and a lack of documentation to verify compliance. Unidentified, uncontrolled emissions pose a risk for ER, not only from a compliance perspective but from a health perspective for such pollutants as asbestos. While sources at several sites had the necessary construction and operating permits, few procedures were in place to document whether operations actually met permit conditions such as limits on total annual operating hours or daily material inputs.

Personnel at some sites were unaware of general SIP regulations (such as opacity limits or maintenance of control equipment) that applied to their emission sources. Site personnel often did not realize that regulations addressed such activities as open burning, dust control, and asbestos demolition during renovation. As a result, the sites had not consistently provided the necessary notice to state environmental agencies, posted mandatory labels for gasoline fuels, bagged asbestos wastes, or disposed of waste asbestos in an acceptable manner. While asbestos program management was not cited in the air assessments for ER, the toxic chemical materials review highlighted the need for proper TCM management of asbestos in several BMPFs.

Appropriate Emission Controls (6 of 7 sites, 9 of 55 findings). Solvent, gasoline, and/or motor emission sources at 3 ER sites were not controlled as required by state permits and regulations. Findings at other sites noted that the procedures used in air effluent control programs were not sufficient and were not effectively enforced to minimize air emissions. At 2 sites, deficiencies in the procedures for use, maintenance, and testing of high-efficiency particulate air (HEPA) systems was found. Uncontrolled titrated water vapor emissions continued at 1 site, even though the reactor had ceased operations in 1977. The potential existed for uncontrolled emissions and violations of regulatory and permit limits because emission controls at boilers and fuel tanks were inadequate.

Permit Management (7 of 7 sites, 7 of 55 findings). The ER site programs did not adequately determine and track permitting requirements (permit applicability) for existing or new sources.

Five sites had not fully identified applicable air permitting regulations for their emission sources. Site programs did not consistently designate staff responsible for making this determination or include procedures to track needed permits. Although many air sources at DOE sites did not need permits, oversight and review were insufficient to ensure that DOE held the appropriate permits and would not be subject to state or Federal enforcement actions.

Emissions Tracking (5 of 7 sites, 7 of 55 findings). Five sites had not developed comprehensive emission inventories of regulated pollutants.

The most frequently identified finding in this area cited inadequate installation or installation of insufficient backflow devices to protect potable water (6 of 7 sites). This deficiency was the result of a failure to implement the DOE policy for installing backflow prevention devices and was exacerbated by inadequate internal verification procedures. Three sites had other findings on potential contamination of the potable water and groundwater. These findings included an incomplete lead survey, infiltration/inflow in sewer pipes, and open top drinking water reservoirs near industrial operations.

SPCC Planning (6 of 7 sites, 7 of 67 findings). The ER sites that received findings had not conducted routine appraisals, audits, and reviews to verify that necessary SPCC programs were being managed within regulatory guidelines.

At 5 sites, SPCC Plans either were not prepared properly or were not updated according to regulatory requirements. The primary root causes included lack of appraisals, audits, reviews, and policy implementation. At 2 sites a lack of resources was identified as the root cause.

Three sites had either inadequate or missing secondary containment for tanks storing petroleum products. One of the major causal factors identified for these deficiencies was the lack of appropriate design of the secondary containment.

4.2.5 Groundwater/Soil, Sediment, and Biota (total: 38 findings)

For this discipline, the Tiger Teams evaluated both the programmatic and technical status of groundwater protection and monitoring as it related to regulations, industry guidance, and best management practices; the environmental monitoring programs of these media; the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and programs and procedures established to prevent future contamination and prevent the spread of contamination from currently contaminated areas to clean areas. Regulations include the requirements of DOE, Resource Conservation Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/SARA, and state regulations.

All identified groundwater program deficiencies fell under Groundwater Protection Management Program (GPMP) and GPMP Plan general requirements, since they comprised the site-wide groundwater management, protection, and monitoring programs. Within the GPMP, the findings can be grouped into 3 performance areas: groundwater monitoring and surveillance; well construction, maintenance, and abandonment; and hydrogeologic characterization.

The performance areas for soil, sediment, and biota findings were soil, sediment, and biota monitoring and surveillance programs and ecological impact/protection. Findings for soil, sediment, and biota were written at 4 of the 5 sites for which assessment was conducted.

Soil, Sediment, and Biota Monitoring and Surveillance Programs (4 of 5 sites, 4 of 32 findings). Four sites had soil, sediment, and biota findings. Programs, plans, and procedures for monitoring and surveillance of soil, sediment, and biota had not been implemented to determine the impact of site operations on the local environment and to meet the requirements of DOE Orders, Federal and state requirements and guidelines, and best management practices.

The findings most frequently identified related to inadequate or informal soil, sediment, and biota monitoring and surveillance programs and plans; sampling procedures that were informal or inadequate to ensure consistency and reproducibility of data; and incomplete characterization of identified or suspected areas of contamination. Three sites had deficient monitoring and surveillance programs. The findings addressed issues including incomplete characterization of background soil conditions and inadequate security surveillance of contaminated areas. One site had inadequate sampling procedures.

Ecological Impact/Protection (1 of 5 sites, 1 of 33 findings). Findings were identified at 2 sites: 1 finding related to ecological sampling and 1 finding related to the lack of wetlands impact and erosion control programs.

4.2.6 Waste Management (total: 83 findings)

For this discipline, the Tiger Teams assessed the current status of hazardous, radioactive, mixed, and solid waste management practices with respect to compliance with RCRA, CERCLA, and state regulations, DOE Orders, site procedures, and best management practices.

For this analysis, 3 performance areas were identified: waste management programs, including waste minimization and waste management program plans, LDR waste, training, vendor oversight, packaging and transportation, and permitting; waste management facilities, consisting of TSDFs, nonhazardous waste facilities, hazardous waste accumulation, emergency planning, and underground storage tanks; and waste characterization, including recordkeeping and waste sampling and analysis. All sites had at least 1 finding in each of the 3 waste management performance areas. Of the 83 findings in this discipline, 75 were CFs and 8 were BMPFs.

The 7 ER sites were all considered large quantity generators of hazardous waste, and they all generated radioactive and mixed wastes. Four of the sites had hazardous waste treatment, storage, or disposal facilities (TSDFs). Five sites had underground storage tanks.

Waste Management Programs (7 of 7 sites, 36 of 83 findings). The ER sites had not fully implemented a hazardous waste management program that included a waste minimization program plan.

No site had a fully implemented waste minimization program plan or had complied with DOE 5820.2A, regarding radioactive waste management. The ER sites had not fully defined roles and responsibilities, policies, procedures, and training requirements. The lack of a formal training program was an issue at

Toxic and Chemical Materials Management (7 of 7 sites, 19 of 42 findings). Site-wide programs to manage the procurement, receipt, tracking, storage, and handling of TCM, and to respond to releases into the environment were informal, inconsistent, and ineffective at the ER sites.

Of the 19 findings, 12 were CFs and 7 were BMPFs. ER sites lacked formal programs and procedures necessary to achieve regulatory compliance and environmental excellence in managing TCM. The lack of programs and procedures gave rise to inconsistent management practices, fragmented lines of responsibility, incomplete training of staff, an increased potential for noncompliance with regulatory requirements, and a greater likelihood of releases of TCM into the environment. Primary areas of concern at ER sites included lack of a comprehensive TCM management program; inadequate storage of TCM, especially incompatible chemicals; lack of secondary containment for bulk storage; and inadequate management of scrap or excess equipment. Findings included deficiencies in asbestos management at 1 site.

PCB Management (6 of 7 sites, 17 of 42 findings). PCB management programs and procedures addressing inventory, labeling, tracking, storage, disposal, and spill cleanup were not formal, comprehensive, or consistently implemented at the ER sites.

Of the 17 findings, 14 were CFs and 3 were BMPFs. Six sites lacked formal, written programs and procedures required to manage the recordkeeping, controls, and spill response requirements for PCBs established under Federal and state regulations. The lack of such formal programs, defined staff responsibilities, and a comprehensive understanding of regulatory requirements resulted in regulatory noncompliance and incomplete control over PCB, PCB-contaminated, and oil-filled items at the ER sites. Key areas of concern included informal or incomplete PCB management procedures; incomplete inventories of PCB equipment onsite, whether owned by the site or local utilities; noncompliant storage for disposal; and inadequate spill response procedures.

Pesticide Management (3 of 7 sites, 3 of 42 findings). Pesticide management programs to effect proper containment, labeling, storage, application, and disposal of pesticides by site staff or subcontractors were not formal or consistent at ER sites.

Of the 3 findings, 1 was a CF and 2 were BMPFs. Findings from the sites indicated that programmatic control for pesticide use and subcontractor oversight was not consistently implemented.

Pollution Prevention Awareness Program Plan (3 of 7 sites, 3 of 42 findings). A fully developed and implemented PPAP Plan, which provides integration of pollution prevention into program planning, training, employee awareness, and incentive programs, was not effectively implemented at ER sites.

The 3 findings were CFs. Three sites were operating without an established PPAP Plan or with a deficient plan, indicating a lack of consistent oversight for DOE requirements.

effective manner. Corrective action programs to monitor remediation of deficiencies were inadequate and did not include the determination of root causes. Inadequate policy implementation was indicated as a causal factor in over 75% of oversight findings.

Sampling and Analysis (6 of 7 sites, 9 of 57 findings). The sampling and analysis performance area addresses the conduct of environmental sampling and analysis as required by DOE 5400.1. ER sampling and analysis activities did not ensure the generation of valid, accurate, and reliable environmental data.

At 6 ER sites, deficiencies were noted in the sampling and analysis program. Findings covered a variety of deficiencies, including inadequate sample chain-of-custody, insufficient workspace, inadequate QC samples, improper calibration using outdated standards, and lack of independent data validation.

The principal causal factors cited in half of these findings were inadequate policy implementation, lack of QA/QC, lack of training, and inadequate consideration of the risk of deficient sampling and analysis.

Reporting (1 of 7 sites, 2 of 57 findings). Reporting requirements are contained in a variety of DOE Orders, such as DOE 5400.1, and are also required by regulations and permits. This category includes such topics as occurrence reporting, annual site environmental reports, and SEN-7 and SEN-7A reporting. Environmental reports from the ER sites were not always complete, accurate, or timely.

Reports were found by the Tiger Team to be incomplete or erroneous. Policy implementation was cited as causal in the compliance findings.

4.2.9 Radiation (total: 39 findings)

For this discipline, the Tiger Teams assessment consisted of evaluating current operational practices and programs to determine compliance status with Federal, state, and local regulations, and DOE Orders. The programs were also reviewed against DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," and against commonly accepted best industry practices and standards of performance.

For this analysis, 6 performance areas were identified: protection of the environment, protection of the public, radiological reporting requirements, radioactive and mixed waste management, radiological emergency planning, and SARs. Of the 39 findings identified, 36 were CFs and 3 were BMPFs. Improvements were needed in environmental surveillance and effluent monitoring activities and demonstration of compliance with National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides.

Protection of the Environment (7 of 7 sites, 17 of 39 findings). Nearly half of the findings in this performance area related to failure to perform adequate airborne and liquid effluent monitoring, adequate environmental surveillance, and preoperational monitoring for new facilities. Other findings addressed the lack of ALARA programs, inability to demonstrate compliance with

For this analysis, 3 performance areas were developed: regulatory compliance, hazardous chemical reporting, and preliminary assessment and site characterization. Of the 41 findings identified, 29 were CFs and 12 were BMPFs.

Regulatory Compliance (6 of 7 sites, 14 of 41 findings). Many sites had not developed written plans and guidelines to comply with the administrative and technical requirements of CERCLA, RCRA, and DOE 5400.4.

Although site investigations and remedial activities occurred at all ER sites, formal, documented guidelines, and procedures had not been established to assist ER environmental personnel in recognizing and understanding applicable CERCLA and RCRA regulations and DOE Orders. Many ER sites had not developed an implementation plan to fulfill the requirements of DOE 5400.4. Specifically, releases of hazardous substances to the environment were not evaluated according to CERCLA provisions. The sites were inconsistent in integrating CERCLA requirements with RCRA corrective action requirements when multiple remediation projects were evaluated under overlapping agencies' control. Formal programs and procedures that outline community relations activities, administrative records, and natural resource damage assessment notification requirements were not established at all ER sites.

Hazardous Chemical Reporting (7 of 7 sites, 14 of 41 findings). Comprehensive, current, and accurate hazardous chemical inventory information had not been submitted to state and local emergency committees for all ER sites, and inadequate procedures had been established to track hazardous chemicals stored at the sites.

Hazardous chemical inventory reporting forms (Tier I and II reports) submitted to emergency committees were not complete (e.g., incomplete reporting of chemical inventories). Appraisals and audits of hazardous chemical inventory reporting were not formalized for the ER sites. Existing inventory and tracking systems were not regularly updated to incorporate new chemicals into the hazardous inventory and annual reporting system. No consistent system existed for tracking and recording hazardous chemicals for SARA Title III reporting, and no formal training programs existed for personnel responsible for coordinating SARA Title III reporting and hazardous chemical inventory tracking. Finally, consistent communication among DOE program offices and the ER sites had not been established to ensure that ER personnel understood and addressed Federal, state, and local requirements.

Preliminary Assessment and Site Characterization (7 of 7 sites, 13 of 41 findings). ER sites did not perform comprehensive preliminary assessments of sites to identify all potential waste disposal locations and environmental concerns. In addition, the ER sites did not develop adequate programs and procedures to consistently and thoroughly characterize identified waste disposal locations according to Federal and state regulations, and DOE Orders.

The ER sites had not developed complete programs or procedures to systematically and consistently identify potential IWSs. Some IWSs had been informally identified; however, other known disposal locations had been excluded from a

Program Incorporation and Implementation (7 of 7 sites, 8 of 36 findings). Inappropriate or inadequate NEPA determinations were found at 2 sites. Memoranda to file were used inappropriately and had not been approved; NEPA determinations were made after the start of a project or by the contractor; NEPA review was deficient; and reporting was deficient or not submitted regularly were noted as findings at individual sites.

NEPA oversight at the ER sites did not result in the enforcement of the DOE requirements for Field Office review of all contractor actions.

Site-wide Policy and Procedures (6 of 7 sites, 8 of 36 findings). The ER sites did not develop comprehensive NEPA plans or policies.

Attempts to standardize NEPA controls and procedural methods were erratic. In many instances, no environmental assessments were conducted or no environmental impact statements were issued for site projects. Most sites did not have a process to define how the site would comply with NEPA.

Guidance and Training (3 of 7 sites, 5 of 36 findings). Lack of training prevented the efficient use of staff resources. Guidance from ER and/or the Field Offices and inadequate training was listed as the most common causal factor for NEPA-related findings.

Tracking and Recordkeeping (4 of 7 sites, 4 of 36 findings). An integrated system for tracking status and determining NEPA activities did not exist.

4.3 SAFETY AND HEALTH

The purpose of this section is to summarize noteworthy practices, key concerns, and concerns in the Safety and Health (S&H) perspective when the 7 ER Tiger Team Assessments were conducted.

The subdivisions of this section begin with noteworthy practices (4.3.1), key concerns (4.3.2), and Category I and II concerns (4.3.3). The subdivisions that follow (4.3.4 through 4.3.24) discuss findings from the 7 ER assessments by discipline.

The S&H perspective includes 20 disciplines: organization and administration (4.3.4), quality verification (4.3.5), operations (4.3.6), maintenance (4.3.7), training and certification (4.3.8), auxiliary systems (4.3.9), emergency preparedness (4.3.10), technical support (4.3.11), packaging and transportation (4.3.12), nuclear criticality safety (4.3.13), security/safety interface (4.3.14), experimental activities (4.3.15), site/facility safety review (4.3.16), radiological protection (4.3.17), personnel protection (4.3.18), worker S&H (OSHA) compliance (4.3.19), industrial hygiene (4.3.20), fire protection (4.3.21), medical services (4.3.22), and occupational safety (4.3.23). Some sites were not assessed in all disciplines. When a site has not been assessed in a particular discipline, this fact is noted in the analysis.

identified noncompliance; missing, deficient, or ineffective programs; ineffective oversight by DOE; and ineffective contractor management system or organizational structure.

Identified Noncompliance with DOE Orders, OSHA Requirements, Consensus Standards or Site Procedures. (7 of 7 sites, 14 of 54 key concerns). Noncompliance with DOE Orders and other mandatory requirements was identified at the 7 sites evaluated within ER. Key concerns at these sites cited both specific noncompliance issues, such as with a certain OSHA requirement, and broader issues such as general noncompliance with DOE Orders and requirements. For example, 3 of the 7 sites were cited as having "widespread" noncompliance with DOE Orders.

Missing, Deficient, or Ineffective S&H Programs and Program Documentation. (6 of 7 sites, 20 of 54 key concerns). At the ER sites, inadequate S&H program documentation or implementation resulted in one or more key concerns. Training and quality assurance program deficiencies accounted for 7 of the 20 key concerns. Most concerns in this area addressed a specific issue.

Ineffective Contractor Management System or Organizational Structure. (6 of 7 sites, 18 of 54 key concerns). This performance area contains key concerns relating to deficiencies in contractor management. Several key concerns relate to management's failure to define and communicate authorities and responsibilities related to S&H issues. More than one-half relate to organizational communications problems.

Ineffective oversight by the DOE. (2 of the 7 sites, 2 of 54 key concerns). The DOE Field Offices for 2 sites were cited for not providing the level of oversight required by DOE Orders or to ensure that identified site deficiencies were corrected in a timely manner.

lockout/tagout issues, and hazard communication. One site was cited for 2 Category I concerns and had almost 3 times the number of Category I and II concerns of any other ER site.

Radiological Protection (3 of 7 sites, 9 of 52 Category I and II concerns). Of the 9 Category I and II concerns, only 1 common element was observed: dosimetry programs at 2 sites did not meet DOE requirements and American National Standards Institute (ANSI) standards.

Maintenance (3 of 7 sites, 5 of 52 Category I and II concerns). The common theme in these Category I and II concerns was that the sites were not using effective procedures or practices for lockout/tagout during maintenance activities.

Fire Protection (2 of 7 sites, 5 of 52 Category I and II concerns). A common element at sites was that the fire protection programs did not comply with the National Fire Protection Association (NFPA) Life Safety Code.

Emergency Preparedness (4 of 7 sites, 4 of 52 Category I and II concerns). The common elements of these Category I and II concerns noted that the ER sites did not have complete programs, plans, or organizations to respond to emergency situations as required by DOE Orders.

Personnel Protection (3 of 7 sites, 3 of 52 Category I and II concerns). In 2 of the Category I and II concerns, personnel protection programs did not fully meet the requirements of DOE.

Industrial Hygiene (2 of 4 sites, 3 of 52 Category I and II concerns). Two concerns (1 at each site) noted issues with the confined space programs. In 1 case, no training was provided to personnel entering confined spaces. The second concern documented deficiencies in the overall confined space program.

4.3.4 Organization and Administration (total: 98 concerns)

For this discipline, the Tiger Teams reviewed organization, management, and administration at the site/facility level for effectiveness in ensuring safety and health for all personnel. Management objectives, corporate interest and commitment, monitoring of facility activities, personnel programs, fitness for duty programs, and document control systems were assessed for their ability to support a safe working environment.

For this analysis, 5 performance areas were identified: site safety, management oversight, formal definition of authority and responsibility, recordkeeping and reporting, and policies and procedures.

Site Safety (7 of 7 sites, 37 of 98 concerns). Safety programs did not ensure that all elements of site safety were implemented as required by DOE Orders.

Safety meetings were not held regularly, and safety information was not shared as a means of promoting safe operations at 1 site. At 5 sites, management had not consistently set definitive and measurable safety goals. Goals were not updated annually at all sites. Oversight of safety operations and resources to implement safety procedures and programs were not consistently supplied and allocated at 6 sites. Safety performance of staff was not consistently reviewed and included in performance appraisals at 5 sites. At 6 sites, substance abuse and fitness for duty programs were not implemented or understood. One site was reported to not have historically demonstrated a commitment to safety as required by DOE Orders.

Management Oversight (7 of 7 sites, 21 of 98 concerns). Management had not consistently provided oversight and administrative controls needed to ensure compliance with DOE Orders.

Management had not consistently provided oversight of operations at all sites as required by DOE Orders. Several Field Offices did not consistently or effectively provide oversight of some of its sites. Also, at 1 site, management could not ensure that programs for hazard recognition, evaluation, and control were reviewed by independent safety oversight functions; 3 sites did not have approved, institutionalized plans and programs for performing ongoing self-assessments as required by SENs and letters and by DOE Orders. Management did not effectively communicate and implement S&H goals at 3 sites.

Formal Definition of Authority and Responsibility (5 of 7 sites, 14 of 98 concerns). Sites did not consistently define authority and responsibility of organizations and staff needed to ensure compliance with DOE Orders.

Site management at the 5 sites had not assigned responsibilities or delegated authorities to ensure S&H in such areas as stop work authority. In addition, job qualification reviews, including safety responsibility explanation, were not consistently implemented at 3 sites.

reviewing procurement of items and services, for controlling computer software, for performing corrective actions, for calibrating instruments, for training inspectors, for controlling special processes, for managing records, and for enforcing compliance with DOE Orders. Another main area of concern was the lack of implementation of the Assistant Secretary's requirements regarding suspect/counterfeit parts.

Procedures (5 of 7 sites, 22 of 115 concerns). Some ER procedures to verify quality were lacking or did not meet DOE requirements.

Areas of concern included use of draft unapproved procedures for conduct of activity; inattention to existing procedures; and unauthorized revisions of procedures. Another area of concern was the lack of procedures to implement corrective actions, to provide documentation and independent evaluation of inspection results, to identify and control the use or disposition of items, and to ensure that incorrect or defective items are not used.

Audits and Oversight (6 of 7 sites, 21 of 115 concerns). ER oversight did not adequately measure the effectiveness of QA programs.

Areas of concern included lack of formal QA audits and self-assessments by Operations Offices, Site Offices, or contractors; lack of independent verification that inspections comply with DOE Orders and industry practices; and inadequate oversight of contractors' activities and special processes. Other areas of concerns were lack of periodic independent analysis of suppliers' material certifications, failure to use audit and discrepancy reports to track trends, and inadequate identification and control of nonconforming material and equipment.

Materials and Process Control (5 of 7 sites, 18 of 115 concerns). Some ER materials and controls processes did not meet the DOE and NQA-1 requirements.

Areas of concern at some sites included lack of the following: document control and secure record storage, inspection of procured materials for design conformance, properly equipped storage facilities for certified or controllable materials, adequate laboratory facilities, traceability of materials to their procurement and certification records, maintenance and calibration of instruments and measuring and testing devices, and identification of items not meeting design requirements. Also cited were plant modifications without safety analyses, use of uncontrolled special materials, and use of out-of-tolerance measuring and test equipment.

Training and Certification (4 of 7 sites, 5 of 115 concerns). Not all processes at the ER sites were conducted by qualified personnel according to DOE or NQA-1 requirements.

Areas of concern included lack of training for QA personnel, lack of training of plant personnel in quality achievement and QC program requirements, and inadequate training and certification of safety surveillance inspectors and

and systems. Some activities were not conducted safely and reliably. In addition, at 2 sites, lists of authorized, qualified personnel to perform certain tasks were not maintained.

Documentation of Operations (2 of 7 sites, 6 of 61 concerns). For 2 sites there were concerns relating to inadequate documentation of operations. Examples of concerns in this performance area include: entering information into operating logs without sufficient detail and accountability and maintaining incomplete records of temporary alterations.

Work Practices (1 of 7 sites, 2 of 61 concerns). At 1 site, safety equipment was being operated improperly which resulted in a concern. At this same site interlocks were not being tested in compliance with DOE requirements.

Evaluation and Analysis (1 of 7 sites, 1 of 61 concerns). Planned review and approval process to comply with DOE 5480.19 had not been established at 1 site.

4.3.7 Maintenance (total: 63 concerns)

For this discipline, the Tiger Teams reviewed maintenance organization and administration for appropriateness and effectiveness; safe conduct of maintenance activities; proper facilities, equipment, and materials, including effective parts and material control and procurement procedures; planning, scheduling, and control of work to ensure timely, safe completion of maintenance; corrective and preventive maintenance to ensure optimum performance and reliability of systems and equipment; use of historical records and root cause analyses for predictive maintenance; and appropriate procedures and related documents to support safe, effective maintenance activities.

For this analysis, 5 performance areas were identified: programs and procedures; unsafe conditions, practices, and equipment; planning, scheduling, and controlling work; equipment maintenance; and worker qualifications and responsibilities. The ER concerns were sorted into the first 4 performance areas.

Additional programs needed to be established and the implementation of existing programs through increased oversight needed to improve.

Programs, Policies, and Procedures (7 of 7 sites, 34 of 63 concerns). Development and implementation of policies, programs, and procedures did not fully meet the requirements of DOE and OSHA.

All of the ER sites had deficiencies in maintenance programs, policies, and procedures. The recurring concerns indicated incomplete programs, policies, and procedures and insufficient implementation. Deficient programs included lockout/tagout, predictive maintenance, and preventive maintenance. Concerns regarding predictive and preventive maintenance ranged from a lack of program implementation to missing program elements of the programs. Inadequate inspections also contributed to this concern. In some instances, programs,

Training and certification programs did not always meet DOE requirements. Some or all required elements of existing programs were informal and undocumented. Some training and certification programs were not developed as required by DOE and OSHA. At some sites with training and certification programs, qualification requirements based on assigned job tasks were not defined. Maintenance, radiation protection, and QA training and certification programs were routinely identified as being deficient. Deficiencies were noted in S&H training and certification programs mandated by 29 CFR 1910, and DOE Orders.

Training and Certification Records (6 of 6 sites, 8 of 58 concerns). Training and certification records at the ER sites were not complete and did not support the training and certification that had been completed.

Training and certification records at 3 ER sites were not being properly maintained. The Tiger Teams could not verify that DOE and other requirements were completely addressed by training and certification programs. Records were not kept for every employee or subcontractor and were not stored in central filing or database. For the records that were kept, examination scores and on-the-job training experiences were not documented in many cases.

DOE Field/Area/Site Office Training and Certification (3 of 6 sites, 6 of 58 concerns). DOE Field/Area/Site Office training and certification did not fully prepare personnel for their S&H oversight responsibilities.

At 2 sites, concerns were identified in DOE training and certification programs. Two basic issues identified were (1) incomplete and informal S&H training and certification programs and plans for DOE personnel and (2) lack of oversight of contractor training and certification programs.

Management of Training and Certification Programs (3 of 6 sites, 6 of 58 concerns). Training and certification programs at one ER site were not effectively managed and did not have a properly defined scope to ensure that DOE policies and requirements were achieved.

At 1 site, the design, development, conduct, and evaluation of training and certification programs did not meet industry, DOE, or OSHA standards. The site did not have any training goals and policies or any associated implementing procedures or standards.

Training and Qualification Exams (2 of 6 sites, 4 of 58 concerns). Training and certification examinations at the ER sites were not always conducted. When conducted, they did not fully meet DOE policies and requirements.

At 2 sites, the examination and certification process did not ensure that a defined level of proficiency was achieved. Written examinations were not always conducted, and oral exam results were not documented. Examinations did not test for overall proficiency of the subject matter.

Training Facilities and Equipment (2 of 6 sites, 3 of 58 concerns). Training facilities and equipment did not meet the training needs of the sites.

effluent pathways. One site did not have a formal program to ensure that ventilation systems were properly balanced and operated, and not all high-efficiency air filter installations were tested for proper operation in accordance with American Society of Mechanical Engineers (ASME) N510-1989.

Emergency Power Systems (4 of 7 sites, 4 of 36 concerns). Formal programs were not in place to monitor training and operation requirements for emergency power equipment.

Emergency diesel generators at 2 sites were not tested in compliance with NFPA 110, and no assurance was provided that emergency electrical power systems met full-load power requirements.

4.3.10 Emergency Preparedness (total: 97 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the emergency plan and its implementing procedures; emergency response training; drills and exercises, emergency facilities, equipment, and resources; and personnel protection procedures. Organization and administration of emergency preparedness programs were evaluated for their ability to ensure effectively planning for and response to site/facility emergencies.

For this analysis, 5 performance areas were identified: compliance, management support, facilities and resources, training, and drills.

Compliance with Federal and DOE Requirements (7 of 7 sites, 42 of 97 concerns). Programs or elements of programs required by DOE Orders were missing or not fully in place.

Emergency preparedness programs were either nonexistent or had sufficient deficiencies in the existing programs to render them ineffective at 6 of the 7 sites. Personnel protection programs for emergency response personnel were missing or noncompliant with DOE Orders 5500.3A and 5480.10. Programs for personnel accountability were incomplete or ineffective at 3 sites.

Management Support for Programs (7 of 7 sites, 22 of 97 concerns). Management support, resource allocation, and communication with internal and external emergency response organizations were insufficient to ensure compliance with DOE Orders.

Greater management attention was needed to maintain the current level of preparedness and to achieve desirable improvements in emergency preparedness. Six sites needed to provide the required self-assessments of emergency preparedness capability at the sites and site-wide hazards assessment, and 5 sites needed to track and resolve emergency preparedness deficiencies in a timely manner. Three sites needed to develop methods for prompt initial notification of emergency response personnel and for initial and follow-up notification to offsite organizations.

Regulatory Compliance (5 of 6 sites, 14 of 46 concerns). The content and the format of reports, analyses, and procedures often did not comply with DOE regulations.

Technical specifications were not prepared in a consistent manner and often were not in full compliance with DOE 5480.6. There were several procedures concerning the development of safety analysis reports that were not in compliance with DOE regulations. Safety documents and reports were not always available for technical support personnel.

Safety-Related Issues (5 of 6 sites, 12 of 46 concerns). Safety procedures and documents did not address the spectrum of safety issues.

Most concerns centered around the lack of control over developing the safety procedures and documentation. Safety documentation did not identify or describe all safety systems, and approved safety documentation and procedures were not readily available to technical support personnel. Approved operation and safety requirements were not in place for facility operations, and ER program sites did not document evaluations concerning the adequacy of existing safety documentation. Equipment performance testing and monitoring programs did not address all safety-related equipment, and safety-related equipment was tested without proper procedures by personnel without documented qualifications.

Facility Modifications (6 of 6 sites, 12 of 46 concerns). Facility modifications at the sites were made without appropriate reviews and/or documentation.

Modifications to facilities that impact safety-related issues often were not controlled. The program sites had not systematically identified the codes and standards applicable to design of facilities and systems as required by DOE regulation. Engineering design activities were performed by personnel not qualified by training or experience. Technical and interdisciplinary reviews of designs and design changes were not reviewed formally and were not documented.

Policies and Procedures (4 of 6 sites, 8 of 46 concerns). ER program sites lacked formal policies on developing and using operational procedures.

Training programs to maintain technical skills for support personnel were not in place. Operating and maintenance procedures were not routinely reviewed by technical support and other organizations. Many support organizations did not have written procedures for design and analysis activities. Programs to assess the need for operational readiness reviews were not developed, and formal procedures to conduct such reviews were not implemented. No procedures were in place to document the test of particulate air filters to verify their effectiveness as required by DOE regulation. Some ventilation exhaust streams that contain hazardous materials were not monitored. Current air sampling practices did not ensure accuracy of radioisotope release data; and no structured program existed for compiling, trending, and evaluating relevant equipment performance data.

Training and Certification (6 of 7 sites, 8 of 79 concerns). Training and certification of ER personnel involved in packaging and transporting hazardous materials did not fully comply with DOE Orders and Department of Transportation (DOT) regulations.

Three sites had no training programs and 3 were missing parts of training programs. Other concerns noted a lack of effectiveness of the training provided, and some employees had not received required training.

4.3.13 Nuclear Criticality Safety (total: 18 concerns)

For this discipline, the Tiger Teams reviewed the appropriate use of safety control parameters to achieve nuclear criticality safety; the conduct of evaluations to ensure that the design and operation of process equipment will maintain subcriticality; the inclusion of criticality safety limits in approved operation procedures; and the planned mitigation of the consequences of a nuclear criticality accident.

For this analysis, 2 performance areas were identified: criticality safety procedures and monitoring, and oversight and nuclear criticality safety programs.

Criticality Safety Procedures and Monitoring (2 of 2 sites, 10 of 18 concerns). Nuclear criticality safety procedures did not fully comply with DOE requirements.

Documentation of required safety analysis for nuclear criticality safety at 1 site did not comply with DOE Orders and good industry practice and did not receive the required level of review. The required posting of mass limits at this site also was lacking. Criticality alarm systems at that site did not satisfy all calibration and maintenance requirements of DOE Orders and good industry practice. The site failed to satisfy all DOE requirements for nuclear criticality emergency response planning. Both sites in this performance area did not meet all DOE requirements from written procedures concerning criticality control.

Oversight and Nuclear Criticality Safety Programs (2 of 2 sites, 8 of 18 concerns). Site management had not fully implemented nuclear criticality safety policies and procedures to provide effective control during all activities.

Contractor management at 1 site did not have a records control system that fully complied with DOE requirements. Management of 1 site had not initiated an independent review and appraisal system to satisfy all nuclear criticality safety requirements of DOE Orders. In addition, operations at 1 site were initiated without appropriate nuclear safety review. The local DOE Field Office failed to provide oversight and support functions for criticality safety at 1 site.

For this analysis, 4 performance areas were identified: experiment categories/reviews; experiment proposals/planning; risk assessment and operation of experiments, and experimenter training, roles, and responsibilities. One concern did not fit into a performance area.

Experiment Categories/Reviews (4 of 6 sites. 8 of 20 concerns). Proposed experiments were not formally approved through an independent safety review before they were performed.

The concerns were associated with problems in experimental plans receiving a formal and unbiased review. At several sites, documented policies and procedures were lacking for the experimental review process. In some cases, reviews were not documented with formal approval issued to the experimenters for commencement of work.

Experiment Proposals/Planning (3 of 6 sites, 6 of 20 concerns). Experimental plans were insufficient to permit a complete safety evaluation to be made.

All the concerns reflected a lack of guidance for experimenters and/or reviewers to prepare and evaluate experimental plans.

Risk Assessment and Operation of Experiments (2 of 6 sites, 3 of 20 concerns). Experiments performed on the site did not receive a thorough risk evaluation to ensure that an undue risk or significant increase in risk was not present.

The concerns were associated with problems determining risk in experimental plans. At 2 sites, the safety offices did not routinely conduct random safety surveillance of experimental activities. In another case, operating procedures for equipment allowed the normal operator to relinquish control of the system to an experimenter without additional safeguards and assurance that the system (spectrometer) was returned to normal operating conditions.

Experimenter Training, Roles, and Responsibilities (2 of 6 sites, 2 of 20 concerns). Roles and responsibilities of experimenters were not clearly defined and understood, and the experimenters were inadequately trained to perform all functions expected.

The concerns were associated with problems in defining and training the experimenters in their roles and responsibilities. At 1 site, no documented delegation of responsibilities existed for safety review and oversight. At another site, no disciplined system was in place for training experimenters in S&H as required.

4.3.16 Site/Facility Safety Review (total: 35 concerns)

For this discipline, the Tiger Teams reviewed the availability of a Safety Review Committee; the clear definition and understanding of items to be reviewed by the Committee; the degree of safety resulting from the Committee's reviews; and the performance of an annual operating review of each facility, triennial appraisal of the safety review system, and operating experience reviews to improve safety and reliability.

high external exposure scenarios. Additionally, 1 site had a concern regarding external dosimetry practices not being in full compliance with DOE Orders. Five sites had not fully implemented internal radiation dosimetry programs with documented procedures and policies as required by DOE Orders.

Radiological Monitoring (7 of 7 sites, 39 of 146 concerns). Instrumentation used for radiological monitoring did not fully meet DOE requirements.

At 6 sites, programs to inventory, track, and calibrate fixed and portable radiation survey instruments had not been fully implemented as required by DOE Orders. Most sites did not have contamination monitoring programs that met DOE requirements. One site had 2 concerns relating to both of these issues.

Oversight of Radiological Protection Programs (6 of 7 sites, 31 of 146 concerns). Management at most sites did not fully implement DOE policies and requirements.

Contractor management at 6 sites had not fully delineated authorities, responsibilities, and/or operating policies and procedures for radiological protection. Although the seventh site did not have specific oversight concerns in the radiological protection discipline, it had 12 oversight type findings relating to radiation protection that were moved to the organization and administration section of the Tiger Team report. Therefore, effectively all 7 ER sites had oversight concerns.

Independent audits and management reviews at these sites were generally lacking. Further, ALARA programs were not fully implemented. One site's failure to report or improve a prolonged operation in violation of DOE Orders resulted in a Category II concern.

Exposure Control Programs (7 of 7 sites, 22 of 146 concerns). External and internal radiation exposure control programs did not fully comply with DOE requirements.

All 7 sites had deficiencies in their exposure control programs. One site had a concern relating to a high external exposure potential at its instrument calibration facility. Three sites had deficiencies in their external radiation exposure control programs. Further, 6 sites had concerns in their internal radiation exposure control programs. Several sites did not meet DOE requirements for contamination control or did not take a proactive health physics approach in work areas where internal intakes were possible.

Additionally, several sites had not demonstrated that placement of fixed air sampling equipment would ensure compliance with established DOE-derived air concentration limits. Three sites had exposure records programs that did not comply with DOE requirements.

4.3.18 Personnel Protection (total: 76 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the personnel protection program;

Programs were ineffective at identifying, controlling, enforcing, and developing corrective action strategies for construction safety concerns such as electrical safe work practice, excavation safety, and operation of motorized vehicles.

S&H Management Systems (6 of 6 sites, 16 of 76 concerns). The ER sites had not developed effective S&H management systems.

The ER sites had not allocated enough technically qualified individuals in critical S&H positions. Roles and responsibilities were not defined; authority (including stop work) and accountability were not assigned between and among line management, QA departments, and ES&H divisions to ensure proactive rather than reactive management of S&H. Several programs (e.g., respiratory protection, industrial hygiene monitoring, approval of safe work permits, construction safety oversight, confined space operations) could not be effectively implemented because program administrators and supervisor were not assigned, trained, or given authority over affected workers. Technical support often was available only as needed, with no system to ensure that all S&H issues as well as all regulatory requirements were identified and adequately addressed.

Program Implementation and Training (6 of 6 sites, 10 of 76 concerns). Implementation of existing programs, policies, procedures, and work practices did not fully comply with Federal and DOE requirements.

The Tiger Teams identified incomplete implementation of, or weak enforcement of, existing industrial hygiene monitoring programs for chemical, physical, biological, and environmental hazards at 3 sites. Industrial hygiene activities were conducted by untrained, unqualified individuals, and activities were conducted infrequently and improperly. In several instances qualified S&H professionals were not provided the opportunity to pursue/maintain their levels of competency. One concern identified a lack of an effective mechanism to inform line management and workers of the hazards of their activities; this resulted in a lack of basic hazard identification and control as well as noncompliance with various Federal and DOE requirements.

Data Management and Information Transfer Systems (4 of 6 sites, 4 of 76 concerns). The ER sites neither maintained easily accessible data management systems nor fully complied with DOE and OSHA requirements for access to employee information.

Four sites had ineffective data management systems and information transfer policies concerning standard operating procedures, medical monitoring records, accident reports, and industrial hygiene monitoring data. This ineffectiveness created difficulty in accessing data, defending data, and reporting that information to employees, Federal agencies, and DOE in a timely manner. Undefined and enforced policies for communication between line management and medical services resulted in delayed, incomplete, and obviated reporting of medical information. Similar problems existed in transferring industrial hygiene and safety information between line management and other segments of the organization.

to accomplish the objectives of the programs. The lack of effective training was indicated by the unsafe practices found at 1 site with ladder use, trenching activities, and compressed gas handling activities; at another site with use of worn lifting and sling equipment; and at another site with unsafe welding activities.

Safety and Health Management Systems (2 of 7 sites, 3 of 87 concerns). ER had not developed effective S&H management systems.

Two sites had not defined overall S&H goals, objectives, and priorities or developed performance indicators. Management had not established effective roles, and responsibilities or assigned authority and accountability. The sites failure to identify all regulatory requirements and to designate qualified program administrators was a causal factor for many of the concerns.

4.3.20 Industrial Hygiene (total: 27 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the industrial hygiene program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure industrial hygiene performance; compliance with DOE-prescribed standards for occupational health; and the adequacy of information communicated to site/facility personnel about chemical, physical, and biological stresses that may be encountered in the work environment.

For this analysis, 4 performance areas were identified: administrative programs; hazard identification, evaluation, and control; staffing, resources, administration, and oversight; and information management, records, and documentation. Two concerns did not fit into a performance area; the remaining ER concerns were sorted into the first 3 performance areas. Only 4 of the 7 ER sites were assessed in this discipline.

Administrative Programs (4 of 4 sites, 16 of 27 concerns). Programs designed to mitigate employee exposures to occupational health hazards and minimize occupational illnesses and injuries were inadequate or not effectively implemented.

An overall weakness existed in developing and/or implementing administrative programs designed to minimize occupational S&H hazards. Significant deficiencies were noted in the respiratory protection program and confined space entry programs at all 4 sites. At 2 sites, the confined space entry programs was a concern. Three sites had not fully implemented an effective carcinogen control program, and the fourth site had not implemented a chemical hygiene plan.

Hazard Identification, Evaluation, and Control (4 of 4 sites, 5 of 27 concerns). The identification, evaluation, and control of occupational health hazards did not meet DOE or OSHA requirements and objectives.

Fire Protection Programs and Policies (4 of 7 sites, 14 of 83 concerns. One site received half of the total concerns. The focus of the concerns lay in the inadequacies of the current programs to provide a comprehensive fire protection program at the DOE sites. The program and policy inadequacies included those associated with fire protection manuals and meeting NFPA standards.

Life Safety Code Compliance (7 of 7 sites, 11 of 83 concerns. Life Safety Code concerns were noted at each site. Current programs were found to be inadequately implemented and enforced with exceptions to the current standards noted for several issue areas.

Fire Protection Organization and Administration (5 of 7 sites, 8 of 83 concerns). The concerns in this performance area focused on the lack of management support for existing fire protection programs and the lack of direct lines of communication to the senior managers at the DOE sites.

Training and Resources (4 of 7 sites, 6 of 83 concerns. Insufficient resources were allocated to fire protection programs to adequately protect DOE contractor personnel and DOE property. The first protection force was not provided the level of training required to maintain maximum effectiveness.

4.3.22 Medical Services (total: 27 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the organizational and administrative implementation and control of the medical services program; the appropriateness of procedures and documentation; the availability and adequacy of medical treatment and facilities and competency of staff; the effectiveness of reviews and audits; and the adequacy of information provided to personnel about the medical hazards that may be encountered and the medical services that are available.

For this analysis, 6 performance areas were identified: medical program design, staffing/training, management support, medical facilities and equipment, procedures and documentation, and review/audit. The ER concerns were sorted into the first 5 performance areas.

Medical Program Design (6 of 6 sites, 12 of 27 concerns). The focus of the concerns was on the lack of medical programs that meet internal and external standards, including frequency and scope of examinations based on the potential workplace exposures.

Staffing/Training and Awareness (6 of 6 sites, 7 of 27 concerns). The concerns focused on the lack of staff to provide the needed medical care. Staffing levels were found to be below the minimum requirements at the sites, and 1 site was lacking the training and awareness programs needed to make its medical programs effective.

Management Support (2 of 6 sites, 3 of 27 concerns). The concerns focused on the lack of management support for the medical programs and the need to have the support to ensure that adequate services are being provided.

SYNOPSIS: FOSSIL ENERGY (FE)

The Office of the Assistant Secretary for Fossil Energy (FE) is responsible for R&D programs involving fossil fuels--coal, petroleum, and gas. The FE program involves applied research, exploratory development, and limited proof-of-concept testing targeted to high risk and high payoff endeavors. Six FE facilities' Tiger Team Assessments are covered in this report: Morgantown Energy Technology Center, Pittsburgh Energy Technology Center, the Naval Petroleum Reserves in California, the Strategic Petroleum Reserves, National Institute for Petroleum and Energy Research, and the Naval Petroleum Oil Shale Reserves.

This synopsis briefly describes the findings from the analysis of the 6 FE sites from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). These perspectives are discussed in more detail in the following chapter.

MANAGEMENT AND ORGANIZATION (FE)

Seven of the 11 root causes focused on the need to move the culture and attitude of facility management closer to the ES&H standards established by the Secretary; this was indicated by a lack of formal management systems and the necessary leadership and guidance in ES&H.

Of the 21 key findings, frequently identified areas were lack of formality and rigor in program evaluation (6 key findings), inadequate or nonexistent strategic planning for ES&H (6 key findings), deficiencies in training programs and inadequate skill mix (4 key findings), and the lack of formal ES&H programs and procedures (3 key findings).

The 99 M&O findings were concentrated in 5 of the 7 disciplines. In formality of operations (30 findings), the central issue at all sites was incomplete or nonexistent programs to carry out ES&H missions. In resources and training (18 findings), the Tiger Teams noted that no sites had comprehensive ES&H training programs and that 5 of 6 sites had not planned for adequate human resources in ES&H. The disciplines of organizational structure and program evaluation each had 14 findings, indicating a lack of formal, comprehensive definition and communication of roles, responsibilities, and authorities; and a lack of evaluation programs, procedures, and tools, for example, audits, self-assessment, and Cost Plus Award Fee (CPAF) programs. From 2 to 11 self-assessment findings per site were identified.

ENVIRONMENT (FE)

For the 6 FE sites, the Tiger Teams identified 19 key findings.

- FE sites lacked effective programs to provide environmental protection for air, water, or soil.

Compliance issues contributed only 4 key concerns. Compliance issues addressed deficiencies such as general noncompliance with Occupational Safety and Health Administration (OSHA), failure to provide an effective emergency preparedness program as required, and overall noncompliance with DOE Orders.

Of the 759 concerns for the FE sites, 68 were Category I or Category II concerns. Category I and II concerns were identified in 12 of the 20 performance areas. Worker S&H (OSHA) compliance and occupational safety contributed half the Category I and II concerns, a total of 34; maintenance and emergency preparedness accounted for 8 Category I and II concerns each, with the remaining Category I and II concerns spread fairly evenly over 8 other disciplines. Frequently identified Category I and II concerns included noncompliance with electrical safety standards, lockout/tagout deficiencies, programs that did not properly control confined space entry, dangerous conditions at work sites caused by lack of maintenance, and incomplete programs and structures to respond to emergency situations.

Safety of personnel was a major focus of the 759 concerns; 168 concerns were classified in the related disciplines of worker S&H (OSHA) compliance, personnel protection, industrial hygiene, and occupational safety. Programs were missing, inadequate, or not implemented. Training, staffing, and communication were also problems needing correction by the sites.

Other major clusters of concerns were in organization and administration (77 concerns), maintenance (70 concerns), quality verification (56 concerns), emergency preparedness (56 concerns), and packaging and transportation (55 concerns). Problems that were reported repeatedly included lack of oversight and active management in S&H-related areas in general and maintenance in particular; lack or non-implementation of quality verification programs and oversight (including corrective action in materials and process controls); pervasive deficiencies in emergency preparedness programs, facilities, and resources; and noncompliance with DOE and Department of Transportation (DOT) packaging and transportation standards, including concerns about hazardous materials and subcontractor responsibilities. The lack of programs, procedures, training, and resources was also identified in medical services (45 concerns) and operations (44 concerns).

5.0 FOSSIL ENERGY

This review and summary of the 6 Fossil Energy (FE) sites is part of a larger analysis focused on the final 19 Tiger Team Assessments. The 6 FE sites are as follows:

- Morgantown Energy Technology Center (METC)
- Pittsburgh Energy Technology Center (PETC)
- Naval Petroleum Reserves in California (NPR)
- Strategic Petroleum Reserves (SPR)
- National Institute for Petroleum and Energy Research (NIPER)
- Naval Petroleum Oil Shale Reserves (NPOSR)

Following the Tiger Team methodologies and categories, this analysis discusses the findings/concerns from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings/concerns are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 20 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, findings, and root cause analysis are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns, Category I and II concerns, and concerns are discussed. Category I concerns are those that address a "clear and present" danger to people; Category II concerns address significant risk or substantial noncompliance with DOE Orders.

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each TTA discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area give 2 sets of information. The first set of numbers indicates the number of sites having a finding(s) or concern(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (3 of 6 sites, 4 of 16 concerns)

TABLE 5.1. Summary of M&O Key Findings for FE Sites

M&O Key Finding Discipline	METC	PETC	NPR	SPR	NIPR	NPOSR	TOTAL
Program Evaluation	1	1	1	1	1	1	6
ES&H Planning	0	1	2	1	1	1	6
Formality of Operations	1	0	1	0	1	0	3
Resources and Training	0	1	1	0	1	1	4
ES&H Program Commitment	1	0	0	0	0	0	1
Organizational Structure	0	0	0	1	0	0	1
TOTAL	3	3	5	3	4	3	21

5.1.3 Key Findings (total: 21 key findings)

Key findings, summarized in Table 5.1, were evaluated to determine whether any common trends existed in the characteristics that define key findings, so that FE can use this knowledge in planning its strategy to achieve ES&H excellence. In evaluating the FE M&O key findings, each M&O key finding in each FE Tiger Team Assessment report was reviewed, analyzed, and sorted according to similar themes. M&O key findings typically represent a synthesis of many issues. In sorting the key findings, the overriding issue being communicated was determined, and the key finding was then assigned to a performance area. The sorting was conducted using the M&O disciplines and their respective performance areas.

Program Evaluation (6 of 6 sites, 6 of 21 key findings). Key findings included 1 in self-assessment and 5 in audits, appraisals, and surveillance. The key findings indicated that 1 facility did not have a well-designed program for corrective action followup and closure. Three of the audit program's key findings focused on the lack of program formality and the need for directives, while 2 key findings focused on the need to increase audit frequency and scope to ensure the effectiveness of the program.

ES&H Planning (5 of 6 sites, 6 of 21 key findings). Key findings included 1 in budgeting and 5 in planning. The deficiency that was most commonly noted was inadequate or nonexistent strategic planning documents. If the document existed for the site, it did not have components devoted to the short- and long-term strategic planning for attaining and maintaining ES&H excellence, and did not adequately address ES&H needs in the integrated planning process.

Resources and Training (4 of 6 sites, 4 of 21 key findings). Key findings included 3 in training and 1 in resources, focusing on the need to have a more formal, comprehensive training programs for ES&H activities. The resource issue addressed the lack of skills mix to competently carry out the ES&H duties at the site.

Roles, Responsibilities, and Authorities (6 of 6 sites, 14 of 14 findings). Thirteen findings identified a lack of defined roles, responsibilities, and authorities among the many organizations involved in various FE activities, programs, and sites, including non-ES&H functions with potential ES&H impacts, and to a lesser degree, the ES&H function. Specifically, recurring deficiencies in stop/restart authorities and procedures and independent ES&H oversight were observed. Also, recurring deficiencies were related to overall coordination of roles and responsibilities among the many organizations and contractors associated with individual sites. Less frequently identified problems in roles and responsibilities were noted in managing corrective actions, the NEPA process, QA, training, and site safety. One finding related to the stop/restart work process, which was well defined but not well understood.

5.1.5 ES&H Program Commitment (total: 8 findings)

For this discipline, the Tiger Teams assessed the commitment to excellence demonstrated by formal ES&H policy, top management support, and line responsibility. The existence and content of ES&H policy were evaluated, including issuance of formal environmental policy statements that reflected the site's goals, guidance to attain those goals, and the commitment of senior management. Top management support was assessed based on demonstration of commitment to programs and performance. Line responsibility was evaluated based on the sense of responsibility demonstrated by managers and operating personnel.

For this analysis, 2 performance areas were identified: management support and ES&H policy.

Analysis indicated the need to improve ES&H policy guidance to ensure consistent understanding and implementation. In addition, management support for ES&H programs needed to be strengthened to reflect DOE's priority on ES&H excellence.

Management Support (4 of 6 sites, 6 of 8 findings). The findings were associated with the lack of clear management commitment at all levels to ES&H excellence. The findings included the absence of visible management support and "ownership" of ES&H programs as evidenced by insufficient funding and staffing for programs.

ES&H Policy (2 of 6 sites, 2 of 8 findings). The findings in this performance area focused on inadequate ES&H policy guidance provided by DOE for applicability and implementation of DOE ES&H directives.

5.1.6 Resources and Training (total: 18 findings)

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at the sufficiency of environmental staffing resources and the completeness of the organization's systems for

ES&H status. One finding focused on the lack of clear oversight of the contractor's ES&H Scope of Work provisions in the site contract.

Self-Assessment Programs (2 of 6 sites, 2 of 14 findings). Two facilities had yet to develop comprehensive self-assessment programs. The specific issues identified in the findings included the lack of formalized and functioning procedures to track and trend self-assessment findings, the lack of performance indicators to track the progress of the program, the lack of a formalized root cause analysis program, and the lack of a strong program to track the lessons learned. In addition, deficiencies were noted with the system to track corrective actions undertaken to remedy the issues identified, and the lack of formal procedures to close issues once resolved.

5.1.8 Formality of Operations (total: 30 findings)

For this discipline, the Tiger Teams reviewed regulatory procedures and programs, and recordkeeping and reporting. The management systems were evaluated for their ability to provide the formal guidance and direction for ensuring that DOE Orders and regulations were properly received, disseminated, and incorporated into existing site procedures. Procedures and programs were examined for incorporation of guidance, regulations, and Orders into viable and complete programs. Recordkeeping and reporting were examined with regard to incident reporting systems and formality of recordkeeping and reporting.

For this analysis, 3 performance areas were identified: procedures and programs, regulatory tracking, and recordkeeping and reporting. No findings were identified in the recordkeeping and reporting performance area.

All sites needed to improve the quality of existing procedures and programs, and the dissemination and incorporation of regulations and DOE Orders.

Procedures and Programs (6 of 6 sites, 27 of 30 findings). The findings focused on the lack of programs or the lack of complete programs to carry out the missions of the ES&H programs in a variety of ES&H areas; problem identification; management communications systems; QA programs; ES&H planning, oversight, and prioritization; oversight of contractors; conduct of operations; configuration management systems; control of work for others; and corrective action management.

Regulatory Tracking (1 of 6 sites, 3 of 30 findings). The findings focused on lack of a system to incorporate regulations and DOE Orders into existing procedures, and lack of or inadequate directive systems to disseminate regulations and Orders.

5.1.9 Communications (total: 4 findings)

For this discipline, the Tiger Teams reviewed the existence and effectiveness of internal and external communications systems. The effectiveness of internal communications was assessed by evaluating the understanding of roles and responsibilities and the awareness of ES&H policies, procedures, and programs

Findings are divided into compliance findings (CFs) and best management practice findings (BMPFs). Compliance findings represent conditions that, in the judgment of the subteam, may not satisfy the requirements of environmental regulations, DOE Orders (including internal DOE directive memoranda, where referenced), consent orders, and directives/procedures/action plans. BMPFs represent situations that, in the judgment of the subteam, sound and generally accepted industry management practices were not being employed.

The subdivisions of this section begin with noteworthy practices (5.2.1) and key findings (5.2.2). The subdivisions that follow (5.2.3 through 5.2.11) discuss findings from the 6 FE assessments by discipline.

The Environment perspective includes 9 disciplines: air (5.2.3), surface water/drinking water (5.2.4), groundwater/soil, sediment, and biota (5.2.5), waste management (5.2.6), toxic and chemical materials (5.2.7), environmental QA and oversight (5.2.8), radiation (5.2.9), inactive waste sites (5.2.10), and NEPA (5.2.11).

5.2.1 Noteworthy Practices

No noteworthy practices were identified at the 6 FE sites.

TABLE 5.3. Summary of Environment Key Findings for FE Sites

M&O Key Finding Discipline	METC	PETC	NPR	SPR	NIPR	NPOSR	TOTAL
Formality of Programs	1	0	3	1	2	2	9
Environmental QA/QC	1	1	1	2	1	1	7
Inactive Waste Sites	1	1	0	0	0	0	2
Waste Management	0	1	0	0	0	1	2
Toxic & Chemical Materials	0	1	0	0	0	0	1
TOTAL	3	4	4	3	3	4	21

5.2.2 Key Findings (total: 21 key findings)

Key findings, as summarized in Table 5.3 above, were reviewed, analyzed, and sorted to determine whether common trends existed. Because environmental key findings typically represented common issues from several of the environmental disciplines, a determination was made as to the overriding issue being communicated. Based on that determination, the key finding was placed within the appropriate discipline.

The 21 key findings identified were a distillation of the 364 environmental findings summarized by the Tiger Team Environmental Subteam. Sixteen of the key findings were in 2 disciplines: quality assurance/quality control oversight (7), and formality of environmental programs (9), indicating a large

Activities at another FE facility were incomplete in terms of identification and inadequate with respect to removal of contaminated soils and evaluation of groundwater contamination.

Toxic and Chemical Materials Management (1 of 6 sites, 1 of 21 key findings). One FE site had developed several programs, plans, and procedures that addressed aspects of the toxic and chemical materials (TCM) management. However, these documents were not well integrated, lacked elements for contractor oversight, and did not provide for written standards and procedures in some areas.

TABLE 5.4. Summary of Environment Findings for FE Sites

Environment Finding Discipline	METC	PETC	NPR	SPR	NIPR	NPOSR	TOTAL
Air	7	4	9	9	6	7	42
Surface/Drinking Water	7	6	8	17	7	8	53
Groundwater/Soil, Sediment & Biota	7	4	7	17	3	7	45
Waste Management	8	6	6	6	6	11	43
Toxic & Chemical Materials	4	7	6	8	6	4	35
Environmental QA & Oversight	5	4	8	13	8	12	50
Radiation	4	2	7	3	4	3	23
Inactive Waste Sites	6	4	8	7	5	6	36
NEPA	9	4	7	4	6	5	35
TOTAL	57	41	66	84	51	63	362

The following sections summarize and analyze environmental findings across all the FE sites, as shown in Table 5.4. Each of the following sections focuses on 1 environmental discipline and its performance areas.

5.2.3 Air (total: 42 findings)

For this discipline, the Tiger Teams assessed the current operating practices with regard to regulations promulgated under the Federal Clean Air Act, pertinent state statutes, DOE Orders and guidance, SEN requirements, best management practices, and internal policies and procedures.

For this analysis, 5 performance areas were identified: compliance with permit and regulatory conditions, ambient air impact surveillance, emissions tracking, appropriate emission controls, and permit management.

Emissions Tracking (6 of 6 sites, 6 of 42 findings). The FE sites did not have systems in place to ensure complete source identification and accurate annual emission reports.

The accuracy of emission tracking (effluent monitoring) was identified as a compliance finding at only 1 FE site where state inventory reports were required, but a similar program deficiency regarding source identification and emission quantification was raised as a best management practice for all other sites. At the site where the finding was emphasized, the site-wide inventory reports for the state were not comprehensive. This site and the others had no procedures to ensure complete source identification, accuracy of inventory calculations, or a site-wide evaluation of hazardous air pollutants (HAPs). Identification of HAPs can define the sites as "major" sources subject to additional regulations.

Because of the lack of calculated emission inventory information, several sites were unable to determine their compliance status relative to Prevention of Significant Deterioration permitting or state regulatory thresholds. For the FE sites the quantification of their emissions was deficient, and did not meet the requirements of DOE Order 5400.1 for source emission monitoring and impact evaluation.

Appropriate Emission Controls (3 of 6 sites, 6 of 42 findings). Air emission sources did not have appropriate emission controls as required by state permits and state and Federal regulations.

Three FE sites did not have adequate emission controls at boilers and tanks. Sites did not know about various emission controls required for their projects and modifications, and had no procedures for incorporating environmental control requirements into the design stage to avoid retrofit equipment costs for FE sites after facilities had been built or new operations started.

Permit Management (2 of 6 sites, 2 of 42 findings). Programs did not have provisions to determine and track permitting requirements (permit applicability) for existing or new sources.

Two FE sites did not adequately determine which air permitting requirements applied to their emission sources, and several sources appeared to be operating without necessary state permits. Site programs had not always designated staff responsible for this determination or included procedures to track needed permits. Sites had deficient pre-construction permit oversight and review, resulting in the potential for unpermitted sources.

5.2.4 Surface Water/Drinking Water (total: 53 findings)

For this discipline, the Tiger Teams evaluated compliance with Federal, state, and local water pollution control requirements established for conformance with the Clean Water Act, and with drinking water regulations promulgated as part of the Safe Drinking Water Act (SDWA). In addition, the assessment

Although this performance area had only 2 findings, they indicated a lack of awareness of the risk associated with the discharges. A number of operations routinely conducted onsite potentially impacted surface water discharges, including pesticide application and unplanned discharges. The site did not fully understand these risks and had not developed procedures or programs to implement DOE policy with regard to effluent surveillance and monitoring.

5.2.5 Groundwater/Soil, Sediment, and Biota (total: 45 findings)

For this discipline, the Tiger Teams evaluated both the programmatic and technical status of groundwater protection and monitoring as it related to regulations, industry guidance, and best management practices; the environmental monitoring programs of these media; the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and programs and procedures established to prevent future contamination and prevent the spread of contamination from currently contaminated areas to clean areas. Regulations include the requirements of DOE, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/SARA, and state regulations.

All identified groundwater program deficiencies fell under Groundwater Protection Management Program (GPMP) and GPMP Plan general requirements, since they comprised the site-wide groundwater management, protection, and monitoring programs. Within the GPMP, the findings can be grouped into 3 performance areas: groundwater monitoring and surveillance; well construction, maintenance, and abandonment; and hydrogeologic characterization.

The performance areas for soil/sediment and biota findings were soil/sediment and biota monitoring and surveillance programs and ecological impact/ protection.

The findings included 36 CFs and 9 BMPFs. The groundwater programs had 24 CFs and 7 BMPFs; soil, sediment, biota programs had 12 CFs and 2 BMPFs. The groundwater findings for FE identified a number of common deficiencies in the site groundwater monitoring and protection programs as evaluated against DOE Orders, Federal and state regulations and requirements, and best management practices. The findings identified deficiencies in the sites' GPMP Plan, as well as deficiencies in specific groundwater program requirements.

Generally, the groundwater specialists observed that significant pre-audit preparation and quick fixes had been implemented. Lessons learned from previous Tiger Team Assessments were implemented without formal and consistent programs and procedures. The FE sites prepared for the assessments by responding to findings identified at other DOE facilities. Individual sites did not identify the root cause for the findings, and as a result they implemented quick-fix solutions that treated symptoms instead of developing comprehensive programs. FE-wide environmental programs to ensure regulatory compliance at the facility level also appeared to be lacking.

The FE site had not sufficiently characterized the site-wide hydrogeologic regime to establish baseline conditions and to identify aquifers and aquifer characteristics, vertical and horizontal groundwater flow paths and receptors, groundwater quality and quantity entering and leaving the site, and geologic conditions affecting groundwater flow and occurrence. This information was necessary to develop the site-wide and source-specific groundwater monitoring and surveillance programs.

Soil, Sediment, and Biota Monitoring and Surveillance (4 of 5 sites, 9 of 45 findings). Soil, sediment, and biota monitoring and surveillance programs, plans, and procedures were not adequately developed or implemented at the FE sites to meet the requirements of DOE Orders, Federal and state requirements and guidelines, and best management practices. The findings most frequently identified related to informal or inadequate soil, sediment, and biota monitoring and surveillance programs and plans; informal or inadequate sampling procedures to ensure consistency and reproducibility of data; and incomplete characterization of identified or suspected areas of contamination. Three sites had deficient soil, sediment, and biota monitoring and surveillance programs. Four of the findings related to lack of formal and complete surveillance and monitoring programs and plans; 3 findings related to inadequate sampling procedures; and 2 finding related to incomplete characterization of contaminated areas.

Ecological Impact/Protection (2 of 5 sites, 6 of 45 findings). Two FE sites did not have programs in place to ensure the mitigation of impacts to wetlands and ecological receptors.

A total of 6 findings were identified. Four findings related to endangered species and wildlife protection programs; 2 related specifically to inadequate exclusionary devices, and 2 related specifically to assessment and mitigation of ecological and wetland impacts. The ecological impact/protection findings were more prevalent at FE, specifically in part because of their operations involve oil storage and production, and in part because of the unique location of SPR sites in ecologically sensitive areas.

5.2.6 Waste Management (total: 43 findings)

For this discipline, the Tiger Teams assessed the current status of hazardous, radioactive, mixed, and solid waste management practices with respect to compliance with Federal and state regulations, DOE Orders, site procedures, and best management practices. Applicable regulations include the requirements of DOE, RCRA, CERCLA, and state specific statutes.

For this analysis, 3 performance areas were identified: waste management facilities, consisting of TSDFs, nonhazardous waste facilities, hazardous waste accumulation, emergency planning and underground storage tanks; waste management programs, including waste minimization and waste management program plans, LDR waste, training, vendor oversight, packaging and transportation, and permitting; and waste characterization, including recordkeeping and waste sampling and analysis.

under TSCA and FIFRA, respectively, as well as state requirements. The receiving, handling, and storage of chemicals were assessed for compliance with DOE Orders, Federal and state regulations, and best management practices.

For this analysis, 5 performance areas were identified: toxic and chemical materials management, PCB management, Pollution Prevention Awareness Plans (PPAPs), pesticide management, and asbestos.

The findings included 23 CFs and 12 BMPFs. The most significant findings observed at the FE sites were in the performance area of toxic and chemical materials (TCM) management and polychlorinated biphenyl (PCB) management.

The FE sites exhibited inadequate, informal, and inconsistent procedures, fragmented line management, and lack of oversight of site activities. These deficiencies indicated programmatic weaknesses in the TCM management at FE sites.

Toxic and Chemical Materials Management (6 of 6 sites, 16 of 35 findings). Formal programs and procedures to procure, receive, use, store, and track TCM were not developed, implemented, or overseen at the FE sites.

Findings included 9 CFs and 6 BMPFs. The 6 FE sites lacked the formal procedures and programs to promote consistent, compliant management of TCM and to minimize the potential for release to the environment, human exposure, or liability for DOE. Three key programmatic findings were identified at the FE sites: TCM management that was informal, not comprehensive, and not integrated; inadequate procedures, resulting in noncompliant storage of TCM, including bulk storage and the storage of incompatible chemicals; and a lack of procedures to address TCM in scrap or excess equipment. Findings included deficiencies in asbestos management at 1 site.

One site noted deficiencies in the management of Asbestos Containing Materials (ACM), including inadequate comprehensive policies, administrative controls, and training to ensure compliance with National Emission Standards for Hazardous Air Pollutants (NESHAPs). The site lacked formal written policies and procedures regarding identification, abatement, and disposal of ACM.

PCB Management (6 of 6 sites, 12 of 35 findings). Formal procedures detailing mechanisms to inventory, label, test, track, store, and dispose of PCBs and PCB-containing and oil-filled equipment were not consistently developed or implemented at the FE sites. PCBs were not managed consistently to ensure compliance.

Findings included 8 CFs and 4 BMPFs. The FE sites lacked consistent, written procedures and did not integrate PCB management into established site programs, which created the potential for regulatory noncompliance, releases or spills of PCBs, or contamination of site or offsite property. Consistent documentation, training, designated staff responsibility, and written guidance were necessary to comply with Federal regulations and to promote environmental excellence for PCB management. Key concerns at the FE sites included the lack of comprehensive, formal PCB management programs; informal agreements with

QA requirements had not been applied in a well-organized, effective manner. Inadequate implementation had been characterized by program planning documentation that was lacking or deficient. As a result of poor implementation, activities affecting environmental quality were not performed using approved procedures; personnel responsible for environmental quality were inadequately trained; and QA functions were not independent. Environmental records were not maintained in a manner to ensure their continued preservation in order to demonstrate environmental compliance.

The finding most frequently identified was QA program plans that were inadequate, not formally approved or implemented. Almost all of the findings in this performance area had inadequate policy implementation as a causal factor.

Oversight (5 of 6 sites, 11 of 50 findings). FE sites had sporadic and ineffective oversight through periodic, formal, documented audits, appraisals and reviews of contractors, subcontractors, and suppliers.

Five FE sites lacked effective oversight of operations. Inadequate oversight had led to inadequate implementation of programs, plans, and procedures for ensuring compliance with environmental regulations and DOE Orders. Oversight through audits, appraisals, and reviews of contractors, subcontractors, and suppliers was inadequate to ensure the quality and reliability of environmental compliance activities.

Audits or assessments to identify deficiencies in environmental compliance were insufficient. Corrective action programs to monitor the effectiveness and completion of remediation when deficiencies were detected were inadequate and did not determine root causes.

FE programs to qualify and monitor subcontractors and suppliers did not ensure that environmental activities (sampling, analysis, or remediation) were performed by qualified individuals using approved methods in a safe, effective manner. Oversight activities by the FE Field/Area Offices at 2 FE sites were not adequate to ensure effective implementation of environmental and QA programs.

Inadequate policy implementation was indicated as a causal factor in more than 60% of oversight findings, indicating inadequate attention given to the requirements for oversight by FE.

Sampling and Analysis (3 of 6 sites, 10 of 50 findings). FE sampling and analysis activities were not performed in a manner to ensure that valid, accurate, and reliable environmental data were generated.

At 3 of FE sites, deficiencies were noted in the sampling and analysis program. The findings covered various deficiencies, including inadequate chain of custody, insufficient workspace, inadequate QC samples, improper calibration using outdated standards, and inadequate data validation.

lacked reporting of effluent data in ASERs; and lacked documentation of environmental monitoring requirements in Emergency Management Plans.

5.2.10 Inactive Waste Sites (total: 36 findings)

For this discipline, the Tiger Teams assessed the identification and evaluation of inactive waste sites (IWSs) and releases of hazardous substances from site operations, site-wide integration and resource planning of environmental restoration activities, CERCLA and National Contingency Plan (NCP) release notification and remedial response requirements, real property transfer and site development planning requirements, hazardous chemical tracking and reporting programs for the SARA Title III, 40 CFR 300 et seq., and DOE 5400.4 requirements as well as adherence to best management practices.

For this analysis, 3 performance areas were developed: regulatory compliance, preliminary assessment and site characterization, and hazardous chemical reporting.

The findings included 23 CFs, 12 BMPFs, and 1 special issue. Hazardous chemical reporting was not included for the FE sites.

Regulatory Compliance (5 of 6 sites, 20 of 36 findings). Site characterization studies and remedial actions had not been uniformly performed according to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP), and DOE 5400.4 for 5 of the FE sites.

Policies and procedures had not been adequately developed to satisfy the requirements of CERCLA and NCP. Regulatory compliance guidelines had not been established for community relations plans, administrative records, and natural resource damage assessment notification procedures when the FE sites had been involved in CERCLA corrective action activities. Remediation projects implemented were not based on complete, well-documented and technically sound characterization studies, as outlined in CERCLA and the NCP. A regulatory framework outlining the required steps necessary for remediation activities, such as clean-up standards, reporting requirements, and post-closure monitoring, did not occur at all FE sites.

The FE sites had not developed policies describing roles and responsibilities for CERCLA response activities when identifying hazardous substance releases at sites not listed on the National Priorities List, in accordance with DOE 5400.4. In addition, the FE sites had not ensured that ES&H personnel had been adequately trained and supervised regarding DOE 5400.4.

Preliminary Assessment and Site Characterization (6 of 6 sites, 11 of 36 findings). Preliminary assessments and site characterization studies to identify and evaluate potential releases of hazardous substances from IWSs had not been performed according to Federal and state regulations, and DOE Orders at all FE sites.

Planning, Integration, and Coordination (6 of 6, sites, 9 of 35 findings). NEPA was not being used as an effective planning tool at all FE sites to help make environmentally informed decisions.

The FE sites had not used NEPA to plan their project work. This was especially apparent in "non-clean coal" areas. Early planning and budgeting did not consider or take advantage of NEPA documentation; as a result, it was often regarded as an add-on, rather than a tool for environmental planning as intended.

Program Incorporation and Implementation (4 of 6 sites, 7 of 35 findings). The site contractors had processed inadequate categorical exclusions and inappropriate memoranda to file when the environmental impacts of the projects were not clearly insignificant. Also, a full NEPA review or a determination of the appropriate level of NEPA documentation was not performed in almost all cases.

Tracking and Recordkeeping (5 of 6 sites, 5 of 35 findings). Recordkeeping procedures were spotty, filing was incomplete, and an integrated system for tracking status and determining NEPA activities did not exist. FE and the Field Offices did not require the sites to account for NEPA activities; therefore, most of the sites had not performed activity tracking and adequate recordkeeping.

Guidance and Training (3 of 6 sites, 3 of 35 findings). Site project managers did not encourage incorporation of NEPA compliance at these facilities. FE was not sufficiently diligent with NEPA guidance to ensure its use. Training was listed as a contributing factor in 16 out of 66 occurrences at FE sites.

5.3 SAFETY AND HEALTH (S&H)

The purpose of this section is to summarize noteworthy practices, key concerns, Category I and II concerns, and concerns in the Safety and Health (S&H) perspective when the final 6 FE Tiger Team Assessments were conducted.

The subdivisions of this section begin with noteworthy practices (5.3.1), key concerns (5.3.2), and Category I and II concerns (5.3.3). The subdivisions that follow (5.3.4 through 5.3.24) discuss findings from the 6 FE assessments by discipline.

The S&H perspective includes 21 disciplines: organization and administration (5.3.4), quality verification (5.3.5), operations (5.3.6), maintenance (5.3.7), training and certification (5.3.8), auxiliary systems(5.3.9), emergency preparedness (5.3.10), technical support (5.3.11), packaging and transportation (5.3.12), nuclear criticality safety (5.3.13), security/safety interface (5.3.14), experimental activities (5.3.15), site/facility safety review (5.3.16), radiological protection (5.3.17), personnel protection (5.3.18), worker S&H (OSHA) compliance (5.3.19), industrial hygiene (5.3.20), fire protection (5.3.21), medical services (5.3.22), occupational safety (5.3.23), and miscellaneous (5.3.24) (aviation safety and firearms safety).

TABLE 5.5. Summary of S&H Key Concerns for 6 FE Sites

S&H Key Concern Discipline	METC	PETC	NPR	SPR	NIPR	NPOSR	TOTAL
Noncompliance	2	1	0	0	1	0	4
S&H Programs	2	1	3	2	3	0	11
Oversight	1	0	1	0	1	2	5
Management Systems & Resources	1	3	2	3	1	2	12
TOTAL	6	5	6	5	6	4	32

5.3.2 Key Concerns (total: 32 key concerns)

Key concerns for S&H are summarized above in Table 5.5. The key concerns were reviewed, analyzed, and sorted to determine whether common trends existed. Because S&H key concerns typically represented common issues from several of the disciplines, the overriding issue was identified. Based on that determination, the key concern was placed into 1 of the 4 key concern disciplines: identified noncompliance; missing, deficient, or ineffective programs; ineffective oversight by DOE; and ineffective contractor management system or organizational structure.

Identified Noncompliance with DOE Orders, OSHA Requirements, Consensus Standards and Site Procedures. (3 of 6 sites, 4 of 32 concerns). For this performance area only 4 key concerns were identified at the FE sites. No key concerns relating to compliance were identified at 3 sites. At the remaining sites, the concerns related to general noncompliance with DOE requirements and failure to provide a required quality assurance program at one.

Missing, Deficient, or Ineffective S&H Programs and Program Documentation. (5 of 6 sites, 11 of 32 key concerns). The issue of insufficient program documentation was identified as a key concern at 5 of the 6 FE sites. Specifically identified programs identified as deficient or missing included training, quality assurance, and S&H oversight. Some key concerns addressed the lack of effective S&H programs at specific sites as a general issue.

Ineffective Oversight by the DOE. (4 of 6 sites, 5 of 32 key concerns). DOE field offices for 4 sites were cited for not providing the level of oversight required by DOE Orders or to ensure that identified site deficiencies were corrected in a timely manner. An effective program to accomplish this had not been established.

Ineffective Contractor Management System or Organizational Structure. (6 of 6 sites, 12 of 32 key concerns). The Tiger Teams identified a number of management related issues at the FE sites. Issues highlighted as key concerns included ineffective document control systems, failure to detect and correct hazards, ineffective communications, insufficient allocation of resources to S&H, and the failure to provide compliant S&H programs.

Emergency Preparedness (4 of 6 sites, 8 of 68 Category I and II concerns). The common element of these Category I and II concerns is that the FE sites do not have complete programs, plans, or organizations to respond to emergency situations as required by DOE Orders.

Occupational Safety (3 of 6 sites, 7 of 68 Category I and II concerns). A confined space concern was observed at each site. The occupational safety programs did not properly control confined space entries.

Fire Protection (3 of 6 sites, 3 of 68 Category I and II concerns). A common element between 2 sites was that the fire protection programs did not comply with the National Fire Protection Association (NFPA) Life Safety Code.

Medical Services (2 of 6 sites, 3 of 68 Category I and II concerns). The common theme of these concerns is that the sites do not have sufficient medical resources to support the sites' mission.

For this analysis, 5 performance areas were identified: management oversight, site safety, recordkeeping and reporting, policies and procedures, and formal definition of authority and responsibility.

Management Oversight (6 of 6 sites, 26 of 77 concerns). Management did not consistently provide the oversight and administrative controls needed to ensure compliance with DOE Orders.

Management did not consistently perform its oversight role in many safety- and health-related areas to ensure compliance with the S&H components of DOE Orders. One site's structure for ES&H management oversight was not operational. At another site, no effective system was in place for DOE to oversee ES&H activities. At 3 sites, key management issues related to S&H were not identified and resolved by top management. Management did not consistently issue or implement formal safety and health goals and objectives. None of the sites except 1 had defined a planning strategy directed at defining, communicating, and implementing an overall S&H program with clearly articulated standards, goals, and objectives. Management did not ensure a proactive program of career development and performance appraisal that included S&H elements at 2 sites.

Site Safety (5 of 6 sites, 15 of 77 concerns). Safety programs did not ensure that all elements of site safety were in place and implemented as required by DOE Orders.

Several issues contributed to this performance area. First, safety meetings were not held regularly at 1 site, and safety information was not always shared as a way to promote safe operations. Second, management at 2 sites did not consistently set definitive and measurable safety goals that were updated annually. Third, oversight of safety operations, performance, and programs was not consistently supplied at 3 sites. Fourth, at 3 sites, substance abuse and fitness for duty programs were not implemented or understood because of ineffective training.

Recordkeeping and Reporting (6 of 6 sites, 14 of 77 concerns). Programs lacked the consistent document control and incidence reporting needed to ensure compliance with DOE Orders.

Document control programs were deficient in several areas. Three sites had no assurance that documents were kept up to date. In addition, 2 sites did not have document control systems. Incidence and occurrence reporting was not consistent at some sites. Except for 1 site, there was no definition of actions to follow in response to safety violations and no program to ensure proper analysis and followup of incident reports.

Policies and Procedures (5 of 6 sites, 13 of 77 concerns). Policies and procedures were not consistently developed and implemented along with DOE Orders and other compliance requirements.

Management at 2 sites did not effectively control all aspects of preparation, review, and implementation of procedures, which resulted in noncompliance with

records management, and for enforcing compliance with DOE Orders; and lack of implementation of the Assistant Secretary's requirements regarding suspect/ counterfeit parts.

Audits and Oversight (5 of 6 sites, 10 of 56 concerns). The effectiveness of QA programs was not adequately measured.

Areas of concern included lack of formal QA audits; inadequate oversight of contractors' activities and special processes; lack of periodic independent analysis of suppliers' material certifications; failure to use audit and discrepancy reports to track problems; and inadequate identification and control of nonconforming material and equipment.

Materials and Process Control (5 of 6 sites, 10 of 56 concerns). Some materials and controls processes did not meet the DOE and NQA-1 requirements.

The major area of concern was a lack of appropriate action to redress questionable structural and high-pressure welds performed without proper special processes controls. Other areas of concern included lack of document control and secure record storage, lack of inspection of procured materials for design conformance, lack of properly equipped storage facilities for certified materials or to control labile materials, and lack of adequate laboratory facilities. Other concerns included lack of traceability of materials to their procurement and certification records; lack of maintenance and calibration of instruments, and measuring and testing devices; and questionable structural and high-pressure welds.

Procedures (4 of 6 sites, 8 of 56 concerns). Areas of concern included use of draft unapproved procedures for conduct of activity; inattention to existing procedures; and lack of procedures to implement corrective actions, to identify and implement DOE Orders and Notices, to document and independently evaluate inspection results, to identify and control the use or disposition of items, and to ensure that incorrect or defective items were not used.

Training and Certification (2 of 6 sites, 3 of 56 concerns). Not all processes at FE sites were conducted by qualified personnel according to DOE or NQA-1 requirements.

Personnel at some sites did not receive training on elements of quality verification or applicable QA standards and requirements. As a result, worker awareness of QA requirements and expectations varied widely. At some sites, training and certification were not provided for nondestructive test inspectors, welders, electronics technicians, and shop machinists working on special processes.

5.3.6 Operations (total: 44 concerns)

For this discipline, the Tiger Teams reviewed activities related to safe and reliable operation of systems and equipment. Aspects of this discipline encompass safe, reliable conduct of operations; effective guidance for normal and abnormal facility operations; personnel knowledge of both operational

reliability of systems and equipment; use of historical records and root cause analyses for predictive maintenance; and appropriate procedures and related documents to support safe, effective maintenance activities.

For this analysis, 5 performance areas were identified: programs and procedures; unsafe conditions, practices, and equipment; planning, scheduling, and controlling work; equipment maintenance; and worker qualifications and responsibilities.

Significant deficiencies were identified in maintenance programs at the FE sites caused by a lack of formality, procedures, and oversight.

Programs, Policies, and Procedures (6 of 6 sites, 33 of 70 concerns). Programs, policies, and procedures were not developed and implemented to meet the requirements of DOE Orders.

Programs, policies, and procedures were either not developed or were not implemented at all 6 of the FE sites. The lockout/tagout program was not properly implemented at 1 site. Several sites had not prepared policies or plans for performing maintenance activities. Every site did either not fully implement preventive and predictive maintenance programs or did not have the program in place. Three sites had not prepared or were not fully implementing a maintenance management plan. The most frequently cited DOE Orders were DOE 4330.4A and 4330.2C.

Unsafe Work Conditions and Equipment (5 of 6 sites, 15 of 70 concerns). Workplace conditions and equipment were not maintained in a manner to ensure a safe working environment.

Workplace conditions and equipment used by personnel were not maintained and created potential safety hazards at 5 of the 6 FE sites. In many instances, facilities were not maintained and therefore created unsafe working conditions. Unsafe working conditions were also created by use of inappropriate equipment and deficient equipment maintenance. The DOE Order cited most frequently was DOE 4330.4A.

Planning, Scheduling, and Control of Maintenance Activities (5 of 6 sites, 12 of 70 concerns). Planning, scheduling, and control of maintenance activities did not meet the requirements of DOE Orders.

Five sites were not formally or thoroughly planning, scheduling, and controlling maintenance activities as required by DOE Orders. In several instances, mechanisms were not used in optimizing planning, scheduling, and control of maintenance activities, such as using maintenance histories or predictive maintenance. The DOE Order most frequently cited was DOE 4330.4A.

Maintaining Equipment and Supplies (5 of 6 sites, 10 of 70 concerns). Real property and facility equipment were not being properly maintained as required by DOE Orders.

Training and certification program records at 2 FE facilities could not verify that DOE and other requirements were completely addressed. Records were not kept for every required employee or subcontractor. For the records that were kept, examination scores and on-the-job training experiences were not documented in many cases.

Training Facilities and Equipment (3 of 6 sites, 2 of 31 concerns). Training facilities and equipment did not meet the training needs of the site.

Training facilities and equipment at the FE sites did not effectively support the training objectives of DOE. Of particular note was the lack or absence of sufficient classroom space for training classes at 2 sites.

5.3.9 Auxiliary Systems (total: 14 concerns)

For this discipline, the Tiger Teams reviewed systems for effluent holdup and treatment, solid hazardous wastes, ventilation, electricity, water, emergency power, heat removal, engineered safety, and coolant cleanup. Under this discipline, criteria are assessed against functional criteria for the structural, confinement, and primary process system of the facility. Each of the auxiliary systems has its own set of criteria for safe operation and compliance with regulations.

For this analysis, 4 performance areas were identified: waste systems, ventilation systems, policies and procedures, and emergency power systems (not addressed for FE sites).

Waste Systems (3 of 6 sites, 5 of 14 concerns). Waste handling and waste minimization practices are not being effectively implemented at FE program sites.

Not all personnel had received proper training on implementing waste minimization policies, and annual waste reduction goals were not being used at 1 site. Disposal methods for potentially contaminated effluents were not subjected to scoping analysis to determine risk to offsite personnel. Also, programs to control and reduce hazardous substances lacked specific goals and had not been formalized as required by DOE mandate.

Ventilation Systems (2 of 6 sites, 5 of 14 concerns). Operating personnel at FE sites could be exposed to potentially hazardous effluent streams.

Sites had not analyzed concentration and distribution of toxic gases in and around exhaust vents under potential accidental release conditions. Also, overall area monitoring for toxic airborne effluents was not performed at 1 site's facilities as required by DOE mandate. One site's laboratories presented a potential for exposure to contaminated exhaust gases from experimental test rigs.

Policy and Procedures (3 of 6 sites, 4 of 14 concerns). Policies concerning operations and emergency situations have not been effectively documented at FE sites.

resolve cited emergency preparedness deficiencies in a timely manner. Three sites needed to develop methods for prompt initial notification of emergency response personnel and for initial and follow-up notification to offsite organizations.

Training Programs (5 of 6 sites, 7 of 56 concerns). Emergency preparedness training programs did not fully comply with DOE and other Federal requirements.

Five sites did not have a formal training program for personnel (primary and alternates) in the emergency response organizations.

Emergency Preparedness Drills (6 of 6 sites, 6 of 56 concerns). Emergency preparedness drill critiques and the results of past incidents indicated that drill programs, established plans, and procedures did not fully meet DOE requirements.

Three sites had not developed and implemented a program for full participation exercises to be conducted at least annually to test and demonstrate an integrated emergency response capability as outlined in DOE 5500.2, 5500.3, and 5500.3A. Two sites with exercise and drill programs had deficiencies in planning development, conduct, and critique of emergency exercises.

5.3.11 Technical Support (total: 32 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of implementation and control for technical support activities, technical support procedures and documents, and equipment performance testing and monitoring. Technical support services required for facility modifications were evaluated for proper design, review, control, implementation, and timely documentation. Efforts to minimize the environmental impact of operations were assessed, as well as the conformance of packaging and transportation functions to existing standards and regulations. For reactors only, technical services in engineering activities and criticality safety were evaluated for comprehensiveness and efficiency.

For this analysis, 4 performance areas were identified: policies and procedures, regulatory compliance, safety issues, and facility modifications.

Polices and Procedures (5 of 6 sites, 10 of 32 concerns). Technical support activities lack the necessary policies and procedures for effective operation.

Facility modifications were not reviewed and implemented as required by DOE procedures, and procedures were not established for planning, designing, and implementing facility modifications. Independent ES&H reviews were not incorporated as a formal requirement in preparing operating instructions. As a result, facilities could be modified without conducting interdisciplinary reviews required to comply with DOE mandates. Also, risks were not identified and assessed and emergency features are not tested to ensure they function as

5.3.12 Packaging and Transportation (total: 55 concerns)

For this discipline, the Tiger Teams reviewed the adequacy of systems to implement Federal and state regulations, DOE Orders, and good industrial practices; appropriate training, qualification, and certification of personnel handling hazardous materials; effective QA checks and balances; the compliance and safety of intra-building movements, enroute storage operations, onsite and offsite shipments, and packaging and storage of hazardous materials; timely reporting of accidents and incidents; adequacy of records; and appropriate conduct of appraisals and internal audits.

For this analysis, 5 performance areas were identified: management systems, operations, pipeline safety, QA/QC program, and training. Eight concerns did not fit into any of the 5 performance areas.

Management Systems (3 of 6 sites, 13 of 55 concerns). Management systems did not control packaging and transportation activities as required by DOE Orders and DOT regulations. Management did not provide guidance on applying DOE standards. In addition, independent safety oversight did not meet DOE standards at 1 site.

Operations (3 of 6 sites, 13 of 55 concerns). Packaging and transportation operations at the FE sites did not fully comply with DOE Orders and DOT regulations.

In several instances packages leaving the site were not properly marked, labeled, or packaged in accordance with DOT standards at 2 sites. One site's offsite shipment/receipt data were not supplied to DOE as required by DOE 1540.1. Onsite and offsite transfers of hazardous materials at 2 sites were also not shipped in accordance DOT standards. In addition, subcontractor receipt, handling, and onsite transfers of hazardous materials at 2 sites did not comply with 49 CFR and DOE 5480.3 at NPR.

Pipeline Safety Management (3 of 6 sites, 9 of 55 concerns). Pipeline safety management procedures either were not in place or did not meet the requirements of DOE Orders, DOT regulations, or industry standards.

At two sites, external and internal wall corrosion control requirements of DOT were not met, and pipelines were not being operated according to standards set by the National Association for Corrosion Engineering. At 1 site, the procedures in place for abandoning pipelines did not provide for isolation of the pipeline from all transported liquid as required by DOT and periodic appraisals of pipeline operations were not performed as required by DOE.

Quality Assurance (2 of 6 sites, 7 of 55 concerns). QA oversight of packaging and transportation activities at FE sites did not fully meet DOE Requirements.

QA programs at both sites were nonexistent. Responsibilities and authorities at 1 site were dispersed among different organizations.

Review of Security Operations (1 of 6 sites, 1 of 10 concerns). Reviews or audits of security operations were not conducted or documented.

One site did not document critiques of security operations to determine adequacy and deficiency through to resolution. The lack of a formal review process was noted in several areas.

5.3.15 Experimental Activities (total: 3 concerns)

For this discipline, the Tiger Teams reviewed the interface between experimenters and operational groups for clear definition; the process, including approval by an Independent Safety Review Committee, for adequacy and completeness; and the performance experiments for risk control and safety.

For this analysis, 4 performance areas were identified: experiment proposals/planning; experiment categories/reviews; risk assessment and operation of experiments; and experimenter training, roles, and responsibilities (not addressed for the FE sites).

Experiment Proposals/Planning (1 of 6 sites, 2 of 3 concerns). Experimental plans were insufficient to permit a complete safety evaluation.

The concern dealt with problems in experimental plans that failed to ensure a thorough evaluation. At the facility, planners did not always give clear guidance to operators before experiments started.

Experiment Categories/Reviews (1 of 6 sites, 1 of 3 concerns). Proposed experiments were not formally approved through an independent safety review before they were performed.

The concern stated that changes in formal procedures were not subjected to the same formal review as the original procedure before the experiment started.

5.3.16 Site/Facility Safety Review (total: 32 concerns)

For this discipline, the Tiger Teams reviewed the availability of a Safety Review Committee; the clear definition and understanding of items to be reviewed by the Committee; the degree of safety resulting from the Committee's reviews; and the performance of an annual operating review of each facility, triennial appraisal of the safety review system, and operating experience reviews to improve safety and reliability.

For this analysis, 4 performance areas were identified: program design, safety reviews/approval, lessons learned/trending, and corrective action program.

Program Design (6 of 6 sites, 13 of 32 concerns). The focus of these concerns was on the inadequacies associated with the safety review organizations and the policies and guidelines used to conduct the evaluations, including fragmented organizations, incomplete safety reviews and safety review processes not meeting DOE standards.

procedures were not formally implemented. The main areas of concern throughout the FE sites related to sealed source control and naturally occurring radioactive material (NORM) personnel radiation protection.

5.3.18 Personnel Protection (total: 44 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the personnel protection program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; and the appropriateness of surveillance to measure safety and health performance.

For this analysis, 5 performance areas were identified: compliance with Federal and DOE requirements, program implementation and training, management of occupational hazards, management systems, and data management. One concern was judged insignificant and did not warrant a unique summary statement.

The concerns indicated a need for FE sites to improve systems to proactively identify, evaluate, control, and monitor occupational hazards; to ensure that comprehensive S&H programs exist, are complete, and are maintained current as required by Federal regulations and DOE Orders; to ensure that an effective, technically qualified, informed, and adequately staffed S&H management system is in place; and to ensure that S&H programs are fully implemented and enforced; and that effective training is provided in a timely manner to all affected workers, supervisors, program administrators, and S&H professionals.

Compliance with Federal and DOE Requirements (3 of 6 sites, 22 of 44 concerns). Written safety and health programs, policies, and procedures did not fully comply with Federal and DOE requirements.

One site had previously identified more than 150 necessary S&H programs, procedures, and policies that required development (e.g., tracking deficiencies, construction safety, radiation protection, contractor safety, confined space entry, laser safety, hazard communication, asbestos, and industrial hygiene monitoring). All 3 sites had many programs that were missing essential elements and were not maintained current to comply with DOE Orders, Federal regulations, and industry best management practices (e.g., radiation dosimetry, respiratory protection, carcinogen control program, eye and face protection, and ventilation equipment maintenance).

Program Implementation and Training (3 of 6 sites, 14 of 44 concerns). Implementation of existing programs, policies, procedures, and work practices did not fully comply with Federal and DOE requirements.

Existing S&H programs were not completely implemented and were weakly enforced, including respiratory protection, hazard communication, industrial hygiene monitoring, energy control, and laser safety. The few qualified S&H professionals at two sites were not provided the opportunity to maintain their levels of competency. One site had not established an effective mechanism to

Program Implementation (5 of 6 sites, 30 of 73 concerns). Implementation of existing programs, policies, procedures, and work practices did not fully comply with Federal and DOE requirements.

The implementation of many programs was incomplete; and evaluation, monitoring, verification, and surveillance activities were nonexistent, infrequent, or inappropriate. All 5 sites had deficiencies in fully implementing existing S&H programs. Numerous concerns were identified in electrical safety, energy control, machine guarding, and walking and working surfaces.

Compliance with Federal and DOE Requirements (6 of 6 sites, 27 of 73 concerns). Written S&H programs, policies, and procedures at FE sites did not fully satisfy Federal and DOE requirements.

Throughout the FE sites, S&H programs were nonexistent or did not comply with applicable Federal regulations, DOE Orders, or industry best management practices. The programs also did not ensure that occupational hazards associated with the operation, task, or activity were adequately identified, evaluated, and controlled. Similar deficiencies were identified in the following programs: confined space entry, hazard communication, operation of mechanized vehicles, and warehousing activities.

Safety and Health Management Systems (4 of 6 sites, 15 of 73 concerns). The FE sites did not develop effective S&H management systems.

Management had not defined overall S&H goals, objectives, and priorities or had not developed performance indicators. Also, sites had not established effective roles and responsibilities or assigned authority and accountability. The sites' failure to identify all regulatory requirements and designate qualified program administrators was a root cause for many of the concerns. Major deficiencies in developing effective management systems to oversee contractor activities resulted in numerous deficiencies at 3 sites in the areas of excavations safety, use of worn and defective equipment, inadequate walking and working surfaces, confined space entry, drilling safety, and electrical safety.

Safety and Health Training (1 of 6 sites, 1 of 73 concerns). Training did not satisfy the requirements of an existing program or of Federal regulations and DOE Orders.

Training in hazardous waste operations and emergency response (HAZWOPER) had not been conducted at 1 site to satisfy the requirements of OSHA 29 CFR 1910.120.

5.3.20 Industrial Hygiene (total: 19 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the industrial hygiene program; the appropriateness of procedures and documentation; the identification,

findings in the industrial hygiene discipline were referenced to concerns in other disciplines but also indicated weaknesses in site programs designed to identify and control exposures to hazardous chemicals.

Resources, Staffing, and Oversight (2 of 6 sites, 5 of 19 concerns). The management responsible for the industrial hygiene program had not provided the resources, staffing, and oversight required so that the industrial hygiene department could accomplish its objectives.

Industrial hygiene management had not taken sufficient action to ensure that the program requirements contained in DOE 5480.10 were implemented. No audit system was in place to evaluate the effectiveness of the industrial hygiene program. Deficiencies identified in previous DOE appraisals had yet to be corrected. DOE- and OSHA-mandated programs were not adequately implemented, including the carcinogen control program, chemical hygiene plans (laboratory S&H), and hazard analyses.

At 1 site, industrial hygiene field procedures had not been developed; a review of training records revealed that only a fraction of the site's training responsibilities were being met; safety administrators, without adequate industrial hygiene training, were tasked with providing industrial hygiene support for contractors; and the safety department lacked an awareness of industrial hygiene-related noncompliance issues.

Information Management (1 of 6 sites, 1 of 19 concerns). Information management systems were inadequate to meet industrial hygiene program requirements.

The information management systems at 1 site were inadequate to meet the needs and requirements of the industrial hygiene department as required by DOE Order 5480.10. The site was unable to evaluate industrial hygiene data, identify trends, or track exposures. Chemical inventories were incomplete in that not all chemicals were listed or important information was not included, such as identifying the hazards of each chemical or the location where the chemical was stored and/or used. Exposure monitoring results were not always provided to employees or to the personnel responsible for evaluating occupational diseases and illnesses and medical surveillance programs.

5.3.21 Fire Protection (total: 38 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation and control of fire protection equipment and activities; the adequacy of life safety provisions against the effects of fire; the adequacy of protection to the public from hazardous materials released as the result of an onsite fire; the adequacy of measured taken to prevent shutdown of operations and reduce property loss; the capacity of the Fire Department to terminate and mitigate the effects of a fire; and the effectiveness of the fire protection engineering program.

Procedures and Documentation (5 of 5 sites, 8 of 45 concerns). The theme of these concerns was on the lack of procedures to ensure proper medical recordkeeping.

Medical Facilities and Equipment (3 of 5 sites, 6 of 45 concerns). The concerns focused on the need for transportation for the nurse at 1 site and medical equipment and facilities at another site.

Staffing/Training and Awareness (4 of 5 sites, 6 of 45 concerns). The concerns focused on the lack of staff and the lack of physician time and examinations.

Oversight Activities (3 of 5 sites, 5 of 45 concerns). The concerns focused on the lack of internal auditing of the medical programs and lack of systems to track corrective action taken on medical services concerns.

Management Support (2 of 5 sites, 2 of 45 concerns). The concerns focused on the lack of definition in the roles and responsibilities of the occupational health unit at 1 site and the need to have a direct line of communication with senior management at another site.

5.3.23 Occupational Safety (total: 32 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the occupational safety program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure occupational safety performance; and the adequacy of information communicated to site/facility personnel about physical stresses that may be encountered in the work environment.

For this analysis, 9 performance areas were identified: inspections, audits, and Job Safety Analyses (JSAs); communication of S&H roles, responsibilities, and programs; confined space entry; contractor and construction safety; S&H training and expertise; accident investigation and recordkeeping; personal protective equipment; testing, inspection, and maintenance; and lockout/tagout. Two of the concerns did not fit into an identified performance area. In 3 cases, only a single concern fell under a performance area (lockout/tagout, personal protective equipment and testing, inspection, and maintenance).

Inspections/Audits and Job Safety Analyses (3 of 3 sites, 7 of 32 concerns). Programs or systems had not been developed to identify, evaluate, and control occupational S&H hazards on an ongoing basis in accordance with DOE and OSHA requirements.

Although inspections or self-audits were conducted at the sites, the scope of the reviews was limited to physical conditions and did not address work practices and S&H programs. Line personnel who were responsible for performing inspections and audits had little or no training in hazard recognition and

Accidents and incidents were not consistently analyzed for root causes, and corrective action was not effectively applied as required by DOE 5484.1A. Occupational injuries and illness were not being properly recorded on the OSHA 200 Log at one site, while the other site investigated recordable cases but did not follow up on near misses and first aid cases.

Construction Safety (3 of 3 sites, 4 of 32 concerns). The surveillance program for contractor and subcontractor construction activities was not effective in identifying and addressing concerns or in enforcing DOE and OSHA requirements.

The S&H surveillance program for contractor and construction activities did not ensure the ongoing implementation and enforcement of OSHA and DOE regulations and safe work practices. At 1 project, OSHA noncompliance was noted for shoring, confined space entry, training, safe access, atmospheric monitoring, and the use of platforms. Contractor S&H plans were not routinely reviewed by S&H professionals, and line personnel responsible for contractor and construction safety had not received formal training. In addition, a program had not been established to ensure that contractor selection criteria include safety performance.

5.3.24 Miscellaneous (total: 13 concerns)

This discipline assessed the commitment to safety in aviation and firearms. The existence and content of safety directives was evaluated, including issuance of safety orders that reflect management's commitment to attainment of these goals, along with assessments of routine operations. This responsibility was evaluated on compliance with program guidance and deviations from recognized standards.

Within aviation safety, 3 performance areas were identified: aviation safety organization and administration, aviation maintenance safety, and operational aviation safety. Within firearms, 5 performance areas were identified: firearms safety programs and appraisals; firearms safety training, range operations, and storage of munitions; firearms procedures and documentation; firearms exercises; and firearms safety organization and administration.

Analysis of the findings indicated that further attention to detail was required in both of these areas.

Aviation Safety Organization and Administration (1 of 6 sites, 7 of 13 concerns). Aviation safety was not executed to required standards.

Chartered aircraft frequently did not comply with DOE requirements for carrying passengers at 1 site. Neither the site contractor nor the project management office were performing safety oversight. Manuals and aviation activity reports had not been fully documented. The project management office had not promulgated consistent guidance for aviation operations and had not ensured that all significant flight obstructions were clearly marked.

SYNOPSIS: DEFENSE PROGRAMS (DP)

The Office of the Assistant Secretary for Defense Programs (DP) directs the nation's nuclear weapons research, development, testing, production, and surveillance program, as well as the production of the special nuclear materials used by DOE's weapons program and management of defense nuclear waste and byproducts. Two DP sites' Tiger Team Assessments are covered in this report: Los Alamos National Laboratory and Sandia National Laboratory, Albuquerque, New Mexico.

This synopsis briefly describes the findings from the analysis of the 2 DP sites from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H).

MANAGEMENT AND ORGANIZATION (DP)

The 9 root causes focused on 2 areas, the need for management to commit more fully to ES&H programs and the need for sufficient numbers of qualified ES&H professionals, performance measures, and strong training programs.

The 9 M&O key findings were spread evening among disciplines. The sites did not have well-designed programs for conducting independent oversight of ES&H activities. ES&H planning was not integrated into strategic planning documents, and training and certification programs were not as formal, comprehensive, and integrated as they needed to be. Programs and procedures needed to be more formalized, including those in self-assessment, and implementing guidance was needed to ensure a common understanding of the commitment to ES&H excellence.

The largest clusters of findings were in formality of operations (13) and resources and training (11). The lack of formal programs or the lack of complete programs was the focus of findings in the former discipline; findings in the latter discipline cited the lack of comprehensive human resources management programs and ES&H training programs at all levels. Other issues were the lack of formal documentation and understanding of individual and organizational roles and responsibilities,a lack of ES&H audit program oversight, inadequacies in self-assessment and in Cost Plus Award Fee (CPAF) programs; and the lack of funding and staffing commitment coupled with a lack of management "ownership" of ES&H programs.

ENVIRONMENT (DP)

Of the 9 key findings identified, those in oversight and waste management were determined to have significant discrepancies:

S&H related programs as well as with the overall S&H programs. Management at the DP sites had not provided the guidance or oversight necessary to establish effective S&H programs. DOE was also cited in key concerns at one site for not effectively exercising responsibilities in providing oversight and guidance to the operating contractors.

The greatest numbers of the Category I and II concerns clustered in Worker S&H Occupational Safety and Health Administration (OSHA) compliance (14) and Fire Protection (11). Noncompliance with regulations for electrical safety, machine guarding were included in worker S&H; in fire protection, substantial noncompliance was noted with requirements of National Fire Protection Association (NFPA), Life Safety Code, and Federal regulations. Another 6 Category I and II concerns were in radiological protection, citing deficiencies in contamination control programs.

The 98 concerns in radiological protection cited deficiencies in internal and external dosimetry and exposure control programs and in instrumentation and action limits used in radiological monitoring. In addition, management did not fully implement DOE policies and requirements for radiological protection at the DP sites.

Concerns in the related disciplines of personnel protection, worker S&H, industrial hygiene, and occupational safety totaled 96. Noncompliance with Federal and DOE requirements was the central issue in personnel protection. Implementation of many worker S&H programs was incomplete, and there were weaknesses in developing and implementing programs designed to identify and control occupational hazards.

In fire protection, the 66 concerns identified lack of equipment to detect and suppress fires, lack of strong oversight programs, lack of life safety programs, and lack of plans and review programs relevant to fire protection.

Organization and administration had 60 concerns. The Tiger Teams found that management at the DP sites had not consistently provided oversight and administrative controls needed to ensure compliance with DOE Orders, and safety programs did not ensure that all elements of site safety were in place as required by DOE Orders. Authority and responsibility were not consistently defined, and programs lacked consistent document control and incidence reporting.

Other disciplines with substantial numbers of concerns were packaging and transportation (59), operations (58), auxiliary systems (57), and maintenance (51). Noncompliance with DOE Orders and Department of Transportation (DOT) regulations, inadequate control by management systems, and inadequate QA programs were issues in packaging and transportation. In operations, policies, programs, and procedures were not developed and implemented as required. For auxiliary systems, programs did not ensure that tests on engineering safety systems had been performed. Maintenance programs, policies, and procedures were not developed and implemented as required; and planning, scheduling, and control of maintenance activities did not meet the requirements of DOE Orders.

6.0 DEFENSE PROGRAMS

This review and summary of the 2 Defense Program (DP) sites are part of a larger analysis focused on the final 19 Tiger Team Assessments. The 2 DP sites are as follows:

- Los Alamos National Laboratory (LANL)
- Sandia National Laboratory (SNL)

Following the Tiger Team methodologies and categories, this analysis discusses the findings from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 21 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, findings, and root cause analysis are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns, Category I and II concerns, and concerns are discussed. Category I concerns are those that address a "clear and present" danger to people; Category II concerns address significant risk or substantial noncompliance with DOE Orders.

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area give two sets of information. The first set of numbers indicates the number of sites having a finding(s) or concern(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (1 of 2 sites, 4 of 16 concerns) means that 1 of DP's 2 sites had concerns and 4 of the 16 total concerns identified by the Tiger Team Assessments are discussed in that subsection. For the overall discussion of each discipline, the total number of findings or concerns are shown in the heading.

training (4 of 9), with 1 root cause in the area of formality in operations. The central theme of the environmental commitment root causes lay in the need for a change in management's culture and its attitude toward ES&H affairs. The programs at DP were program-driven with little ownership of ES&H programs. In the human resources and training performance area, the focus was on the lack of the sufficient number of qualified ES&H professionals, performance measures, and strong training programs.

TABLE 6.1. Summary of M&O Key Findings for DP Sites

M&O Key Finding Discipline	SNL	LANL	TOTAL
Program Evaluation	2	1	3
ES&H Planning	1	1	2
Formality of Operations	1	0	1
Resources & Training	1	1	2
ES&H Program Commitment	0	1	1
Organizational Structure	0	0	0
TOTAL	5	4	9

6.1.3 Key Findings (total: 9)

Nine key findings were evaluated to determine whether any common trends existed in the characteristics that defined key findings, so DP can use this knowledge in planning its strategy to achieve ES&H excellence. In evaluating the DP M&O key findings, each M&O finding in each DP Tiger Team Assessment report was reviewed, analyzed, and sorted according to similar themes. M&O key findings typically represent a synthesis of many issues. In sorting the key findings, the overriding issue being communicated was determined, and the key finding was then assigned to a performance area. Table 6.1 above summarizes the key findings.

Program Evaluation (2 of 2 sites, 3 of 9 key findings). The key findings related to audits, appraisals, and surveillance programs. The sites did not have well-designed programs for conducting independent oversight of ES&H activities. The oversight programs were neither comprehensive nor rigorous and formal enough to ensure that thorough evaluations were conducted. In addition, the evaluations were not scheduled at frequencies in line with DOE Orders, and the independence of the auditors was questioned because of the lack of organizational independence.

For this analysis, 3 performance areas were identified: roles, responsibilities, and authorities; ES&H goals and objectives; and organizational independence. The findings for DP all related to the first 2 performance areas.

The 7 findings in this discipline indicated the need to more formally define and communicate roles and responsibilities for a wide range of ES&H-related activities to support meeting DOE ES&H performance objectives.

Roles, Responsibilities, and Authorities (2 of 2 sites, 6 of 7 findings). The findings were associated with a lack of formal documentation and understanding of individual and organizational roles and responsibilities in a range of different areas. Two findings identified deficiencies related to external affairs: coordination with state oversight groups and community relations. Stop work authority was inadequately defined at the 2 sites. Other deficiencies related to facilities and equipment maintenance, training, and internal oversight activities.

Goals and Objectives (1 of 2 sites, 1 of 7 findings). The 1 finding related to a lack of documented ES&H goals and objectives, as well as a lack of a formal mechanism to monitor progress toward such goals.

6.1.5 ES&H Program Commitment (total: 6 findings)

For this discipline, the Tiger Teams assessed the commitment to excellence demonstrated by formal ES&H policy, top management support, and line responsibility. The existence and content of ES&H policy were evaluated, including issuance of formal environmental policy statements that reflected the site's goals, guidance to attain those goals, and the commitment of senior management. Top management support was assessed based on demonstration of commitment to programs and performance. Line responsibility was evaluated based on the sense of responsibility demonstrated by managers and operating personnel.

For this analysis, 2 performance areas were identified: management support and ES&H policy.

Analysis indicated the need for management support for ES&H programs to reflect DOE's ES&H priority and the need to improve ES&H policy guidance.

Management Support (2 of 2 sites, 5 of 6 findings). The 5 findings focused the lack of funding and staffing commitment; lack of acknowledged management ownership of ES&H programs; and lack of a commitment to compliance.

ES&H Policy (1 of 2 sites, 1 of 6 findings). The 1 finding identified the lack of effective ES&H policy guidance provided by the Area Office.

6.1.6 Resources and Training (total: 11 findings)

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at the sufficiency of environmental staffing resources and the completeness of the organization's systems for

Cost Plus Award Fee Programs (1 of 2 sites, 2 of 7 findings). The findings focused on the lack of specific performance indicators to determine ES&H performance. The CPAF program system was limited in its ability to objectively evaluate the program's ES&H status.

6.1.8 Formality of Operations (total: 13 findings)

For this discipline, the Tiger Teams reviewed regulatory procedures and programs, and recordkeeping and reporting. The management systems were evaluated for their ability to provide the formal guidance and direction for ensuring that DOE Orders and regulations were properly received, disseminated, and incorporated into existing site procedures. Procedures and programs were examined for incorporation of guidance, regulations, and Orders into viable and complete programs. Recordkeeping and reporting were examined with regard to incident reporting systems and formality of recordkeeping and reporting.

For this analysis, 3 performance areas were identified: procedures and programs, regulatory tracking, and recordkeeping and reporting. The 13 findings all focused on the informality of ES&H procedures and programs.

Procedures and Programs (2 of 2 sites, 13 of 13 findings). Twelve of the findings focused on the lack of programs or the lack of complete programs to carry out the missions of the ES&H programs, including configuration management, ES&H prioritization, conduct of operations, quality assurance (QA), audit item closeouts, and oversight of contractors. One finding focused on incomplete implementation of funded work contracting requirements. Findings in this area were directed to sites, and Area and Field Offices.

6.1.9 Communications (total: 4 findings)

For this discipline, the Tiger Teams reviewed the existence and effectiveness of internal and external communications systems. The effectiveness of internal communications was assessed by evaluating the understanding of roles and responsibilities and the awareness of ES&H policies, procedures, and programs throughout the organization. The extent and effectiveness of external communications were assessed by evaluating the relationship the site had with oversight agencies and citizen and environmental groups.

For this analysis, 2 performance areas were identified: internal communications and external communications.

The 4 findings indicated the need to develop a comprehensive employee communications program to ensure the top-down, bottom-up, and lateral communication of ES&H information. In addition, an external communications program needed to be developed for effective interaction with external parties such as regulatory agencies and community groups.

Internal Communications (1 of 2 sites, 2 of 4 findings). One finding focused on the lack of a comprehensive employee communications program, and the other finding was associated with implementing the employee concerns program to achieve ES&H objectives.

6.2.1 Noteworthy Practices

Noteworthy practices are listed in this section. Since noteworthy practices are, by definition, "exceptional practices," and would therefore usually be unique to a single DOE site, no further analysis is provided here for these items. An indepth analysis of noteworthy practices within the DOE site system can be found in *Noteworthy Practices* (DOE 1992).

SNL, Albuquerque, had prepared a summary wall chart to illustrate applicable Federal, state, and local regulations and their relation to DOE Orders and the development of site policies and procedures and a document containing a summary of pertinent sections of DOE ES&H Orders and a fact sheet on each DOE Order that identifies the site organization and individuals responsible for carrying out the orders that apply to them.

TABLE 6.3. Summary of Environment Key Findings for DP Sites

Environment Key Finding Discipline	SNL	LANL	TOTAL
Formality of Programs	1	1	2
Environmental QA/ Oversight	2	2	4
Inactive Waste Sited	0	0	0
Waste Management	1	1	2
Toxic & Chemical Materials	0	0	0
TOTAL	4	4	8

6.2.2 Key Findings (total: 8 key findings)

Key findings, as shown in Table 6.3 above, were reviewed, analyzed, and sorted to determine whether common trends existed. Because environmental key findings typically represented common issues from several of the environmental disciplines, a determination was made as to the overriding issue being communicated. Based on that determination, the key finding was placed within the appropriate one of the 5 disciplines that were used for the key finding analysis: formality of environmental programs; environmental quality assurance and oversight; inactive waste site identification, investigation, and remediation; waste management; and toxic and chemical materials.

The review identified 8 key findings. Three key finding disciplines were represented: environmental QA and oversight, waste management, and formality of environmental programs.

TABLE 6.4. Summary of Environment Findings for DP Sites

Environment Finding Discipline	SNL	LANL	TOTAL
Air	12	8	20
Surface/Drinking Water	8	14	22
Groundwater/Soil, Sediment & Biota	5	8	13
Waste Management	24	19	43
Toxic & Chemical Materials	2	15	17
QA/QC	8	17	25
Radiation	15	15	30
Inactive Waste Sites	6	13	19
NEPA	6	5	11
TOTAL	86	114	200

The following sections summarize and analyze environmental findings across the DP sites, as shown in Table 6.4. Each of the following sections focuses on 1 environmental discipline and its performance areas.

6.2.3 Air (total: 20 findings)

For this discipline, the Tiger Teams assessed the current operating practices with regard to regulations promulgated under the Federal Clean Air Act, pertinent state statutes, DOE Orders and guidance, Secretary of Energy Notices (SEN) requirements, best management practices, and internal policies and procedures.

For this analysis, 5 performance areas were identified: ambient air impact surveillance, appropriate emission controls, compliance with permit and regulatory conditions, permit management, and emissions tracking.

The 2 Tiger Team Assessments of DP facilities identified 19 CFs, and 1 BMPF. One of the emission tracking compliance findings was from a group of findings identified as contractor-specific.

Ambient Air Impact Surveillance (2 of 2 sites, 5 of 20 findings). While both sites had some meteorological information available, valid data that represented site conditions for emergency response purposes were not available. One DP site did not have meteorological or ambient impact surveillance monitoring. Where the site meteorological program was operating, formal operating procedures, calibration procedures, adequate resources and staff training, and proper siting evaluation were lacking.

monitoring discharges to sewer systems. Sites did not have internal verification procedures and had not implemented protective measures to ensure ongoing compliance with regulatory requirements. In addition one site did not use available monitoring data in its NPDES permit re-application and therefore may not have properly characterized the nonradioactive contaminants.

Drinking Water (2 of 2 sites, 5 of 22 findings). Neither site had a backflow prevention program, and neither had developed a comprehensive program to inventory, test, and maintain backflow prevention devices. In addition, 1 site had a finding regarding the potential to contaminate groundwater from an onsite septic system. In general, these findings were attributed to the lack of internal verification procedures ensuring ongoing compliance.

SPCC Programs (2 of 2 sites, 4 of 22 findings). Both sites had incomplete SPCC plans, while 1 site also did not effectively implement the spill plan.

DOE Order and EO Programs (1 of 2 sites, 1 of 22 findings). One site was not on schedule to meet DOE 5400.1 mandated deadlines for implementing the site's effluent monitoring and surveillance program.

6.2.5 Groundwater/Soil, Sediment, and Biota (total: 13 findings)

For this discipline, the Tiger Teams evaluated both the programmatic and technical status of groundwater protection and monitoring as it related to regulations, industry guidance, and best management practices; the environmental monitoring programs of these media; the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and programs and procedures established to prevent future contamination and prevent the spread of contamination from currently contaminated areas to clean areas. Regulations include the requirements of DOE, Resource Conservation and Recovery Act (RCRA), CERCLA/SARA, and state regulations.

All identified groundwater program deficiencies fell under Groundwater Protection Management Program (GPMP) and GPMP Plan general requirements, since they comprised the site-wide groundwater management, protection, and monitoring programs. Within the GPMP, the findings can be grouped into 3 performance areas: groundwater monitoring and surveillance; well construction, maintenance, and abandonment; and hydrogeologic characterization.

The performance areas for soil, sediment, and biota findings were soil, sediment, and biota monitoring; and surveillance programs and ecological impact/protection.

In this discipline, 13 findings were identified, 9 CFs and 4 BMPFs. The groundwater program had 7 CFs and 4 BMPs; the soil, sediment, and biota programs had 2 CFs.

Groundwater Monitoring and Surveillance (2 of 2 sites, 7 of 13 findings). Neither site had a GPMP Plan or formal sampling and sample handling procedures that met the requirements of DOE Order 5400.1. Although the program at 1 site

Waste Management Facilities (2 of 2 sites, 13 of 43 findings). Both sites had deficiencies in managing satellite hazardous waste accumulation areas and underground storage tanks. Each site had a finding related to the improper operation or management of a nonhazardous waste landfill. Procedures for operating hazardous and mixed waste TSDFs were not complete, resulting in noncompliance with Federal and state requirements.

Waste Management Programs (2 of 2 sites, 12 of 43 findings). Both sites had recordkeeping deficiencies in their training programs. Neither site had implemented a waste minimization program plan that met the requirements of DOE 5400.1 and 5820.2A.

6.2.7 Toxic and Chemical Materials (total: 17 findings)

For this discipline, the Tiger Teams evaluated compliance with regard to TSCA, FIFRA, HMTA, DOE Orders, applicable state regulations, internal policies and administrative memoranda, and best management practices. The use, storage, and disposal of PCBs and pesticides were compared to regulations promulgated under TSCA and FIFRA, respectively, as well as state requirements. The receiving, handling, and storage of chemicals were assessed for compliance with DOE Orders, Federal and state regulations, and best management practices.

For this analysis, 4 performance areas were identified: toxic and chemical materials management, PCB management, pesticide management, and Pollution Prevention Awareness Plan (PPAP) plans. The DP findings were sorted into the first 3 performance areas.

In this discipline, 17 findings were observed, 16 CFs and 1 BMPF. A total of 14 findings (13 CF, 1 BMPF) were clustered in 2 performance areas. The clustering of findings in toxic and chemical materials (TCM) management (8 CF) and in PCB management (5 CF, 1 BMPF) indicated that formal policies, procedures, recordkeeping, and administrative controls were not consistently developed and implemented at DP sites. An additional performance area, pesticide management, contained similar deficiencies (3 CF) in the control and oversight of pesticide applications. Formalized programs, procedures, and oversight mechanisms to control, track, store, and oversee operations using TCM were lacking and inconsistent at both DP sites.

Toxic and Chemical Materials Management (2 of 2 sites, 8 of 17 findings). The number of findings indicated that formal policies, procedures, recordkeeping, and administrative controls were not consistently developed at the 2 DP sites.

Formal administrative controls to identify, label, segregate, manage, and track TCM were not implemented at one of the sites. The lack of formality had resulted in the potential for mismanagement, noncompliance in storage and recordkeeping, and releases of asbestos and other TCM from the site to the environment. In addition, the requirements of SARA Title III Community Right-to-Know regulations were not being met. At the other site, there was no program adequate to ensure that all TCM were being stored in a manner that would prevent release to the environment.

Sampling and Analysis (2 of 2 sites, 7 of 25 findings). The inconsistent implementation of procedures for proper use of standards and instrument calibration had the potential to compromise the validity and reliability of environmental monitoring and surveillance data. At one site, inconsistent documentation and implementation of chain-of-custody for field sampling activities and inadequate laboratory space and sample handling during storage jeopardized the integrity of analytical samples. Sample analyses and data management activities were performed either without SOPs or with unapproved procedures at the same site. In addition, this site did not have a program to ensure that computer software underwent formal validation or verification.

6.2.9 Radiation (total: 30 findings)

For this discipline, the Tiger Teams Assessment consisted of evaluating current operational practices and programs to determine compliance status with Federal, state, and local regulations, and DOE Orders. The programs were also reviewed against DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," and against commonly accepted best industry practices and standards of performance. The assessments addressed actions to minimize the spread of radioactive materials through the environment, including ALARA (as low as reasonably achievable) programs as mandated by DOE 5400.5, effluent monitoring, environmental surveillance, and preoperational monitoring. Also addressed were public dose determinations from daily and emergency activities (DOE 5500.3A), residual radioactive materials, and contamination control (DOE 5820.2A and 5400.5). The assessment addressed facilities' abilities to respond to a radiological emergency.

For this analysis, 6 performance areas were identified: protection of the environment, radiological reporting requirements, protection of the public, radioactive and mixed waste management, radiological emergency planning, and SARs.

There were 29 CFs and 1 BMPF. Improvement was needed in the areas of effluent monitoring, environmental surveillance, environmental contamination control, demonstration of compliance with National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides, and radioactive waste management.

Protection of the Environment (2 of 2 sites, 16 of 30 findings). The 16 CFs identified inadequate programs for monitoring and controlling the tritium content and quantity of liquid effluent discharges, and applying best available technology to liquid radioactive effluent discharges. Pre-operational monitoring of new facilities, an inability to demonstrate compliance with NESHAPs for radionuclides, absence of an environmental ALARA program were also noted in the deficiencies.

Radiological Reporting Requirements (2 of 2 sites, 7 of 30 findings). Of the 7 findings, 6 were CFs and 1 was a BMPF. The findings focused on lack of certification of compliance with DOE 5400.5, errors in or omissions from ASERs and ODIS reports, and a delinquency in environmental monitoring plan development.

change and growth. Programmatic deficiencies were identified in conjunction with virtually all regulatory requirements and DOE Orders that pertained specifically to environmental restoration activities. Findings cited absent or inadequate policies, programs, and procedures to evaluate and manage transferred property and to conduct community relations programs at both sites. One site had not met such regulatory requirements as the establishment of a complete administrative record, appropriate resource damage assessment notification of trustees, the filing of timely monthly management and quarterly technical progress reports. This site had received no formal Field Office guidance for planning a corrective action program that would comply with CERCLA, RCRA, and DOE Orders and had not formally developed or implemented guidance on ER Program involvement in construction projects at solid waste management unit areas.

Preliminary Assessment and Site Characterization (2 of 2 sites, 5 of 19 findings). The findings consisted of 2 CFs and 3 BMPFs. Programs for the characterization of inactive waste sites at both sites were found to be either inconsistent across operable units or less than fully developed and implemented. One site had not undertaken implementation of its program for audits and appraisals of ER activities and did not have a formal, consistent, and documented program for risk management at IWSs. The resolutions of discrepancies in assessments performed under different EPA programs at the same site were not documented.

Hazardous Chemical Reporting (2 of 2 sites, 2 of 19 findings). The programs and procedures that were in place at 1 site were insufficient to identify all activities that might release reportable quantities. At the other site, site-wide procedures for reporting releases are not adequate to ensure compliance with applicable regulations.

6.2.11 NEPA Programs (total: 11 findings)

For this discipline, the Tiger Teams assessed the NEPA management structure and NEPA review processes; NEPA procedures and documentation; compliance with NEPA, Council on Environmental Quality (CEQ) regulations, and DOE NEPA Guidelines, Orders, and guidance memoranda; and the adequacy of guidance and oversight from Program Secretarial Officers and the Assistant Secretary for Environment, Safety and Health (EH-1).

For this analysis, 5 performance areas were developed: program incorporation and implementation; planning, integration, and coordination; site-wide policy and procedures; tracking and recordkeeping; and guidance and training. The DP findings were sorted into the first 4 performance areas.

Of the 11 findings at the DP sites, 10 were CFs and 1 was a BMPF. Although both sites were not fully in compliance during the assessments, their programs were well developed and coordinated. A potential weakness identified in the 2 programs was that NEPA usage, as a doctrine and tool for making environmentally concerned decisions, had not spread outside of the ES&H community.

unique to a single DOE site, no further analysis is provided here for these items. An indepth analysis of noteworthy practices within the DOE site system can be found in *Noteworthy Practices* (DOE 1992).

At SNL management developed and distributed a flowchart that listed all ES&H requirements at SNL, Albuquerque, and how these requirements fed into ES&H policy, programs, manuals, and finally into operating procedures. The noteworthiness of this flow diagram was that, posted in conspicuous places around the Laboratory, it provided at a glance the entire list of ES&H regulations.

TABLE 6.5. Summary of S&H Key Concerns for DP Sites

S&H Key Concern Discipline	SNL	LANL	TOTAL
Noncompliance	1	3	4
S&H Programs	3	6	9
Oversight	0	2	2
Management Systems & Resources	3	9	12
TOTAL	7	20	27

6.3.2 Key Concerns (total: 52)

Key concerns for S&H are shown above in Table 6.5. The key concerns were reviewed, analyzed, and sorted to determine whether common trends existed. Because S&H key concerns typically represented common issues from several of the disciplines, the overriding issue was identified. Based on that determination, the key concern was placed into 1 of the 4 key concern disciplines: ineffective contractor management system or organizational structure; missing, deficient, or ineffective programs; identified noncompliance; and ineffective oversight by DOE.

Ineffective Contractor Management System or Organizational Structure. (2 of 2 sites, 12 of 27 key concerns). A number of key concerns at the DP sites were identified as management-related. Specific examples include failure to provide necessary training, not having a plan to manage S&H resources, lack of a line safety function, no documentation hierarchy, and failure to provide an organizational structure to carry out S&H initiatives.

Missing, Deficient, or Ineffective S&H Programs Documentation. (2 of 2 sites, 9 of 27 key concerns). Program related key concerns address deficiencies in specific S&H related programs including training, fire protection, safety review, radiological protection, and maintenance. Additionally, key concerns were identified at both DP sites which addressed deficiencies in the overall safety and health programs.

Fire Protection (2 of 2 sites, 11 of 52 Category I and II concerns). Concerns noted substantial noncompliance with various requirements of NFPA 72 and 101, Life Safety Code, and 29 CFR 1910. Noncompliance included lack of requirements to ensure reliable fire protection systems, deficiencies in emergency voice notification systems, evacuation procedures that caused occupants to be detained up to 10 minutes after a fire alarm signal, and issues in means of egress. The Area Office had not ensured the availability of trained fire department personnel, and the site did not ensure complete corrective action before closing out Category II concerns.

Radiological Protection (2 of 2 sites, 6 of 52 Category I and II concerns). The common concern at the DP sites related to contamination control program deficiencies. Radioactive contamination control in contaminated areas and release of materials from these areas did not meet the requirements of DOE Orders.

Packaging and Transportation (2 of 2 sites, 4 of 52 Category I and II concerns). Packaging and transportation programs and procedures at the DP sites did not satisfy or implement DOE requirements. At 1 site, there were no controls to prevent loading or transport of hazardous materials by untrained and unqualified personnel.

Operations (2 of 2 sites, 4 of 52 Category I and II concerns). At 1 site, several Category II deficiencies were observed relating to a lack of formality in operations. The site was unable to demonstrate compliance with technical specifications. A Qualified shift supervisor was unavailable to exercise command functions at one facility. At another facility the safety implications of a cracked fuel ring had not been evaluated.

Emergency Preparedness (2 of 2 sites, 4 of 52 Category I and II concerns). Emergency preparedness programs and procedures did not reflect DOE requirements. Individual facilities were unable to demonstrate that they could satisfactorily detect, react to, coordinate or mitigate emergency situations as required by DOE Orders. Site-wide emergency notification systems were deficient at one site.

Personnel Protection (2 of 2 sites, 4 of 52 Category I and II concerns). Lockout/tagout systems failed to meet DOE and OSHA requirements. At 1 site asbestos work was not properly controlled. The laser safety and confined space programs were also deficient.

Organization and Administration (2 of 2 sites, 2 of 52 Category I and II concerns). Management at 1 DP site was unable to demonstrate that an individual facility was being operated within and evaluated and approved safety envelope.

Maintenance (2 of 2 sites, 1 of 52 Category I and II concerns). Installation, modification and maintenance of cranes at 1 site was not in accordance with OSHA requirements.

TABLE 6.7. Summary of S&H Concerns for DP Sites

S&H Concern Discipline	SNL	LANL	TOTAL
Organizational & Administration	19	41	60
Quality Verification	10	38	48
Operations	18	40	58
Maintenance	22	29	51
Training & Certification	4	36	40
Auxiliary Systems	7	50	57
Emergency Preparedness	9	29	38
Technical Support	3	22	25
Packaging & Transportation	9	50	59
Nuclear Criticality	10	14	24
Security/Safety Interface	6	11	17
Experimental Activities	5	13	18
Site/Facility Safety	4	20	24
Radiological Protection	24	74	98
Personnel Protection	0	36	36
Worker Safety	19	16	35
Industrial Hygiene	13	0	13
Occupational Safety	12	0	12
Fire Protection	10	56	66
Medical Services	8	16	24
Aviation Safety	N/A	16	16
Explosives Safety	8	12	20
Natural Phenomena	N/A	14	14
Firearms Safety	22	N/A	22
TOTAL	242	633	875

as required by DOE 5480.19. At the second site, roles, responsibilities, interfaces, and job qualifications also were not clearly defined for and among many of the site's organizations.

Recordkeeping and Reporting (2 of 2 sites, 9 of 60 concerns). Programs lacked the consistent document control and incidence reporting needed to ensure compliance with DOE Orders.

Document control programs were deficient in several areas. One site had no uniform requirement for periodic review and update of controlled documents and no independent audit system to ensure that individual copies of controlled documents were maintained current, as required by DOE 5480.19. Also at that site, important records were not always stored according to the requirements of DOE 1324.2A, NFPA 232, and American Society of Mechanical Engineers (ASME) NQA-1-1989.

At the second site, a consistently applied document control system was not in place for important safety-related documentation, and current methods did not provide positive assurance that uncontrolled or outdated versions of "controlled documents" did not become working documents. The occurrence reporting system for incidents at the site was inconsistent at some facilities and incomplete at others; less serious incidents were not always reported and investigated as required by DOE 5000.3A and 5480.19.

Policies and Procedures (2 of 2 sites, 5 of 60 concerns). Policies and procedures were not consistently developed and implemented to ensure compliance with DOE Orders.

At 1 site, procedures for some safety-related activities, including operational readiness reviews, restarts, and revisions to Safety Analysis Reports, were not in place in the Operations Office as required by SEN-16A-90. At the second site, no system existed in the Nuclear Materials Technology Division to ensure that the nongeneric safe operating procedures involving operations with significant risk received independent safety reviews, as required for compliance with DOE 5480.5. That site did not have a hierarchy of documentation to provide the policies, programs, plans, procedures, and guidance needed at the tritium and reactor facilities to ensure consistent safety programs that met the various DOE Orders and requirements.

6.3.5 Quality Verification (total: 48 concerns)

For this discipline, the Tiger Teams reviewed programs and controls for procurement and supplier control, receiving and pre-installation inspections, calibration of measuring and testing devices, control and use of hardware and materials, inspection procedures, and control of special processes. Consideration was given to documentation of adequate procedures and the qualification of personnel, procedures, and equipment.

For this analysis, 5 performance areas were identified: programs and program implementation, procedures, materials and process control, training and certification, and audits and oversight.

For this analysis, 7 performance areas were identified: policies, programs, and procedures; worker qualifications and operation activities; documentation of operations; evaluation and analysis; communication; work practices; and testing and verification. Concerns at the DP sites were sorted into the first 4 performance areas.

Policies, Programs, and Procedures (2 of 2 sites, 29 of 58 concerns). Policies, programs, and procedures were not developed and implemented in compliance with DOE requirements.

Policies, programs, and procedures at the sites were either not fully developed or not implemented as required by DOE Orders. Components of some policies, programs, and procedures at the sites were identified as not effective in maintaining and improving safe operations. The DOE Order most frequently cited was DOE 5480.19

Worker Qualifications and Operation Activities (1 of 2 sites, 11 of 58 concerns). Duties and responsibilities of personnel and management were not defined or were not being carried out in a manner to ensure the safe and effective performance of facility operations.

Concerns related to personnel not having the qualifications or necessary training to perform their duties. Additional concerns related to management not providing guidance or oversight in areas required by DOE Orders, the most frequently cited DOE Order being DOE 5480.19.

Documentation for Operations (2 of 2 sites, 9 of 58 concerns). Documentation and records for operations were not maintained as required by DOE Orders.

Concerns related to a lack of documentation for facility operations, position responsibilities, and authorities. In addition, operations records, safety analyses, and other documentation were not properly maintained or were incomplete. Additional concerns identified a lack of documented personnel responsibilities and qualifications. The most frequently cited DOE Order was DOE 5480.19.

Evaluation and Analysis (2 of 2 sites, 9 of 58 concerns). Evaluation and analysis of operations and equipment were not fully performed or were not conducted.

Operations and equipment were not fully evaluated or analyzed to ensure that facilities and equipment were safely operated. One concern at 1 site cited that the shift routine in the design of a control panel had not been considered. The lack of evaluations and analyses at the other site resulted in the continued use of equipment and a facility in a condition that could have affected the safety of operations. Additional concerns at that site ranged from a lack of consideration of human factors to the improper assignment of hazard classes.

6.3.8 Training and Certification (total: 40 concerns)

For this discipline, the Tiger Teams reviewed training organization and administration for the ability to identify training needs and ensure that needs are met; quality of training for reactor and nuclear facility operations (with nuclear criticality safety and simulator training/facility exercises), personnel protection, maintenance, quality control inspector, nondestructive examination technician, radiological protection, and supervisory and managerial skills; and the support provided by training facilities, equipment, and materials.

For this analysis, 6 performance areas were identified: training and certification programs, examinations, facilities and equipment, records, DOE/Field/Area/Site Office training and certification, and management of programs. The DP concerns clustered in the first 3 performance areas.

Many basic elements of complete programs were absent or not fully implemented at the DP sites.

Training and Certification Programs (2 of 2 sites, 35 of 40 concerns). Training and certification programs at the DP sites did not fully meet the requirements of DOE 4330.4A, 5480.5, 5480.11, and 5480.20.

Training and certification programs did not always meet the requirements of DOE Orders. Training plans were not developed in many cases; and, when these plans existed, training was not conducted according to the formal plan. Both sites had training and certification programs, although some required elements of these programs were informal and undocumented. Management had not established policies or procedures that provided the basis for the training and certification programs. Deficiencies were noted in the general employee training programs, radiological technician training programs, and manager and supervisor training programs.

Training and Qualification Exams (2 of 2 sites, 4 of 40 concerns). Training and certification examinations at the DP sites were not always conducted and, when conducted, did not fully meet DOE policies and requirements.

The concerns indicated that the examination and certification process at the DP sites did not ensure that a defined level of proficiency was achieved. Written examinations were not always conducted, and oral exam results were not documented. The exams did not test for overall proficiency of the subject matter. The DP sites did not exercise control and oversight of the examination process.

Training Facilities and Equipment (1 of 2 sites, 1 of 40 concerns). Training facilities and equipment did not meet the site's training needs.

Training facilities and equipment at 1 site did not effectively support the DOE's training objectives.

Ventilation Systems (2 of 2 sites, 14 of 57 concerns). A design problem in the operating procedures of ventilation systems could have resulted in a discharge of contaminated effluents into the environment.

Exhaust stacks from materials and incinerators were not equipped with real-time monitoring equipment, and exhaust systems equipped with high-efficiency air filters did not have programs to predict the required maintenance intervals. Several operating facilities were plagued with air balancing problems that created the potential for uncontrolled migration of contaminants into occupied clean areas. Formal configuration control programs were not in place for either ventilation systems or for auxiliary heat removal systems at one site's facilities.

Waste Systems (2 of 2 sites, 11 of 57 concerns). Waste handling and waste minimization practices were not effectively implemented at DP program sites.

The monitoring, storage, and disposal of hazardous and radioactive effluents were not consistent as required by DOE mandates, and DOE Headquarters did not provide the defense waste generator certification necessary to meet requirements of NVO-325. Drainage systems and underground storage tanks for radioactive process water were not monitored to ensure the safety of building occupants. Effluent pathways were not continuously monitored for the presence of contaminated materials, and a program to address the ALARA of radioactive waste was not formally developed at 1 site, as required by DOE regulations. Restrictions on low-level radioactive waste stored in that site's facilities were not properly controlled. In addition, assurances were not provided that tritium effluent releases were measured and quantified accurately as required.

Emergency Power Systems (1 of 2 sites, 6 of 57 concerns). Formalized programs for training, operation, and maintenance of auxiliary power supply equipment were not established.

Power panel indicator lights for auxiliary equipment were not uniformly color coded to support consistent operation. Emergency and standby power systems at the sites were not tested according to the requirements of NFPA 110. Tests were not conducted to evaluate the quality of diesel fuel supply for emergency generators, and programs to assess the need for power systems were not evaluated.

6.3.10 Emergency Preparedness (total: 38 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the emergency plan and its implementing procedures; emergency response training; drills and exercises, emergency facilities, equipment, and resources; and personnel protection procedures. Organization and administration of emergency preparedness programs were evaluated for their ability to ensure effectively planning for and response to site/facility emergencies.

For this analysis, 5 performance areas were identified: compliance, facilities and resources, management support, training, and drills.

unsatisfactory because of poor command and control at the EOC and at the on-scene exercise control points, deficient performance by both the onsite and offsite field emergency response teams, and the inability of emergency personnel to perform their functions as required in DOE 5500.3 and 5500.3A. This site also did not have an emergency drill and exercise program as required by DOE.

6.3.11 Technical Support (total: 25 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of implementation and control for technical support activities, technical support procedures and documents, and equipment performance testing and monitoring. Technical support services required for facility modifications were evaluated for proper design, review, control, implementation, and timely documentation. Efforts to minimize the environmental impact of operations were assessed, as well as the conformance of packaging and transportation functions to existing standards and regulations. For reactors only, technical services in engineering activities and criticality safety were evaluated for comprehensiveness and efficiency.

For this analysis, 5 performance areas were identified: regulatory compliance, safety-related issues, policies and procedures, facility modifications, and documentation.

Regulatory Compliance (2 of 2 sites, 9 of 25 concerns). Individual responsibilities and authorities for technical support activities are not clearly delineated throughout DP sites.

Roles and qualifications for S&H technical support personnel and their working relationships with line organizations were not clearly defined, resulting in a lack of responsibility for maintaining day-to-day oversight of the line organizations to ensure compliance with DOE requirements. In addition, written job descriptions were not provided for professional positions at several DP site facilities, resulting in a lack of technical specifications and operational requirements as required by DOE mandate.

Safety-Related Issues (2 of 2 sites, 8 of 25 concerns). Safety review programs and controls have not been implemented to ensure that facility operations are properly evaluated as required in DOE mandates.

Safety assessments and Safety Analysis Reports were not completed for the sites, and those completed to date did not meet several of Federal and DOE requirements. Technical support activities with an emphasis on safety were not always controlled or reviewed in a way that ensures the proper protection of facility personnel. In addition, Safety Analysis Reports are not receiving timely review by DOE organizations to ensure compliance with established DOE requirements. Fissile and combustible materials were being stored improperly at 1 site.

meet DOE standards, improperly marking and labeling packages; and improperly maintaining shipping records. Packaging and transportation activities at the second site were not conducted according to site policies.

Management Systems (2 of 2 sites, 16 of 59 concerns). Management systems did not provide control over packaging and transportation activities as required by DOE Orders and DOT regulations.

Neither site had a site-wide management system to ensure compliance with DOE Orders and DOT regulations. This included oversight of packaging and transportation activities related to plutonium and enriched uranium at one site, and provision for independent safety oversight at both sites.

Quality Assurance (2 of 2 sites, 14 of 59 concerns). QA oversight of packaging and transportation activities did not meet DOE requirements.

At 1 site, QA programs were not developed, and at the other site they were inadequate to ensure compliance with DOE requirements. At 1 site some programs were fragmented and inconsistent; the programs were not operating uniformly across the site. That site's QA manual did not meet DOE standards, and independent audits were not conducted as required by DOE.

Training and Certification (2 of 2 sites, 5 of 59 concerns). Training and certification of site personnel involved in packaging and transportation of hazardous materials did not fully comply with DOE Orders and DOT regulations.

Training programs at the sites either were nonexistent or were missing required elements of a completely functional program. At 1 site, concerns noted a lack of documentation for personnel that had received training.

6.3.13 Nuclear Criticality Safety (total: 24 concerns)

For this discipline, the Tiger Teams reviewed the appropriate use of safety control parameters to achieve nuclear criticality safety; the conduct of evaluations to ensure that the design and operation of process equipment will maintain subcriticality; the inclusion of criticality safety limits in approved operation procedures; and the planned mitigation of the consequences of a nuclear criticality accident.

For this analysis, 2 performance areas were identified: oversight and nuclear criticality safety programs, and criticality safety procedures and monitoring.

Oversight and Nuclear Criticality Safety Programs (2 of 2 sites, 13 of 24 concerns). Site management did not fully implement nuclear criticality safety policies and procedures to provide effective control during all activities.

Management of both sites did not fully implement an independent review and appraisal system to satisfy all nuclear criticality safety requirements of DOE Orders. In addition, the local DOE Field Offices for both sites had not performed required periodic appraisals related to nuclear criticality safety.

Safety of Improvements (1 of 2 sites, 2 of 17 concerns). Improvements or modifications to the security system (facility and procedures) were not formally reviewed for operational safety before they were implemented.

The concerns dealt with the procedures for safety of improvements to the security system. One facility had no approval procedures for reviewing modifications under $150,000, and general procedures did not ensure that all affected parties appropriately reviewed design changes.

6.3.15 Experimental Activities (total: 18 concerns)

For this discipline, the Tiger Teams reviewed the interface between experimenters and operational groups for clear definition; the process, including approval by an Independent Safety Review Committee, for adequacy and completeness; and the performance experiments for risk control and safety.

For this analysis, 4 performance areas were identified: experiment categories/reviews; risk assessment and operation of experiments; experiment proposals/planning; and experimenter training, roles, and responsibilities.

Experiment Categories/Reviews (2 of 2 sites, 8 of 18 concerns). Proposed experiments were not formally approved through an independent safety review before they were performed.

The concerns addressed problems in experimental plans receiving a formal and unbiased review as required by DOE 5480.5. In some cases, review committee memberships could not ensure an independent and unbiased review, as required by DOE 5480.5 and 5480.6. One concern indicated a lack of a formalized method to ensure the safety experiments sponsored by outside organizations. A concern was noted that safety committees were not given complete opportunity to review and approve experiments before they were conducted.

Risk Assessment and Operation of Experiments (2 of 2 sites, 4 of 18 concerns). Experiments performed on the site did not receive a thorough risk evaluation to ensure that an undue risk or significant increase in risk was not present.

Several concerns indicated that the sites lacked program controls to evaluate the risks of planned experiments to ensure that experiments were performed without significant increase in risk to operating the facility. One concern suggested the system used was flawed and did not meet the requirements. Another concern indicated that experiments were conducted without any prior risk analysis being performed, as required by DOE 5481.1B.

Experiment Proposals/Planning (2 of 2 sites, 3 of 18 concerns). Experimental plans and/or evaluation criteria and guidance were insufficient to completely evaluate safety.

All three concerns dealt with the lack of a process being established to give guidance in evaluating experimental plans to ensure that all critical concerns were addressed.

ALARA; the accuracy of fixed and portable instrumentation and air monitoring systems; and the availability of records related to occupational radiation exposure.

For this analysis, 4 performance areas were identified: radiological protection procedures, radiological monitoring, oversight of radiological protection programs, and exposure control programs.

Radiation Protection Procedures (2 of 2 sites, 37 of 98 concerns). Procedures concerning radiological area posting, and internal and external dosimetry did not fully comply with DOE requirements.

The systems for radiation protection procedure were ineffective at both sites. Generally, procedures were incomplete or not fully implemented. At 1 site, the design and testing of a radiation warning and interlock system did not meet American National Standards Institute (ANSI) standards. For both sites, technical documentation relating to personnel dosimeter systems or issuance criteria was not complete. Further, the internal dosimetry programs at both sites lacked elements to ensure that the quality and accuracy of the programs met the requirements of DOE Orders.

Radiological Monitoring (2 of 2 sites, 23 of 98 concerns). Instrumentation and action limits used during radiological monitoring did not fully meet DOE requirements.

A program to inventory, track, and calibrate fixed and portable radiation survey instruments had not been fully implemented by both sites, as required by DOE Orders. High-range instrument calibration capability was lacking at 1 site. At both sites contamination monitoring programs did not meet DOE requirements.

Oversight of Radiological Protection Programs (2 of 2 sites, 19 of 98 concerns). Management did not fully implement DOE policies and requirements.

The concerns were fairly uniformly distributed between the 2 sites. Contractor management for both sites did not ensure effective implementation and control of radiological protection activities. The lack of written guidance and rigorous oversight resulted in inconsistent application and noncompliance with DOE Orders. These factors, coupled with little oversight by local DOE Field Offices, resulted in the lack of review of procedures and plans, infrequent scheduled inspections and audits, and ALARA programs that were not fully implemented.

Exposure Control Programs (2 of 2 sites, 19 of 98 concerns). External and internal radiation exposure control programs did not fully comply with DOE requirements.

One site had nearly 80% of the total number of concerns. Nevertheless, both sites did not fully implement programs to proactively control worker radiation exposure through surveys and a work permit system. Formal criteria for assigning personnel dosimeters had not been established at both sites, as

line management, QA departments, and ES&H divisions to ensure proactive rather than reactive S&H management. Several programs (e.g., industrial hygiene monitoring, construction safety oversight, confined space operations) could not be effectively implemented because program administrators and supervisor were not assigned, trained, or given authority over affected workers. Technical support was available only as needed, with no system to ensure that all S&H issues as well as all regulatory requirements were identified and adequately addressed.

Management of Occupational Hazards (1 of 2 sites, 6 of 36 concerns). The DP sites did not ensure that workplaces were kept free from occupational hazards.

The DP sites did not maintain technically based and effectively managed systems to identify, evaluate, control, and monitor chemical, physical, biological, and environmental hazards present in the worksite. Several potentially significant risks of chemical exposures to toxic and carcinogenic chemicals were identified, as well as many deficient walking and working surfaces, and several electrocution hazards, including unapproved electrical installations and damaged powered hand tools. The DP sites did not enforce a system of documented periodic safety inspections, audits, and reviews of facilities, operations, and new policies and procedures by technically qualified and adequately trained personnel according to DOE Orders. Several concerns identified the DP sites as not establishing proactive systems to effectively respond to, correct, and develop strategies to prevent the recurrence of previously identified occupational hazards.

Program Implementation and Training (1 of 2 sites, 5 of 36 concerns). Implementation of existing programs, policies, procedures, and work practices did not fully comply with Federal and DOE requirements.

Basic S&H concepts were not effectively communicated to line management and workers throughout 1 site, resulting in a lack of hazard recognition and control as well as noncompliance with various Federal and DOE requirements. Many administrative and operational aspects of that site's existing programs were not fully implemented and enforced (e.g., accident reporting practices, confined space entry, laser safety, hazard communication, special work permits, lockout/tagout, and carcinogens program).

Data Management and Information Transfer Systems (1 of 2 sites, 1 of 36 concerns). One site did not maintain easily accessible data management systems or fully comply with DOE and OSHA requirements for access to employee information.

The 1 concern addressed compliance with Federal and DOE access to employee information regulations and Orders. The site's data management system and information transfer policy concerning medical monitoring records, accident reports, and industrial hygiene monitoring data were ineffective and uncontrolled, resulting in delayed, incomplete, and nonexistent reporting of medical and monitoring information.

At 1 site, training concerns were identified in the following areas: diving safety, operation of powered industrial trucks, and crane safety. Training concerns at the second site were in the area of hazardous waste operation and emergency response.

6.3.20 Industrial Hygiene (total: 13 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the industrial hygiene program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure industrial hygiene performance; compliance with DOE-prescribed standards for occupational health; and the adequacy of information communicated to site/facility personnel about chemical, physical, and biological stresses that may be encountered in the work environment.

For this analysis, 4 performance areas were identified: administrative programs; hazard identification, evaluation, and control; staffing, resources, administration, and oversight; and information management, records, and documentation. Three concerns did not fit into a performance area, and the remaining concerns were sorted into the first 3 performance areas.

Administrative Programs (1 of 1 site, 4 of 13 concerns). The concerns in the industrial hygiene programs indicated an overall weakness in developing and/or implementing administrative programs designed to minimize occupational S&H hazards.

Three concerns identified weaknesses in the respiratory protection program, hearing conservation program, and carcinogen control program. In addition, the laboratory had not implemented a chemical hygiene plan. The fourth concern involved the laser safety program.

Hazard Identification, Evaluation, and Control (1 of 1 site, 4 of 13 concerns). Programs developed to identify, evaluate, and control occupational exposures to health hazards were either deficient or not fully implemented.

Programs to evaluate and control occupational exposures to carcinogens, toxic chemicals, noise, and lasers were either deficient or were not fully implemented. The site had not conducted initial exposure monitoring of workers exposed to carcinogens, reproductive toxins, or other hazardous chemicals and had not developed/documented its exposure monitoring strategy. The site's hearing conservation program did not meet DOE or OSHA requirements in that the site did not conduct adequate site-wide noise surveys, training was not provided in the proper use and limitations of hearing protection, and contractors were not informed of the location of high-noise areas.

Two concerns identified weaknesses associated with the labeling of hazardous chemicals and the posting of hazard warnings where employees may encounter specific hazards such as high-noise areas.

Training and Resources (2 of 2 sites, 4 of 66 concerns). The concerns related to the lack of adequately trained resources to properly implement an adequate fire protection program.

6.3.22 Medical Services (total: 24 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the organizational and administrative implementation and control of the medical services program; the appropriateness of procedures and documentation; the availability and adequacy of medical treatment and facilities and competency of staff; the effectiveness of reviews and audits; and the adequacy of information provided to personnel about the medical hazards that may be encountered and the medical services that are available.

For this analysis, 6 performance areas were identified: medical program design, procedures and documentation, staffing/training, review/audit, medical facilities and equipment, and management support. One site had 16 of the concerns.

Medical Program Design (2 of 2 sites, 7 of 24 concerns). The concerns focused on the lack of medical programs, lack of a review programs, lack of compliance programs, and lack of occupational health programs.

Procedures and Documentation (2 of 2 sites, 5 of 24 concerns). The concerns focused on the lack of documentation that medical services were uniformly and efficiently being delivered.

Staffing/Training and Awareness (2 of 2 sites, 4 of 24 concerns). The concerns focused on the lack of staff to provide the needed medical care.

Oversight Activities (2 of 2 sites, 4 of 24 concerns). The concerns focused on the lack of internal DOE oversight and contractor review programs.

Medical Facilities and Equipment (2 of 2 sites, 3 of 24 concerns). The concerns focused on the need for larger, better equipped facilities to provide medical care.

Management Support (1 of 2 sites, 1 of 24 concerns). Management commitment at the site was inadequate to fully support the medical services program.

6.3.23 Occupational Safety (total: 12 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the occupational safety program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure occupational safety performance; and the adequacy of information communicated to site/facility personnel about physical stresses that may be encountered in the work environment.

projects less than $150,000 did not include evaluation by professional safety personnel to ensure compliance with applicable OSHA standards as required by DOE 5483.10 and 5480.4.

6.3.24 Miscellaneous (total: 72 concerns)

This discipline includes 4 sub-disciplines. Where appropriate at individual sites, the Tiger Teams reviewed the commitment to safety in the areas of aviation, explosives, natural phenomena hazards, and firearms. The existence and content of safety directives were evaluated, including issuance of safety orders that reflect management's commitment to attainment of S&H excellence, along with assessments of routine operations.

Within aviation safety, 16 concerns in 3 performance areas were identified: aviation safety organization and administration, aviation maintenance safety, and operational aviation safety. Within explosives safety, 20 concerns in 3 performance areas were identified: explosives operations; explosives safety appraisal program; and transportation, handling, and storage of explosives. Within natural phenomena hazards, 14 concerns in 3 performance areas were identified: seismic system interaction; natural phenomena hazards safety program; and natural phenomena hazards anchorage, structural integrity, and operability. Within firearms, 22 concerns in 5 performance areas were identified: firearms safety programs and appraisals; firearms safety training, range operations, and storage of munitions; firearms procedures and documentation; firearms exercises; and firearms safety organization and administration.

All the concerns were related to one site, except for explosives safety, which was assessed at both sites.

Aviation Safety Organization and Administration (1 of 2 sites, 7 of 72 concerns). Required oversight of aviation operations had not been performed.

One site did not have an established or documented aviation safety program as required by DOE. Neither the Field Office nor the Area Office had performed required management oversight reviews and audits as required. The site had failed to provide staff, equipment, funding, or other required support for conducting an aviation safety program. One Area Office had not established a required aviation safety program, with the associated policy and authority, and had not ensured that airport fire and rescue personnel were trained as required. A master plan for present and future use of the airport in that area had not been developed as required by the Area Office.

Maintenance Aviation Safety (1 of 2 sites, 6 of 72 concerns). Required maintenance safety did not fully comply to DOE requirements.

The aviation service operator did not always have maintenance manuals with latest revisions and did not conduct maintenance personnel training as required after maintenance manual changes. Maintenance manuals were not correctly formatted according to Federal Aviation Administration regulations. Correct markings were not used on aircraft emergency exits or refueling trucks.

Some "high hazard" buildings at the site did not have seismic interactions fully evaluated. Other buildings had fire protection systems that would be lost in the event of an earthquake. The potential for a seismic-induced fire in 1 "high hazard" facility was not evaluated.

Natural Phenomena Hazards Safety Program (1 of 2 sites, 5 of 72 concerns). Comprehensive reviews were not completed for all natural phenomena hazards safety.

Personnel training and documented plans and procedures were not in place for a design basis earthquake for several facilities at 1 site. The list of facilities classified by the site as "high hazard" did not meet the site's definition, nor did the site's classification method fully comply with DOE requirements. A comprehensive seismic safety program to design new facilities and review existing ones did not exist.

Natural Phenomena Hazards Anchorage, Structural Integrity, and Operability (1 of 2 sites, 3 of 72 concerns). Facilities at the site did not fully comply with DOE requirements for operability, structural integrity, and anchorage for seismic events.

Many of the site's facilities did not have required anchorages for safety and non-safety systems. One building had the possibility of cyanide gas release at expected earthquake levels, while another could release other toxic gases. Several facilities did not meet structural design requirements for seismic loading or had Class I operative systems that did not fully comply with seismic design.

Firearms Safety Organization and Administration (1 of 2 sites, 4 of 72 concerns). A firearms safety program was not fully implemented.

The site did not fully comply with guidance for firearms safety other than for protective force/security personnel. Guidance from the Field Office only applied to security operations rather than all firearms use at the site. The Field Office did not have a fully implemented firearms safety program, and responsibility for this program was not clearly defined or reflected within the protective force.

Firearms Procedures and Documentation (1 of 2 sites, 5 of 72 concerns). Firearms safety procedures did not fully reflect DOE requirements.

The site's procedures for weapons loading/clearing were not being followed. Procedures for security inspectors regarding transportation, control, and storage of munitions taken offsite had not been developed. Documentation was incomplete for other procedures for transport, control, and storage of munitions at the site. Operations at 1 facility were conducted without standard operating procedures or firearms safety policies. The procedures and documentation for the Field Office Protective Forces had not been formalized or implemented.

SYNOPSIS: NUCLEAR ENERGY (NE)

The Office of the Assistant Secretary for Nuclear Energy (NE) administers DOE's fission energy research and development. This includes programs associated with nuclear reactor development, both civilian and naval; nuclear fuel cycle; space nuclear application; and uranium enrichment. This report covers Tiger Team Assessments for 2 NE sites: Idaho National Engineering Laboratory (INEL) and the Energy Technology Engineering Center (ETEC).

This synopsis briefly describes the findings from the analysis of the NE site from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). These perspectives are discussed in more detail in the following chapter.

MANAGEMENT AND ORGANIZATION (NE)

Four of the 7 root causes focused on the need to change culture at the sites toward greater ES&H commitment; 2 root causes cited lack of formality in operations.

Four of the 11 M&O key findings discussed oversight activities that were poorly defined, flawed in approach, inadequately staffed, and infrequently conducted. Two key findings identified the need for more formalized ES&H programs, procedures, and conduct of operations. An additional 2 key findings cited a need for implementing guidance in the area of ES&H, and the remaining key findings focused on needs for integration of ES&H programs into strategic planning, for a better skills mix of professionals to conduct oversight activities, and for clear definition and communication of roles, responsibilities, and authorities.

Formality of operations had the greatest number of M&O findings (13). These focused on the lack of programs or incomplete programs to carry out ES&H missions in areas as diverse as control of building managers and implementation of the National Environmental Policy Act (NEPA). The 7 findings in organizational structure were associated with a lack of formal documentation and understanding of roles, responsibilities, and authorities; lack of independent performance evaluation and technical support at a site; and lack of a comprehensive, site-wide strategic planning process at a site. In resources and training, the 6 findings addressed the need to strengthen the human resources management plan to emphasize ES&H and to develop a comprehensive ES&H training program.

ENVIRONMENT (NE)

The Tiger Team identified 7 key findings representing 3 important program concerns for the 2 NE sites:

SAFETY AND HEALTH (NE)

Failure of the sites to comply with DOE Orders and requirements was identified throughout the NE sites as a key concern. Key concerns in this performance area used the words "substantial" and "widespread" to describe the degree of noncompliance in 6 of the 8 compliance related concerns.

Several S&H related programs including packaging and transportation, and radiological protection were identified as deficient, and one site was cited for having no formal safety program. Key concerns in the management performance area address the related issues of document control, procedure control, and program descriptions.

About two-thirds of the Category I and II concerns were in worker safety, including deficiencies in ladders and scaffolding, machine guarding, fall protection, electrical safety, hazard communication, chemical hygiene plans, and training. Significant concerns were also noted in personnel protection.

Radiological protection was the single discipline with the most concerns (94 of a total 875 concerns). Procedures for posting radiological areas, internal and external dosimetry programs, and instrumentation used for radiological monitoring did not fully meet DOE requirements. Contractor management did not fully delineate authorities, responsibilities, and operating policies and procedures for an effective program, and independent audits and reviews did not comply with DOE Orders.

Concerns totaled 109 in the related disciplines of personnel protection and worker safety and health. The concerns identified needs for the sites to improve systems to proactively identify, evaluate, control, and monitor occupational hazards; to ensure that comprehensive S&H programs existed, were complete, and were maintained current in compliance with Federal regulations and DOE Orders; to adequately staff the programs and provide effective and timely training.

Quality verification (70 concerns) and organization and administration (66 concerns) were disciplines needing focused attention. In quality verification, major issues were some missing or incompletely implemented QA plans and inadequate procedures to inspect incoming material and identify and resolve nonconformances. In organization and administration, site safety programs were incomplete or not fully implemented, and oversight and management control did not ensure independent review or the communication of ES&H information to all affected personnel.

7.0 NUCLEAR ENERGY (NE)

This review and summary of 2 Nuclear Energy (NE) sites is part of a larger analysis focused on the final 19 Tiger Team Assessments. The NE sites are the Energy Technology Engineering Center and the Idaho National Engineering Laboratory.

Following the Tiger Team methodologies and categories, this analysis discusses the findings from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 21 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings and root cause analysis are discussed. For Environment, key findings and findings are discussed. For Safety and Health, key concerns, Category I and II concerns, and concerns are discussed. Category I concerns are those that address a "clear and present" danger to people; Category II concerns address significant risk or substantial noncompliance with DOE Orders.

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area give 2 sets of information. The first set of numbers indicates the number of sites having a finding(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (1 of 2 sites, 4 of 16 concerns) means that 1 of NE's 2 sites had a concern and 4 of the 16 total concerns identified by the Tiger Team Assessments are discussed in that subsection. For the overall discussion of each discipline, the total number of findings or concerns is shown in the heading.

7.1 MANAGEMENT AND ORGANIZATION

The purpose of this section is to summarize the common trends in the M&O root causes, key findings, and findings identified when the final 2 NE Tiger Team Assessments were conducted; to identify any unique or unusual findings or key findings that could be significant; and to list any noteworthy practices.

TABLE 7.1. Summary of M&O Key Findings for NE Sites

M&O Key Finding Discipline	INEL	ETEC	TOTAL
Program Evaluation	2	2	4
ES&H Planning	1	0	1
Formality of Operations	1	1	2
Resources & Training	1	0	1
ES&H Program Commitment	1	1	2
Organizational Structure	0	1	1
TOTAL	6	5	11

7.1.3 Key Findings (total: 11 key findings)

Key findings were evaluated to determine whether any common trends existed in the characteristics that defined key findings, so that NE can use this knowledge in planning its strategy to achieve ES&H excellence. To evaluate the NE Management and Organization (M&O) key findings, each M&O key finding was reviewed, analyzed, and sorted. M&O key findings typically represented a synthesis of many issues. In sorting the key findings, the overriding issue being communicated was determined, and the key finding was then placed within the respective discipline, discussed below. Table 7.1, above, summarizes the key findings.

Program Evaluation (2 of 2 sites, 4 of 11 key findings). The key findings focused on the lack of a comprehensive oversight program. The oversight activities were poorly defined, inadequately staffed, infrequently conducted, and not formally instituted. Internal as well as external oversight programs were flawed in their approach, and the independence of external programs was questioned.

Formality of Operations (2 of 2 sites, 2 of 11 key findings). The key findings addressed the need for more formalized, integrated, and comprehensive ES&H programs and procedures. Another need was for more formal and rigorous conduct of operations.

ES&H Program Commitment (2 of 2 sites, 2 of 11 key findings). The key findings focused on the need to have implementing guidance to ensure a common understanding of management's commitment to ES&H excellence. In addition, ES&H expectations were not clearly communicated, and the leadership needed to guide ES&H activities was not provided (lack of site-wide guidance via directives).

For this analysis, 3 performance areas were identified: roles, responsibilities, and authorities; organizational independence; and ES&H goals and objectives.

The findings indicated the need to more formally define and communicate roles and responsibilities for a wide range of ES&H-related activities to help meet DOE ES&H performance objectives.

Roles, Responsibilities, and Authorities (2 of 2 sites, 4 of 7 findings). The findings were associated with a lack of formal documentation and understanding of roles, responsibilities, and authorities in several areas. Specifically, 1 finding focused on the lack of defined, independent oversight responsibility for the DOE Field Office. Other findings addressed a lack of site-wide guidance defining the roles, responsibilities, and authorities of the various organizations of contractors associated with the site. Another finding identified deficiencies in stop work and restart work authorities and procedures.

Independence (2 of 2 sites, 2 of 7 findings). The findings were related to the inherent conflict of interest in a contractor's responsibility for both performance evaluation and technical support services for a site program. A similar lack of division of responsibilities was noted as a secondary issue in another finding.

ES&H Goals and Objectives (1 of 2 sites, 1 of 7 findings). One finding addressed the lack of a comprehensive, site-wide strategic planning process that could have been used, not only to define goals and objectives, but also to provide a balance for scarce ES&H resources.

7.1.5 ES&H Program Commitment (total: 2 findings)

For this discipline, the Tiger Teams assessed the commitment to excellence demonstrated by formal ES&H policy, top management support, and line responsibility. The existence and content of ES&H policy were evaluated, including issuance of formal environmental policy statements that reflected the site's goals, guidance to attain those goals, and the commitment of senior management. Top management support was assessed based on demonstration of commitment to programs and performance. Line responsibility was evaluated based on the sense of responsibility demonstrated by managers and operating personnel.

For this analysis, 2 performance areas were identified: management support and ES&H policy.

Management Support (1 of 2 sites, 1 of 2 findings). The finding focused on the lack of commitment to ES&H compliance at the Field Office and site levels. The finding included the failure to modify contracts to reflect DOE's ES&H priorities.

ES&H Policy (1 of 2 sites, 1 of 2 findings). The finding focused on the lack of compliance with DOE's policy stated in DOE 5482.1B to assure protection of the environment and the safety and health of the public and DOE employees.

the root cause of the findings and track lessons learned. A deficiency was also noted with the system to track corrective actions and the lack of a formal procedure to close issues once resolved.

CPAF Programs (2 of 2 sites, 2 of 7 findings). The findings focused on the lack of specific performance indicators to determine ES&H performance. For example, no procedure existed to evaluate contractor performance on ES&H issues. Also, appropriate incentives had not been established for ES&H performance.

Audits, Appraisals, and Surveillance (1 of 2 sites, 1 of 7 findings). The finding identified a lack of ES&H audit program oversight, primarily concerning the followup and closure of finding issues. In addition, the tracking of issues identified during audits was not comprehensive.

7.1.8 Formality of Operations (total: 13 findings)

For this discipline, the Tiger Teams reviewed regulatory procedures and programs, and recordkeeping and reporting. The management systems were evaluated for their ability to provide the formal guidance and direction for ensuring that DOE Orders and regulations were properly received, disseminated, and incorporated into existing site procedures. Procedures and programs were examined for incorporation of guidance, regulations, and Orders into viable and complete programs. Recordkeeping and reporting were examined with regard to incident reporting systems and formality of recordkeeping and reporting.

For this analysis, 3 performance areas were identified: procedures and programs, regulatory tracking, and recordkeeping and reporting. The NE findings clustered in the first 2 performance areas.

Procedures and Programs (2 of 2 sites, 11 of 13 findings). Approximately one-third of the findings focused on the lack of programs or the lack of complete programs to carry out the missions of the ES&H programs in a wide variety of ES&H areas, including control of building managers, funded work, QA, conduct of operations, construction activity oversight, implementation of the National Environmental Policy Act (NEPA), and PSO oversight of contractors. The remaining findings focused on incomplete implementation of independent ES&H oversight programs for DOE Orders and independent safety reviews. Findings in this area were directed to sites, PSOs, and Area and Field Offices.

Regulatory Tracking (2 of 2 sites, 2 of 13 findings). The findings in this performance area focused on lack of a clear directive system to effectively ensure a common understanding of requirements, to convey site-specific guidance, and to ensure that implementation methodologies met legal requirements. One finding was directed to the site, the other to the DOE. Programs were required to ensure that regulations and DOE Orders were properly transmitted, distributed, and implemented.

The subdivisions of this section begin with noteworthy practices (7.2.1) and key findings (7.2.2). The subdivisions that follow (7.2.3 through 7.2.11) discuss findings from the 2 NE assessments by discipline.

The Environment perspective includes 9 disciplines: air (7.2.3), surface water/drinking water (7.2.4), groundwater/soil, sediment, and biota (7.2.5), waste management (7.2.6), toxic and chemical materials (7.2.7), environmental QA and oversight (7.2.8), radiation (7.2.9), inactive waste sites (7.2.10), and NEPA (7.2.11).

7.2.1 Noteworthy Practices

No noteworthy practices were identified for environmental issues for the NE sites.

TABLE 7.3. Summary of Environment Key Findings for NE Sites

Environment Key Finding Discipline	INEL	ETEC	TOTAL
Formality of Programs	1	1	2
Environmental QA/ Oversight	1	2	3
Inactive Waste Sites	0	0	0
Waste Management	2	0	2
Toxic & Chemical Materials	0	0	0
TOTAL	4	3	7

7.2.2 Key Findings (total: 7 key findings)

Table 7.3, above, summarizes the environment key findings. Key findings for each of the 2 Tiger Team Assessments were reviewed, analyzed, and sorted to determine whether common trends existed. Because environmental key findings typically represented common issues from several of the environmental disciplines, a determination was made as to the overriding issue being communicated. Based on that determination, the key finding was placed within the appropriate one of the 5 disciplines that were used for the key finding analysis: formality of environmental programs; environmental quality assurance and oversight; inactive waste site identification, investigation, and remediation; waste management; and toxic and chemical materials.

From 139 findings and 1 special issue finding, 7 key findings were identified. Each key finding indicates a large programmatic issue that existed at one of more of these sites.

TABLE 7.4. Summary of Environment Findings for NE Sites

Environment Finding Discipline	INEL	ETEC	TOTAL
Air	18	3	21
Surface/Drinking Water	20	4	24
Groundwater/Soil, Sediment & Biota	6	8	14
Waste Management	18	4	22
Toxic Chemicals & Materials	9	2	11
QA/QC	9	6	15
Radiation	7	4	11
Inactive Waste Sites	9	3	12
NEPA	5	5	10
TOTAL	101	39	140

The following sections summarize and analyze environmental findings across all the NE sites, as shown in Table 7.4 above. Each of the following sections focuses on 1 environmental discipline and its performance areas.

7.2.3 Air (total: 21 findings)

For this discipline, the Tiger Teams assessed the current operating practices with regard to regulations promulgated under the Federal Clean Air Act, pertinent state statutes, DOE Orders and guidance, Secretary of Energy Notices (SEN) requirements, best management practices, and internal policies and procedures.

For this analysis, 5 performance areas were identified: ambient air impact surveillance, compliance with permit and regulatory conditions, permit management, appropriate emission controls, and emissions tracking.

Eighteen CFs and 3 BMPFs were identified. At 1 site, inadequate oversight to achieve a coordinated permit program and inexperienced and untrained site personnel hampered the effective monitoring and control of air emissions. Findings at the other site were primarily related to ambient air impact surveillance from both the meteorological and ambient air monitoring perspective.

Ambient Air Impact Surveillance (2 of 2 sites, 8 of 21 findings). The collection of representative meteorological and particulate data at both sites was hampered by the inappropriate siting of network monitors. At 1 site this problem was exacerbated by inadequately trained operators and at the other

permit owner for the site. At the time of the Environmental subteam evaluation, coordination and integration of necessary application information among site contractors had not occurred and the site had not clearly defined source emissions and impacts.

7.2.4 Surface Water/Drinking Water (total: 24 findings)

For this discipline, the Tiger Teams evaluated compliance with Federal, state, and local water pollution control requirements established for conformance with the Clean Water Act, and with drinking water regulations promulgated as part of the SDWA. In addition, the assessment evaluated compliance with DOE Orders, SENs, and water pollution control practices in accordance with state requirements and industry-accepted best management practices.

For this analysis, 4 performance areas were identified: drinking water, DOE Orders and EO programs, National Pollutant Discharge Elimination System (NPDES) programs and systems, and SPCC planning.

Of the 24 findings, 11 CFs and 13 BMPFs were identified.

Drinking Water (2 of 2 sites, 9 of 24 findings). Four CFs and 5 BMPFs were identified. Compliance issues involved substandard water well construction, missing backflow prevention devices, inadequate chlorination system, incomplete and late submission of state-required water monitoring data, and lack of SPCC planning. BMPFs addressed potable wellwater bacterial contamination, inadequate programs to monitor for lead in potable water systems, and inconsistent septic system and sludge disposal operating practices at 1 site. At the other site, the monitoring of dispensed bottled drinking water at DOE facilities had not been instituted at the time of the Environmental subteam inspection.

DOE Orders and Executive Orders (DOE/EO) Programs (1 of 2 sites, 7 of 24 findings). The 5 CFs and 2 BMPFs addressed DOE Orders and Executive Orders, specifically, the discharge of uncontaminated liquids to the soil in radiologically contaminated areas, discharge of liquids to the soil without adequate effluent and groundwater monitoring programs, incomplete characterization of liquid effluents, and the lack of preparation of an area floodplain map or performance of a complete floodplain assessment as required by EO 11988. A BMPF identified the lack of proper operation and documentation of a radionuclide-containing wastewater system.

NPDES Programs and Systems (1 of 2 sites, 5 of 24 findings). Findings identified deficiencies in 1 site's NPDES program. Additional findings addressed the inability to prevent uncontrolled and unmanaged releases, incomplete permit applications, and deficiencies in the operation of wastewater treatment facilities and storm water characterization.

SPCC Programs (2 of 2 sites, 3 of 24 findings). There were 1 CF and 2 BMPFs identified at the NE sites. Secondary containment practices at 1 site were not in accordance with recommendations of the Hazardous Material Response

determine the aquifer physical parameters, the nature and extent or direction of travel of contaminants. In addition, the Hydrogeologic Assessment Report for the Sodium Disposal facility at the site did not describe the contamination of the vadose zone.

Soil, Sediment, and Biota Monitoring and Surveillance Programs (1 of 2 sites, 1 of 14 findings). The single BMPF noted that storm water and drainageway sediments in some sections of the site have not been adequately evaluated to assess the contaminant migration.

Ecological Impact/Protection (1 of 2 sites, 1 of 14 findings). The BMPF noted that the former Sodium Disposal Facility was not secured to prevent access and possible spread of contamination by unauthorized personnel, livestock, and burrowing rodents and was not protected to prevent erosion of contaminated soils.

7.2.6 Waste Management (total: 21 findings)

For this discipline, the Tiger Teams assessed the current status of hazardous, radioactive, mixed, and solid waste management practices with respect to compliance with Federal and state regulations, DOE Orders, site procedures, and best management practices. Applicable regulations include the requirements of DOE, RCRA, CERCLA, and state specific statutes.

For this analysis, 3 performance areas were identified: waste management facilities, consisting of TSDFs, nonhazardous waste facilities, hazardous waste accumulation, emergency planning and underground storage tanks; waste management programs, including waste minimization and waste management program plans, LDR waste, training, vendor oversight, packaging and transportation, and permitting; and waste characterization, including recordkeeping and waste sampling and analysis.

One site generates nonhazardous, hazardous, mixed, low-level, transuranic, and high-level wastes and operates treatment and storage facilities for hazardous, mixed, and radioactive wastes. The other site generates hazardous, radioactive, and mixed wastes and operates on site hazardous and radioactive waste storage and treatment facility.

The Tiger Team identified 17 CFs and 4 BMPFs. One Special Issue Finding, related to the regulatory status of stored sodium was not included in the tally of the findings.

Waste Management Facilities (1 of 2 sites, 12 of 21 findings). Three of the 12 waste management facilities findings at 1 site addressed managing hazardous and mixed waste satellite and temporary accumulation areas. The deficiencies concerned inadequate training, supervision, and audits. Inadequacies were identified in the design and operation of hazardous, mixed, and radioactive waste storage units. In particular, required inspections of some facilities were not performed, were incomplete, or were not documented. The site contingency plan did not include all waste management facilities and did not fully comply with Federal and state regulations.

Toxic and Chemical Materials Management (2 of 2 sites, 5 of 11 findings). Four CFs and 1 BMPF were identified in chemical and incompatible material storage, identification, and materials hazard warning practices at the 2 NE sites.

PCB Management (1 of 2 sites, 4 of 11 findings). Deficiencies in the development and implementation of formal programs and site-wide procedures for managing PCBs use, storage, and spill response were the subject of the findings.

Pesticide Management (1 of 2 sites, 2 of 11 findings). The lack of consistent implementation of comprehensive programs and procedures resulted in the 2 CFs noted for pesticide management. The existing program did not adequately provide training of pesticide applicators, adequate labelling of pesticide products, or oversight of subcontractor personnel. In addition, some of the pesticides proposed for use were not approved by the state agency.

7.2.8 Environmental QA and Oversight (total: 15 findings)

For this discipline, the Tiger Teams evaluated the Quality Assurance Program and its application to the generation of sound, verifiable, and traceable environmental data. To fully perform this evaluation, it was necessary to investigate the entire Quality Assurance structure and how it interfaces with line management. The assessment evaluated environmental protection program areas for compliance with relevant Federal regulations, DOE Orders, and industry quality assurance standards.

The Tiger Teams addressed the development and implementation of QA in environmental monitoring and surveillance programs, as required by DOE 5400.1, 5700.6B, and 5700.6C, including organizational structure and independence, implementation program documentation, records management, procedures, and training. Also assessed was the oversight of work performed by the Field/Area Office, the contractor, and any subcontractors, as required by DOE 5480.19, 5400.1, 5700.6B and 5700.6C and related DOE Orders, including audits, assessments, corrective action, procurement control, and DOE oversight. The conduct of environmental sampling and analysis was addressed, as required by DOE 5400.1, including sampling and analysis practices, QC samples, workspace, chain of custody, standards and calibration, data validation, and computer verification and validation. Also reviewed were reporting requirements, including occurrence reporting, annual site environmental reports, and SEN-7 and SEN-7A reporting; these are contained in a variety of DOE Orders, such as DOE 5400.1, and are also required by regulations and permits.

For this analysis, 4 performance areas were identified: environmental QA program, oversight, sampling and analysis, and reporting.

The Tiger Teams identified 13 CFs and 2 BMPFs. In almost all of the findings reviewed, policy implementation was cited as a contributing causal factor, indicating a lack of guidance for implementing a QA program in support of environmental activities at the site.

Protection of the Environment (2 of 2 sites, 4 of 11 findings). The 4 CFs focused on control of contamination by windblown soils, inadequate environmental surveillance data to support changes in routine environmental surveillance programs, and lack of an ALARA program.

Protection of the Public (2 of 2 sites, 4 of 11 findings). This performance area had 3 CFs and 1 BMPF related minimization of public exposure to radioactive materials. The findings focused on incomplete public dose determinations and inadequate release criteria for radiologically contaminated or potentially contaminated materials as required by DOE 5400.5, 5480.19.

Radioactive and Mixed Waste Management (2 of 2 sites, 2 of 11 findings). Two CFs examined control of high-level, low-level, transuranic, naturally occurring and accelerator produced, and mixed radioactive wastes. Decontamination and decommissioning (D&D) programs and waste management plans (including implementation of DOE 5820.2A) were also addressed. The findings focused on lack of a formal D&D program and the absence of a contingency plan for transuranic waste storage.

Radiological Emergency Planning (1 of 2 sites, 1 of 11 findings). The 1 compliance finding in this performance area related to lack of procedures for emergency planning.

7.2.10 Inactive Waste Sites (total: 12 findings)

For this discipline, the Tiger Teams assessed the identification and evaluation of inactive waste sites (IWSs) and releases of hazardous substances from site operations, site-wide integration and resource planning of environmental restoration activities, CERCLA and National Contingency Plan (NCP) release notification and remedial response requirements, real property transfer and site development planning requirements, hazardous chemical tracking and reporting programs for the SARA Title III, 40 CFR 300 et seq., and DOE 5400.4 requirements as well as adherence to best management practices.

For this analysis, 3 performance areas were developed: preliminary assessment and site characterization, regulatory compliance, and hazardous chemical reporting.

Eleven CFs and 1 BMPF addressed (1) incomplete identification and evaluation of IWSs and releases of hazardous substances from site operations, (2) insufficient notification and preassessment procedures for natural resource damage assessment (NRDAs), (3) inadequate site-wide coordination of environmental restoration activities and project management control systems, and (4) inadequate SARA Title III compliance programs.

Comprehensive program management systems were not fully developed at either site. While some deficiencies resulted from insufficient resources and staff inexperienced and untrained in environmental restoration activities, many findings resulted from deficiencies in implementing environmental restoration policy and insufficient guidance from DOE program offices.

implement a set of NEPA processes at the site: The consistent and comprehensive application of NEPA to the site activities had started 2 years earlier and was preceded by the establishment of environmental checklists, evaluation, and analyses. NEPA was not used as an early planning tool and was not used in the decision-making process at either site.

Program Incorporation and Implementation (2 of 2 sites, 2 of 10 findings). Inappropriate NEPA determinations were found to have been made at 1 NE site. NEPA determinations were found to be lacking or generated after project startup. Several NEPA documents at the other NE site failed to show evidence that authoritative sources had been contacted in order to determine the impact of activities on sensitive habitats, failed to identify wetlands or floodplains, or failed to adequately describe or address the environmental impact of site activities. Although the NEPA process was improving at this site, some concerns existed with regard to potential conflicts of interest, since the NEPA Compliance Officer was also managing the preparation of the environmental protection and waste management environmental impact statement (EIS).

Site-wide Policy and Procedures (2 of 2 sites, 2 of 10 findings). Procedures were not consistent with DOE 5440.1D at either site; at 1 site some procedures were lacking. The Tiger Team found that the existing documents were not uniform. This resulted in inconsistency of document flow and contractors frequently having to implement multiple procedures.

Tracking and Recordkeeping (1 of 2 sites, 1 of 10 findings). Identifiable records and recordkeeping required by DOE 5440.1C and DOE 5440.1D, state regulations, and internal contractor policies were found to be incomplete at 1 NE site. There was no centralized record repository or and integrated tracking system at the site.

7.3 SAFETY AND HEALTH

The purpose of this section is to summarize noteworthy practices, key concerns, Category I and II concerns, and concerns in the Safety and Health (S&H) perspective when the 2 NE Tiger Team Assessments were conducted.

The subdivisions of this section begin with noteworthy practices (7.3.1), key concerns (7.3.2), and Category I and II concerns (7.3.3). The subdivisions that follow (7.3.4 through 7.3.24) discuss findings from the 2 NE assessments by discipline.

The S&H perspective includes 21 disciplines: organization and administration (7.3.4), quality verification (7.3.5), operations (7.3.6), maintenance (7.3.7), training and certification (7.3.8), auxiliary systems (7.3.9), emergency preparedness (7.3.10), technical support (7.3.11), packaging and transportation (7.3.12), nuclear criticality safety (7.3.13), security/safety interface (7.3.14), experimental activities (7.3.15), site/facility safety review (7.3.16), radiological protection (7.3.17), personnel protection

EG&G established a mandatory Unit Manager Development Program. This program helped to broaden overall knowledge of processes and equipment and developed supervisory and management skills. This program had strong top management commitment to and involvement in the program.

TABLE 7.5. Summary of S&H Key Concerns for NE Sites

S&H Key Concern Discipline	INEL	ETEC	TOTAL
Noncompliance	7	1	8
S&H Programs	15	1	16
Oversight	2	1	3
Management Systems & Resources	12	3	15
TOTAL	36	6	42

7.3.2 Key Concerns (total: 42)

Key concerns for S&H are summarized above in Table 7.5. The key concerns were reviewed, analyzed, and sorted to determine whether common trends existed. Because S&H key concerns typically represented common issues from several of the disciplines, the overriding issue was identified. Based on that determination, the key concern was placed into 1 of the 4 key concern disciplines: identified noncompliance; missing, deficient, or ineffective programs; ineffective oversight by DOE; and ineffective contractor management system or organizational structure.

Identified Noncompliance with DOE Orders, OSHA Requirements, Consensus Standards and Site Procedures. (2 of 2 sites, 8 of 42 key concerns). Six key concerns identified by the Tiger Teams address the general or widespread lack of compliance with DOE Orders by the smaller contractors at NE sites. The remaining key concerns address compliance issues in storage of munitions and in emergency preparedness.

Missing, Deficient, or Ineffective S&H Programs and Program Documentation. (2 of 2 sites, 16 of 42 key concerns). These key concerns address missing or deficient S&H program descriptions at the 2 NE sites. Deficient programs addressed include overall S&H program documentation as well as specific examples such as packaging and transportation, radiation protection, quality assurance, and emergency preparedness.

Ineffective Oversight by the DOE. (2 of 2 sites, 3 of 42 key concerns). The 2 DOE Field Offices associated with the NE sites have not provided sufficient guidance or oversight to ensure that the required level of safety is maintained.

TABLE 7.7. Summary of S&H Concerns for NE Sites

S&H Concern Discipline	INEL	ETEC	TOTAL
Organizational & Administration	52	14	66
Quality Verification	49	21	70
Operations	33	5	38
Maintenance	29	15	44
Training & Certification	30	9	39
Auxiliary Systems	25	2	27
Emergency Preparedness	51	9	60
Technical Support	25	10	35
Packaging & Transportation	47	0	47
Nuclear Criticality	21	0	21
Security/Safety Interface	3	2	5
Experimental Activities	5	0	5
Site/Facility Safety	21	3	24
Radiological Protection	83	11	94
Personnel Protection	41	11	52
Worker Safety	43	14	57
Fire Protection	31	6	37
Medical Services	8	6	14
Aviation Safety	4	N/A	4
Firearms Safety	18	N/A	18
TOTAL	619	138	757

The following sections summarize and analyze S&H concerns across all the NE sites, as shown in Table 7.7 above. Each of the following sections focuses on 1 S&H discipline and its performance areas.

priority over programmatic considerations. Not all aspects of substance abuse policies were well understood by employees, and random drug screening did not occur. Management did not assure that procedures were followed, that procedures addressed all areas necessary to ensure safe operations, and that procedures were available when needed.

Recordkeeping and Reporting (2 of 2 sites, 8 of 66 concerns). Programs lacked the consistent document control and reporting needed to ensure compliance with DOE Orders.

Concerns addressed the deficiencies of the document control programs. First, the site had no centralized control system for managing preparation, review, update, and approval of Safety Analysis Reports. Second, many documents were out of date, and no overview function existed to ensure that procedures and manuals were expeditiously reviewed or that controlled manuals were actually up to date, as required by DOE 5480.19. Third, the document control procedures for two contractors did not meet the requirements of American Society of Mechanical Engineers (ASME) NQA-1-1989.

Formal Definition of Authority and Responsibility (2 of 2 sites, 8 of 66 concerns). The sites did not consistently define authority and responsibility of organizations and staff that were needed to ensure compliance with DOE Orders.

Authorities were not well documented, defined, delegated, or understood, as required by DOE 5480.19. Responsibilities for safety oversight positions of a major contractor and its subcontractors were not defined, as required by DOE 5480.19. In addition, personnel planning and qualification activities of contractors were deficient. Interfaces and assignment of responsibility for ensuring support, assistance, and independent oversight were not defined.

7.3.5 Quality Verification (total: 70 concerns)

For this discipline, the Tiger Teams reviewed programs and controls for procurement and supplier control, receiving and pre-installation inspections, calibration of measuring and testing devices, control and use of hardware and materials, inspection procedures, and control of special processes. Consideration was given to documentation of adequate procedures and the qualification of personnel, procedures, and equipment.

For this analysis, 5 performance areas were identified: programs and program implementation, materials and process control, audits and oversight, procedures, and training and certification.

Programs and Program Implementation (2 of 2 sites, 27 of 70 concerns). The NE sites' QA programs did not fully comply with DOE and NQA-1 requirements.

Major areas of concern included lack of, or incomplete implementation of, approved QA plans; delayed approval of existing plans; lack of implementation

encompass safe, reliable conduct of operations; effective guidance for normal and abnormal facility operations; personnel knowledge of both operational status and the effect of non-operational systems and equipment; personnel ability to control systems and equipment; provision of proper equipment in a clean, orderly, well-designed environment; and effective and accurate transfers of information between shift personnel.

For this analysis, 7 performance areas were identified: policies, programs, and procedures; communication; documentation of operations; work practices; evaluation and analysis; worker qualifications and operation activities; and testing and verification. The NE concerns were sorted into the first 5 performance areas.

Policies, Programs, and Procedures (2 of 2 sites, 17 of 38 concerns). Programs and procedures were not developed and implemented as required by DOE Orders.

Programs and procedures either had not been developed at the sites or had not been implemented. Programs that were not developed or implemented included predictive maintenance, lockout/tagout, operator aid, and others designed to ensure safe operation of facilities. Procedures were identified as missing elements to ensure proper review and control of operating activities. The DOE Order most frequently cited was DOE 5480.19.

Practice for revision procedures did not allow for complete review of changes before implementation, and other aspects of documentation were not adequate.

Communication (2 of 2 sites, 7 of 38 concerns). Mechanisms used to communicate the operational status of facility complaints were not implemented as required by DOE Orders.

Various mechanisms used to communicate facility conditions and the operational status of facility complaints were not implemented at 1 site. Concerns indicated that labels and tags were not used appropriately, and an audible alarm could not be heard in areas of the facility. Additionally, work control mechanisms, such as shift changeovers, were not being conducted in a manner that would facilitate communication of facility status among shift personnel. The DOE Order cited was DOE 5480.19. Interfaces between operations and support personnel did not establish sufficient operations control to maintain operations stations adequately.

Documentation Review (1 of 2 sites, 6 of 38 concerns). Documentation on operating activities was not maintained and routinely reviewed as required by DOE Orders.

Records, logs, and other documentation on operating activities were not maintained and reviewed at the site as required by DOE Orders. In addition, a document control system had not been implemented, and timeliness and accuracy were identified as concerns. The DOE Order cited was DOE 5480.19.

neglected. The backlog of work was increasing, and certain aspects of controlling work activities and documentation associated with such activities were not maintained. Little long-range planning was evident. The most frequently cited DOE Order was DOE 4330.4A.

Equipment Maintenance (1 of 2 sites, 2 of 44 concerns). Conduct of maintenance on test equipment neither addressed deficiencies in a controlled fashion nor effectively minimized deterioration of the equipment. General upkeep and housekeeping did not meet industry good practices.

Unsafe Conditions, Practices and Equipment (1 of 2 sites, 1 of 44 concerns). Periodic inspections and corrective maintenance of inactive facilities did not preclude the existence of hazardous conditions, which also contributed to the deterioration of these facilities.

Worker Qualifications and Responsibilities (1 of 2 sites, 1 of 44 concerns). Dual responsibilities of operators for maintenance, as well as operations, resulted in plant maintenance items being deferred or neglected.

7.3.8 Training and Certification (total: 39 concerns)

For this discipline, the Tiger Teams reviewed training organization and administration for the ability to identify training needs and ensure that needs are met; quality of training for reactor and nuclear facility operations (with nuclear criticality safety and simulator training/facility exercises), personnel protection, maintenance, quality control inspector, nondestructive examination technician, radiological protection, and supervisory and managerial skills; and the support provided by training facilities, equipment, and materials.

For this analysis, 6 performance areas were identified: training and certification programs, facilities and equipment, DOE/Field/Area/Site Office training and certification, management of programs, examinations, and records.

Most of the concerns noted that training and certification programs did not meet DOE and OSHA requirements, indicating the need for further program improvement efforts at the NE sites.

Training and Certification Programs (2 of 2 sites, 29 of 39 concerns). NE training and certification programs did not fully comply with DOE and OSHA requirements.

Training and certification programs did not always meet requirements as promulgated by DOE Orders and OSHA regulations. The facilities had training and certification programs; however, some or all required elements of these programs were informal and undocumented. Some training and certification programs were not developed as required by DOE and OSHA. At some sites with programs, qualification requirements based on assigned job tasks were not defined. Maintenance, operations, radiation protection, personnel protection, and QA training and certification programs were routinely identified as being

Training and Certification Records (1 of 2 sites, 1 of 39 concerns). Training and certification records at the site were not properly maintained.

The concern indicated that the training and tracking system was not maintained as an effective tool for management.

7.3.9 Auxiliary Systems (total: 27 concerns)

For this discipline, the Tiger Teams reviewed systems for effluent holdup and treatment, solid hazardous wastes, ventilation, electricity, water, emergency power, heat removal, engineered safety, and coolant cleanup. Under this discipline, criteria are assessed against functional criteria for the structural, confinement, and primary process system of the facility. Each of the auxiliary systems has its own set of criteria for safe operation and compliance with regulations.

For this analysis, 4 performance areas were identified: policies and procedures, ventilation systems, emergency power systems, and waste systems.

Policy and Procedures (2 of 2 sites, 11 of 27 concerns). Definitions and requirements for auxiliary systems have not been clear or consistent.

Onsite contractor operators lacked proper interface personnel to ensure that the required tests of auxiliary systems were being performed and the problems that arose with auxiliary systems were properly communicated and investigated. Also, programs were not in place to minimize waste and monitor shipments of accumulated waste. Functional requirements for some systems were not defined, documented or maintained.

Internal organizations were not clearly assigned specific responsibilities as required by DOE, and operational safety requirements for a number of buildings do not contain sufficient surveillance as specified by Safety Analysis Reports. At 1 NE facility, methods for collecting, sampling, monitoring, and disposing of contaminated water in both the decontamination facility and the fuel segment storage pool had not been developed to ensure the safety of operational personnel.

Ventilation Systems (2 of 2 sites, 9 of 27 concerns). Ventilation systems were not monitored for maximum performance.

In some instances, operating procedures, control mechanisms, and equipment maintenance did not ensure control and containment of hazardous, airborne effluents.

Because of the design of the ventilation system at 1 building, a potential existed for releasing radioactivity. Consistently, effluents were not measured accurately, and ventilation systems were not monitored for conformance with established S&H procedures. High-efficiency air filters were not tested according to American National Standards Institute (ANSI)-N510. The safety status of ventilation systems was not established, and problems were not efficiently communicated to the managing contractor.

Management Support for Programs (2 of 2 sites, 9 of 60 concerns). Management support, resource allocation, and communication with internal and external emergency response organizations were not sufficient to ensure compliance with DOE Orders.

Several concerns addressed management support that limited the effectiveness of the sites' emergency management programs. Interfaces among various parts of the sites' emergency response organizations were not clearly defined as required by DOE. In addition, management had not provided sufficient written directions to ensure that effective command, control, and oversight were achieved during emergencies. Internal oversight programs had not been developed and, as a result, required appraisals had not taken place.

Training Programs (2 of 2 sites, 7 of 60 concerns). The emergency preparedness training program did not fully comply with DOE and other Federal requirements.

Little progress had been made in areas of response organization, cadre training, and documentation. Lesson plans and objectives for the training were not done according to DOE Orders or accepted practices. In addition, one training program was not performance-based while the other was not properly documented, evaluated, upgraded, and maintained current.

Emergency Facilities and Available Resources (2 of 2 sites, 7 of 60 concerns). Emergency facilities and resources did not meet DOE requirements for emergency preparedness.

The sites did not have the facilities, equipment, and resources necessary to support emergency response functions as required by DOE 5500.1A, 5500.1B, 5500.3, 5500.3A, and 5500.4.

7.3.11 Technical Support (total: 35 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of implementation and control for technical support activities, technical support procedures and documents, and equipment performance testing and monitoring. Technical support services required for facility modifications were evaluated for proper design, review, control, implementation, and timely documentation. Efforts to minimize the environmental impact of operations were assessed, as well as the conformance of packaging and transportation functions to existing standards and regulations. For reactors only, technical services in engineering activities and criticality safety were evaluated for comprehensiveness and efficiency.

For this analysis, 5 performance areas were identified: regulatory compliance, safety-related issues, policies and procedures, documentation, and facility modifications. The NE concerns were sorted into the first 4 performance areas.

engineering designs approved by the technical services staff. A substantial backlog of key engineering drawings were not in as-built status.

7.3.12 Packaging and Transportation (total: 47 concerns)

For this discipline, the Tiger Teams reviewed the adequacy of systems to implement Federal and state regulations, DOE Orders, and good industrial practices; appropriate training, qualification, and certification of personnel handling hazardous materials; effective QA checks and balances; the compliance and safety of intra-building movements, enroute storage operations, onsite and offsite shipments, and packaging and storage of hazardous materials; timely reporting of accidents and incidents; adequacy of records; and appropriate conduct of appraisals and internal audits.

For this analysis, 5 performance areas were identified: management systems, operations, training, QA/QC program, and pipeline safety. Two concerns did not fit into any of the performance areas; the remaining NE concerns were sorted into the first 4 performance areas.

Management Systems (1 of 2 sites, 15 of 47 concerns). Management systems did not provide control over packaging and transportation activities as required by DOE Orders and Department of Transportation (DOT) regulations.

Concerns indicated that resource allocation was inadequate to ensure that enough properly qualified personnel were involved in packaging and transportation activities. Also, management did not disseminate information on hazardous materials transportation to all employees, and independent safety oversight had not been provided as required by DOE Orders.

Operations (1 of 2 sites, 14 of 47 concerns). Packaging and transportation operations at the NE site did not fully comply with DOE Orders and DOT regulations.

Incoming shipments of hazardous materials were not checked for leaks and breaks. Incoming shipments of radioactive materials were not surveyed by Health Physics. Documentation verifying the use of proper packaging was not maintained. In addition, vermiculite in packaging was used as an absorbent, contrary to DOE Orders. Accident data from packaging and transportation incidents were not collected. Procedures for offsite and onsite transport were not in compliance with DOE and DOT requirements, and no manuals were available for these activities.

Training and Certification (1 of 2 sites, 9 of 47 concerns). Training and certification of NE personnel involved in packaging and transporting hazardous materials did not fully comply with DOE Orders and DOT regulations.

Concerns indicated that training programs across the site were missing required elements of a completely functional program. Other concerns noted a lack of documentation for personnel who had received training.

7.3.14 Security/Safety Interface (total: 5 concerns)

For this discipline, the Tiger Teams reviewed safety aspects of security/safeguards improvements and modifications to ensure that safety is not compromised in such areas as emergency access and egress, and weapons and other protective force equipment. Safety authorities and responsibilities for security/safeguards emergencies were evaluated for clear definition and understanding among all involved parties.

For this analysis, 5 performance areas were identified: facility training and planning for security/safeguard emergencies, emergency access and egress, review of security operations, safety of security, and safety of improvements. The NE concerns were sorted into the first 4 performance areas.

Facility Training and Planning for Security/Safeguards Emergencies (1 of 2 sites, 2 of 5 concerns). Safety authority and responsibility were not well defined and understood. The concerns in this performance area addressed a lack of training for personnel to respond in emergencies.

Emergency Access and Egress (1 of 2 sites, 1 of 5 concerns). Instructions stipulating unimpeded access and egress of emergency vehicles were not included in Post Orders at the entrance to 1 site.

Review of Security Operations (1 of 2 sites, 1 of 5 concerns). Reviews or audits of security operations were not conducted or documented. The concern addressed the site's lack of a formal system for tracking action items from safety reviews of security projects through to resolution. The lack of a formal review process had been noted in several areas.

Safety of Security (1 of 2 sites, 1 of 5 concerns). No operational assurance (annual audit) program was in place for firearms safety at 1 site as required by DOE.

7.3.15 Experimental Activities (total: 5 concerns)

For this discipline, the Tiger Teams reviewed the interface between experimenters and operational groups for clear definition; the process, including approval by an Independent Safety Review Committee, for adequacy and completeness; and the performance experiments for risk control and safety.

For this analysis, 4 performance areas were identified: experimenter training, roles, and responsibilities; experiment categories/reviews; experiment proposals/planning; and risk assessment and operation of experiments. The NE concerns were sorted into the first 3 performance areas.

Experimenter Training, Roles, and Responsibilities (1 of 2 sites, 2 of 5 concerns). Roles and responsibilities of experimenters were not clearly defined and understood, and the experimenters did not have adequate training to perform all functions expected.

Corrective Action Programs (1 of 2 sites, 1 of 24 concerns). This concern addressed the need for improved corrective action programs for review processes.

7.3.17 Radiological Protection (total: 94 concerns)

For this discipline, the Tiger Teams reviewed the organization's ability to implement and control radiological protection activities; the adequacy of the performance assessments provided by internal audits and investigations; the ability of radiation protection procedures to provide for safe operations; the effectiveness of radiation protection programs, including external radiation exposure control, external and internal radiation dosimetry, internal radiation exposure control, radiation monitoring and contamination control, and ALARA; the accuracy of fixed and portable instrumentation and air monitoring systems; and the availability of records related to occupational radiation exposure.

For this analysis, 4 performance areas were identified: radiological protection procedures, oversight of radiological protection programs, radiological monitoring, and exposure control programs.

Radiological Protection Procedures (2 of 2 sites, 31 of 94 concerns). Procedures concerning radiological area posting, and internal and external dosimetry did not fully comply with DOE requirements.

Posting of radiological areas throughout 1 site was not consistent and in some cases did not comply with DOE Orders. Radioactive source location and inventory were not maintained as required by the radiological control manual. The site accident and routine personnel dosimetry program did not fully comply with DOE requirements. Further, some areas of the site had not verified that dosimeters met DOE criteria for personnel monitoring. Lack of timely analysis of bioassay samples did not ensure that potential internal exposures would be detected as required by DOE Orders. Last, the quality control of analysis and data collected, and technical basis for bioassay were not well documented.

At the other site, the lack of procedures compromised the technical basis and justifications for components of the radiation protection program. These included lack of policy or procedure for use of direct reading dosimeters, and lack of procedures for both the internal and external dosimetry programs.

Oversight of Radiological Protection Programs (2 of 2 sites, 25 of 94 concerns). Management had not fully implemented DOE policies and requirements.

Specifically, contractor management did not fully delineate authorities, responsibilities, and operating policies and procedures for an effective radiation protection program. Independent audits and management reviews of the radiological protection program did not meet the requirements of DOE Orders. As a result, documented programs to maintain exposures ALARA had not been realized at either site.

Concerns related to compliance with Federal and DOE requirements for written programs. Safety Manuals and procedures were incomplete and not maintained current with DOE Orders, Federal regulations, and industry best management practices. Several essential programs were missing (e.g., respiratory protection and occupational exposure monitoring); many existing programs were missing essential critical elements (e.g., confined space entry, hearing conservation, hazard communication, regulated substances, laser safety, and monitoring of maintenance and engineering controls). Lack of organized control over developing, administering, and enforcing S&H programs led to multiple programs (e.g., lockout/tagout) within different organizations at 1 site. These multiple programs were inconsistent, ineffective, and/or deficient (i.e., did not receive review of approval by technically competent persons) and complicated uniform implementation and enforcement efforts.

Program Implementation and Training (2 of 2 sites, 14 of 52 concerns). Implementation of existing programs, policies, procedures, and work practices did not fully comply with Federal and DOE requirements.

Several of the concerns identified incomplete implementation of, or weak enforcement of, existing programs, including industrial hygiene monitoring, respiratory protection, hazard communication, management of hazardous materials (e.g., compressed gases), laser safety, carcinogens, and construction safety. A causal factor for incomplete or ineffective implementation of existing S&H programs and noncompliance with various Federal and DOE requirements was a lack of adequate supervisor and worker training in the scope, objective, and performance indicators of applicable programs.

Management of Occupational Hazards (2 of 2 sites, 11 of 52 concerns). The NE sites did not ensure that workplaces were kept free from occupational hazards.

Sites did not maintain technically based and effectively managed systems to identify, evaluate, control, and monitor chemical, physical, biological, and environmental hazards present in the worksite. They did not enforce a system of documented periodic safety inspections, audits, and reviews of facilities, operations, and procedures by technically qualified and adequately trained personnel in accordance with DOE Orders. Sites had developed a reactive rather than proactive system to respond to, correct, and develop strategies to prevent the recurrence of identified occupational hazards, including contractor S&H issues. The sites also had not developed a system that ensured that (1) S&H concerns were identified and reviewed before starting certain known hazardous activities and (2) the hazards were effectively communicated to affected workers.

Safety and Health Management Systems (2 of 2 sites, 7 of 52 concerns). The NE sites had not developed effective safety and health management systems.

The sites had not allocated sufficient numbers of technically qualified individuals to key S&H positions. A significant deficiency was noted in the oversight and management of construction safety because of the lack of technically qualified and trained resources. Roles and responsibilities were not defined,

S&H Management Systems (1 of 2 sites, 12 of 57 concerns). The NE sites had not developed effective S&H management systems.

Management had not defined overall S&H goals, objectives, and priorities for contractor construction safety. The site had not established effective roles and responsibilities or assigned authority and accountability. The site's failure to identify all regulatory requirements and to designate qualified program administrators, supervisors, and inspectors was a causal factor for many of the concerns. Major deficiencies in developing effective management systems to oversee contractor activities resulted in many deficiencies in the areas of excavations safety; use of worn and defective equipment; inadequate walking and working surfaces; and deficiencies in confined space entry, drilling safety, electrical safety, scaffolding, housekeeping, respirators, handling of hazardous materials, and emergency evacuation.

S&H Training (1 of 2 sites, 2 of 57 concerns). Training did not satisfy the requirements dictated by an existing site program or as required under Federal regulations and DOE Orders.

Concerns addressed inadequate training on equipment inspection, checkout, and use for workers operating hoisting and rigging equipment.

7.3.20 Fire Protection (total: 37 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation and control of fire protection equipment and activities; the adequacy of life safety provisions against the effects of fire; the adequacy of protection to the public from hazardous materials released as the result of an onsite fire; the adequacy of measured taken to prevent shutdown of operations and reduce property loss; the capacity of the Fire Department to terminate and mitigate the effects of a fire; and the effectiveness of the fire protection engineering program.

For this analysis, 6 performance areas were identified: facilities and equipment, surveillance/inspections/reviews, Life Safety Code, policies/ procedures, organization and administration, and training and resources.

Facilities and Equipment (1 of 2 sites, 8 of 37 concerns). Concerns in this performance area related to the lack of backup water supply and pump system, lack of structural fire fighting capabilities, and fire equipment testing programs.

Surveillance/Inspection/Review Programs (1 of 2 sites, 8 of 37 concerns). The concerns focused on the lack of strong oversight programs, focusing on the lack of quality fire safety and fire safety hazard analyses.

Life Safety Code (2 of 2 sites, 6 of 37 concerns). Concerns related to both the lack of strong life safety programs including integration strategies, lack of life safety programs at construction sites, lack of audible alarms, and

Medical Facilities and Equipment (2 of 2 sites, 2 of 14 concerns). The concerns focused on the need for larger, better equipped facilities to provide medical care.

Oversight Activities (2 of 2 sites, 2 of 14 concerns). The concerns focused on the lack of internal auditing programs.

7.3.22 Miscellaneous (total: 22 concerns)

This discipline assessed the commitment to safety in the areas of aviation and firearms. The existence and content of safety directives were evaluated, including issuance of safety orders that reflected management's commitment to attaining these goals, along with assessing routine operations. This responsibility was evaluated on compliance with program guidance and deviations from recognized standards.

Concerns were identified in 6 performance areas: aviation safety, firearms safety appraisal program, storage of munitions, range operations, firearms safety programs, and firearms exercises. The findings indicated that further attention to detail was required in these areas.

Aviation Safety (1 of 2 sites, 4 of 22 concerns). Aviation operations and maintenance were not conducted according to DOE requirements.

The hangar at the site had enough structural and Life Safety Code violations that it could not be used for sheltering aircraft. The Field Office had failed to promptly correct the problems noted with the site hangar. Problems with aircraft engines posed a serious threat to flight safety. The Field Office did not conduct aviation safety oversight activities as required.

Firearms Safety Appraisal Program (1 of 2 sites, 5 of 22 concerns). Firearms safety appraisal programs did not fully comply with DOE requirements.

Two contractors did not have proper procedures for storing commercial drivers' weapons and did not have suitable bullet containment devices for clearing weapons. One contractor did not perform required annual appraisals, and the Field Office did not always conduct required appraisals of all contractors.

Storage of Munitions (1 of 2 sites, 5 of 22 concerns). Storage magazine conditions did not fully comply with DOE requirements.

Two concerns indicated that, for security reasons, magazines were not properly placarded or identified, and required storage reviews had not been conducted. Several magazines were not properly electrically grounded. The conditions in 1 magazine could cause physical injury to people working there or damage to the material stored there. One contractor had live and blank ammunition in the same storage box, and there were loose smoke grenades and ammunition in the same location.

Range Operations (1 of 2 sites, 4 of 22 concerns). Range operations did not fully comply with DOE requirements.

SYNOPSIS: ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT (EM)

The Office of the Assistant Secretary for Environmental Restoration and Waste Management (EM) is concerned with all aspects of assessment and cleanup of facilities and sites that are no longer a part of the active operations but are contaminated with transuranic, low-level, hazardous, or mixed radioactive and hazardous waste materials. The Oak Ridge K-25 Site is the only EM site Tiger Team Assessment covered in this report.

This synopsis briefly describes the findings from the analysis of the EM site from the perspectives of Management and Organization (M&O), Environment and Safety and Health (S&H). These perspectives are discussed in more detail in the following chapter.

MANAGEMENT AND ORGANIZATION (EM)

The root causes addressed the need to provide leadership in changing attitudes toward ES&H issues, in developing plans to meet ES&H challenges, and to develop a strong, independent oversight function. The key findings similarly focused on the need to fully implement ES&H vision in more formal, vigorous programs, use resources effectively, and develop a strategic plan and oversight programs.

The findings indicated needs to improve and develop ES&H programs, policy guidance, and procedures; to integrate ES&H planning into existing systems; and to develop a comprehensive training program as well as strengthen the ES&H human resources management program.

ENVIRONMENT (EM)

The key findings indicated that the site had not fully implemented all Federal and state regulations or DOE Order requirements in an integrated system to ensure environmental compliance.

In regulatory compliance, the site had an inadequate program for complying with air regulations and permit conditions. Over 60% of the surface water/drinking water deficiencies were in programs, and adequate groundwater protection programs had not been developed at the site.

Programmatic weaknesses, coupled with incomplete implementation of applicable DOE Orders, resulted in an environmental quality assurance (QA) program that had inadequate documentation, lacked operating procedures, lacked organizational independence, and had inadequate regional management. Thus, it did not ensure that the environmental maintenance and surveillance program was effective.

Deficiencies existed in the waste management facility, the waste characterization program, and the waste management program, as well as in training,

Emergency preparedness (19 concerns) and fire protection (15 concerns) were disciplines with related clusters of concerns. Lack of programs was the focus in each discipline.

In quality verification (16 concerns) the main issues were deficiencies in materials and controls processes with respect to DOE and industry standards. Corrective action and quality assurance (QA) programs also did not meet DOE and NQA-1 requirements.

8.0 ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT (EM)

This review and summary of the Environmental Restoration and Waste Management (EM) site is part of a larger analysis focused on the final 19 Tiger Team Assessments. The EM site is the Oak Ridge K-25.

Following the Tiger Team methodologies and categories, this analysis discusses the findings from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 20 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, root cause analysis, and findings are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns and concerns are discussed. Key concerns are those that either address (1) a "clear and present" danger to people or (2) significant risk or substantial noncompliance with DOE Orders (referred to as Category I and II in the Tiger Team Assessments).

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area give two sets of information. The first set of numbers indicates the number of sites having a finding(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline or performance area. For example, (1 of 1 site, 4 of 16 concerns) means that the 1 EM site was assessed and 4 of the 16 total concerns identified by the Tiger Team Assessments are discussed in that subsection. For the overall discussion of each discipline, the total number of findings or concerns are shown in the heading.

8.1 MANAGEMENT AND ORGANIZATION

The purpose of this section is to summarize the common trends in the M&O root causes, key findings, and findings identified when the final EM Tiger Team Assessment was conducted; to identify any unique or unusual findings or key findings that could be significant; and to list any noteworthy practices.

TABLE 8.1. Summary of M&O Key Findings for the EM Site

M&O Key Finding Discipline	K-25	TOTAL
Program Evaluation	1	1
ES&H Planning	1	1
Formality of Operations	2	2
Resources & Training	1	1
ES&H Program Commitment	0	0
Organizational Structure	0	0
TOTAL	5	5

8.1.3 Key Findings (total: 5 key findings)

Key findings, summarized above in Table 8.1, were evaluated to determine whether any common trends existed in the characteristics that defined key findings, so that EM can use knowledge in planning its strategy to achieve ES&H excellence. To evaluate the EM M&O key findings, each key finding was reviewed, analyzed, and sorted according to common themes. M&O key findings typically represented a synthesis of many issues. In sorting the key findings, the overriding issue being communicated was determined, and the key finding was then placed within the respective discipline, discussed below.

Formality of Operations (1 of 1 site, 2 of 5 key findings). The key findings addressed the need for more formality and rigor in developing and implementing a fully integrated and comprehensive ES&H management system. The findings were intensified because guidance was not transferred to the operating level, which hindered the ES&H vision from being fully implemented.

Resources and Training (1 of 1 site, 1 of 5 key findings). The finding focused on the lack of full implementation of human resources at the site effectively and efficiently. Because of the rapid changes at the site, resources were used to "put out fires" rather than to plan their use in an integrated and comprehensive manner.

ES&H Planning (1 of 1 site, 1 of 5 key findings). The finding focused on the need for a comprehensive, integrated strategic plan for ES&H affairs and implementing subordinate documents to ensure that the plans were carried out at the proper level of management. A strong need existed to link the budgeting and planning processes so that the ES&H activities were properly addressed and that informed decisions were made based on the actual needs of programs.

Roles, Responsibilities, and Authorities (1 of 1 site, 3 of 4 findings). The findings were associated with inadequately defined roles, responsibilities, and authorities for independent oversight. The deficiencies were found to be at the site, Field Office, and PSO levels.

Independence (1 of 1 site, 1 of 4 findings). The finding addressed a lack of independence of the ES&H oversight function. The site had no division of responsibilities between staff members involved in implementing ES&H operational requirements and those associated with day-to-day oversight and compliance functions. This organizational arrangement was not consistent with DOE policies, which require division of responsibilities between line and staff ES&H professionals to ensure strong systems of checks and balances and independent oversight.

8.1.5 ES&H Program Commitment (total: 4 findings)

For this discipline, the Tiger Teams assessed the commitment to excellence demonstrated by formal ES&H policy, top management support, and line responsibility. The existence and content of ES&H policy were evaluated, including issuance of formal environmental policy statements that reflected the site's goals, guidance to attain those goals, and the commitment of senior management. Top management support was assessed based on demonstration of commitment to programs and performance. Line responsibility was evaluated based on the sense of responsibility demonstrated by managers and operating personnel.

For this analysis, 2 performance areas were identified: ES&H policy and management support.

Analysis indicated the need to improve ES&H policy guidance, ensuring a consistent understanding of policies and responsibilities. Management support for ES&H programs also needed to be strengthened to reflect the priority DOE had placed on ES&H excellence.

ES&H Policy (1 of 1 site, 2 of 4 findings). The findings identified the lack of widespread understanding of ES&H policies, roles, and responsibilities at the site and the lack of ES&H guidance by DOE.

Management Support (1 of 1 site, 2 of 4 findings). The findings addressed the lack of Headquarters' management support, specifically in the areas of setting priorities and providing funding landlord responsibility, and the inadequate commitment to compliance evidenced by Field Office and site management's lack of ES&H compliance oversight.

8.1.6 Resources and Training (total: 4 findings)

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at the sufficiency of environmental staffing resources and the completeness of the organization's systems for

8.1.8 Formality of Operations (total: 6 findings)

For this discipline, the Tiger Teams reviewed regulatory procedures and programs, and recordkeeping and reporting. The management systems were evaluated for their ability to provide the formal guidance and direction for ensuring that DOE Orders and regulations were properly received, disseminated, and incorporated into existing site procedures. Procedures and programs were examined for incorporation of guidance, regulations, and Orders into viable and complete programs. Recordkeeping and reporting were examined with regard to incident reporting systems and formality of recordkeeping and reporting.

For this analysis, 3 performance areas were identified: procedures and programs, regulatory tracking, and recordkeeping and reporting. The EM findings were all classified in procedures and programs.

Procedures and Programs (1 of 1 site, 6 of 6 findings). The findings focused on the lack of programs or the lack of complete programs to carry out the missions of the ES&H programs, including document control, conduct of operations, audit item closeouts, and stop work authority.

8.1.9 Communications

The Tiger Team assessed no findings for this discipline at the EM site.

8.1.10 ES&H Planning (total: 5 findings)

For this discipline, the Tiger Teams evaluated management systems for their ability to ensure that ES&H issues, resources, and needs were systematically included, reviewed, and effectively prioritized in all budgetary, financial, and strategic planning efforts.

For this analysis, 2 performance areas were identified: planning systems and programs, and budgeting systems and programs.

Analysis indicated the need to better and more fully integrate ES&H planning and budgeting into existing systems. In addition, better guidance was needed to effectively prioritize ES&H needs and to determine the level of ES&H review of project plans.

Planning Systems and Programs (1 of 1 site, 4 of 5 findings). The findings were associated with inadequacies in planning programs and addressed the lack of integration of ES&H issues at the PSO and site levels into strategic planning processes and long-term planning for ES&H programs.

Budgeting Systems and Programs (1 of 1 site, 1 of 5 findings). One finding addressed inadequacies in budgeting programs. The finding addressed the lack of a well-developed budgeting program for activities associated with landlord responsibilities. A clear disconnect existed in the budgeting process as it related to the site's landlord responsibilities.

8.2.2 Key Findings (total: 3 key findings)

Key findings for the EM Tiger Team Assessment were reviewed, analyzed, and sorted to determine whether common trends existed. Because environmental key findings typically represented common issues from several of the environmental disciplines, a determination was made as to the overriding issue being communicated. Based on that determination, the key finding was placed within the appropriate one of the 5 disciplines that were used for the key finding analysis: formality of environmental programs; environmental quality assurance and oversight; inactive waste site identification, investigation, and remediation; waste management; and toxic and chemical materials.

Three key findings represented significant environmental program weaknesses and potential liabilities for the site. The 3 key findings are a compilation of the 103 findings identified in the environmental section of the site's Tiger Team Assessment. Each key finding is indicative of a large programmatic issue that existed at this site.

Formality of Environmental Protection Programs (1 of 1 site, 3 of 3 key findings). The site did not fully implement all DOE Order requirements in an integrated system to ensure environmental compliance. Systems were not fully developed within individual environmental programs, fully integrated between individual programs, or coordinated with site-wide programs. Management systems for complying with Secretary of Energy Notice (SEN) and DOE Order performance objectives were ineffective. The site NEPA program was characterized by multiple procedures that lacked integration and resulted in redundant, time-consuming practices. The NEPA review process was further hindered by the lack of a NEPA compliance officer at the Oak Ridge Field Office.

The site had not effectively implemented a comprehensive environmental surveillance program, sampling plans, and procedures. This deficiency was identified in all media. Of special concern was the radiological environmental surveillance and contamination control program. Findings were related to both historic and current operations. Inadequacies in site-wide monitoring plans resulted in an incomplete understanding of the extent of the restoration program needs and inadequate support for site operations.

data to verify compliance. The second BMPF addressed oversight in the asbestos management program. There were procedures for actual abatement activities at the site but a lack of procedures governing oversight for transfer of the asbestos from one in-house organization to another. There had been incidents in which untrained personnel had disposed of asbestos without an adequate accounting. Inadequate policy implementation was cited as a causal factor. The common causal factors for both of the BMP findings were insufficient appraisals/audit/reviews and inadequate procedures.

Ambient Surveillance (1 of 1 site, 2 of 9 findings). Maintenance and operating procedures did not ensure the collection of representative radionuclide particulate data and compromised the integrity of the air surveillance program at the site. Although the site operated two meteorological monitors as part of the multi-site contractor network, the collected data were not complete enough to provide baseline air quality information or to be used in general air quality impact models for the site as mandated by DOE 5400.1. The data that were collected were not available to site personnel in an accessible format.

Appropriate Emissions Controls (1 of 1 site, 2 of 9 findings). The HEPA filter systems were not being maintained in a manner to ensure public exposures to radionuclides that were as low as reasonably achievable. The focus of this finding was on maintenance testing (e.g., there were no pressure gauges for detecting clogged filters or procedures for testing filters suspected of being contaminated). The cause for this finding was a lack of procedures and controls to ensure proper equipment maintenance and effective policy implementation.

The onsite gasoline tank did not have a vapor recovery system. Although these systems were not technically required, the proactive stance would be to install them.

Permit Management (1 of 1 site, 1 of 9 findings). The documents defining the multiple contracting relationships at the site do not clearly identify whether the landlord, tenant, or DOE organizations are responsible for overall air planning. There is insufficient oversight of air impact and compliance activities and inadequate air program implementation guidance.

Emissions Tracking (1 of 1 site, 1 of 9 findings). Comprehensive site emission tracking through emission inventories required by state regulation and special agreement had not been completed. Indirect emissions estimates had been used at this site to evaluate potential air effluents of some individual sources for NESHAPs. Because source emissions were not fully quantified, the applicable requirements for the air contaminant sources and the site as a whole were unknown. The causal factors were lack of policy implementation; lack of training; and lack of adequate appraisals, audits, and reviews.

8.2.4 Surface Water/Drinking Water (total: 18 findings)

For this discipline, the Tiger Teams evaluated compliance with Federal, state, and local water pollution control requirements established for conformance

8.2.5 Groundwater/Soil, Sediment, and Biota (total: 7 findings)

For this discipline, the Tiger Teams evaluated both the programmatic and technical status of groundwater protection and monitoring as it related to regulations, industry guidance, and best management practices; the environmental monitoring programs of these media; the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and programs and procedures established to prevent future contamination and prevent the spread of contamination from currently contaminated areas to clean areas. Regulations include the requirements of DOE, Resource Conservation and Recovery Act (RCRA), CERCLA/SARA, and state regulations.

All identified groundwater program deficiencies fell under Groundwater Protection Management Program (GPMP) and GPMP Plan general requirements, since they comprised the site-wide groundwater management, protection, and monitoring programs. Within the GPMP, the findings can be grouped into 3 performance areas: groundwater monitoring and surveillance; well construction, maintenance, and abandonment; and hydrogeologic characterization.

The performance areas for soil, sediment, and biota findings were soil, sediment, and biota monitoring and surveillance programs and ecological impact/protection.

This discipline identified 6 CFs and 1 BMPF. The groundwater program had 3 CFs and 1 BMPF; the soil, sediment, and biota program had 3 CFs.

Groundwater Monitoring and Surveillance (1 of 1 site, 3 of 7 findings). An adequate groundwater protection program had not been developed for the site. One BMPF addressed the site's failure to evaluate the applicability of local water quality (groundwater contamination/discharge) regulations to the facility. Deficient components of the existing program included inadequate site-wide hydrogeologic characterization; groundwater sampling procedures that were not consistent with DOE Orders, internal documents, or guidance documents; and an inadequate monitoring and surveillance program.

Hydrogeological Characterization (1 of 1 site, 1 of 7 findings). The site did not have a monitoring well network capable of providing hydrogeologic information on a site-wide basis.

Soil, Sediment, and Biota (1 of 1 site, 3 of 7 findings). Three deficiencies were identified in the monitoring and surveillance program for soil, sediment, and biota. One finding addressed the site's lack of an adequate soil, sediment, and biota monitoring and surveillance plan. The site did not have adequate sampling plans and procedures and did not adequately characterize soil at active contamination sites.

Waste Characterization (1 of 1 site, 2 of 12 findings). The waste characterization programs at the site were incomplete and inadequate. Contributing to the problem was a unique arrangement in which the site's Incinerator Operations Division was organizationally and functionally separate from the site's Waste Management Division. The two organizations implemented different waste sampling and analysis programs for waste characterization. The Incineration Operations Division had strict standards by which generators test their wastes and very thorough and complex verification testing procedures but no procedures for addressing discrepancies. For the Waste Management Division, generators estimated contents based on process knowledge and the Division developed verification testing on a case-by-case basis. There were no formal procedures for characterizing existing radiological waste.

8.2.7 Toxic and Chemical Materials (total: 13 findings)

For this discipline, the Tiger Teams evaluated compliance with TSCA, FIFRA, HMTA, DOE Orders, applicable state regulations, internal policies and administrative memoranda, and best management practices. The use, storage, and disposal of PCBs and pesticides were compared to regulations promulgated under TSCA and FIFRA as well as state requirements. The receiving, handling, and storage of chemicals were assessed for compliance with DOE Orders, Federal and state regulations, and best management practices.

For this analysis, 4 performance areas were identified: PCB management, toxic and chemical materials management, Pollution Prevention Awareness Plans (PPAPs), and pesticide management. The EM findings were sorted into the first 3 performance areas.

Thirteen CFs were identified. Two performance areas contained 12 CFs: toxic and chemical materials (TCM) management (5 CFs) and PCB management (7 CFs). Findings in PCB management and TCM management indicated a lack of comprehensive, integrated programs and procedures. Management systems did not adequately assign designated staff responsibilities or provide training to promote regulatory compliance and environmental excellence.

PCB Management (1 of 1 site, 7 of 13 findings). The site did not have a comprehensive formal PCB management program to ensure compliance with DOE 5400.1 and Federal regulations. Specific departmental and divisional PCB management procedures such as testing, identification, and tracking; spill response; and storage were not fully integrated and did not fully conform to DOE and Federal requirements.

Oil-filled electrical equipment containing in excess of 50 ppm PCBs was being stored for reuse in onsite and offsite activities.

Toxic and Chemical Materials Management (1 of 1 site, 5 of 13 findings). Two areas of concern were the focus of the 5 CFs: sitewide tracking and above ground storage of TCM. Handling, shelf-life monitoring of potentially explosive chemicals, storage, and use of TCM and potentially reactive chemicals were not tracked on a site-wide basis as required by DOE 5400.1, 5480.10, and

Oversight (1 of 1 site, 2 of 10 findings). Inadequate audit and corrective action programs did not ensure the detection and remediation of situations affecting environmental quality.

8.2.9 Radiation (total: 14 findings)

For this discipline, the Tiger Teams assessment consisted of evaluating current operational practices and programs to determine compliance status with Federal, state, and local regulations, and DOE Orders. The programs were also reviewed against DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," and against commonly accepted best industry practices and standards of performance. As a part of the assessment, reviews of documents, procedures, and records associated with the environmental radiation programs were coordinated with Environmental subteam specialists in surface water, groundwater, quality assurance/oversight, radioactive and mixed waste management, inactive waste sites, and air to ensure that all potential environmental radiation problems were identified and evaluated.

For this analysis, 6 performance areas were identified: protection of the environment, radioactive and mixed waste management, protection of the public, radiological reporting requirements, radiological emergency planning, and SARs.

Of the 14 findings, 13 were CFs and 1 was a BMPF. Analysis indicated the need for improved environmental surveillance, effluent monitoring, demonstration of compliance with NESHAPs for radionuclides and dose assessments.

Protection of the Environment (1 of 1 site, 9 of 14 findings). This performance area related to actions to minimize the spread of radioactive materials through the environment. Areas reviewed include as low as reasonably achievable (ALARA) programs, effluent monitoring, environmental surveillance, and preoperational monitoring. Of the 9 findings, 8 were CFs and 1 was a BMPF. The findings focused on lack of adequate environmental surveillance activities, lack of an ALARA program, poor contamination control, inability to demonstrate compliance with NESHAPs for radionuclides, and inadequate design of liquid effluent monitoring systems.

Radioactive and Mixed Waste Management (1 of 1 site, 2 of 14 findings). This performance area related to control of high-level, low-level, transuranic (TRU) (naturally occurring and accelerator produced), and mixed radioactive wastes. It also examined decontamination and decommissioning (D&D) programs, and waste management plans (including implementation of DOE 5820.2A). The 2 CFs focused on lack of a formal D&D program, and failure to provide monitoring for stored radioactive waste.

Protection of the Public (1 of 1 site, 1 of 14 findings). The information provided by the site for determination of the dose to the public did not evaluate all contributors. In addition, the potential for exposure of the public in excess of 10 mrem per year, or a combined dose equal to or greater than 100 mrem per year had not been reported.

A formal, consistent, documented risk management program had not been considered to ensure continued protection of public health and the environment at IWSs. Specific examples included the inadequate recognition of potential risks associated with IWSs that were not directly related to plant processes; an incomplete awareness of the potential risks inherent in not performing necessary interim remedial actions at IWSs; and an inadequate recognition of the potential risk involved in the failure to coordinate site development and environmental issues.

Hazardous Chemical Reporting (1 of 1 site, 1 of 10 findings). The site does not have complete programs and procedures in place to ensure that the notification requirements of noncontinuous releases of CERCLA reportable quantities are met.

8.2.11 NEPA (total: 10 findings)

For this discipline, the Tiger Teams assessed the NEPA management structure and NEPA review processes; NEPA procedures and documentation; compliance with NEPA, Council on Environmental Quality (CEQ) regulations, and DOE NEPA Guidelines, Orders, and guidance memoranda; and the adequacy of guidance and oversight from Program Secretarial Officers and the Assistant Secretary for Environment, Safety and Health (EH-1).

For this analysis, 5 performance areas were developed: site-wide policy and procedures; planning, integration and coordination; program incorporation and implementation; guidance and training; and tracking and recordkeeping.

This discipline identified 10 findings: 9 CFs and 1 BMPF. There was no central point for overall NEPA documentation review, recordkeeping, and status tracking for the entire site. Complex and segmented organizational structures severely hindered the flow of information needed to ensure that NEPA compliance was being achieved.

The site had not incorporated the RCRA/CERCLA process and flood plain/wetlands regulations into the NEPA review mechanism. NEPA was not integrated into the planning process at the site and, therefore, was treated as an add-on requirement rather than as an environment planning tool.

Site-wide Policy and Procedures(1 of 1 site, 4 of 10 findings). The procedures in use for implementing NEPA at the site and its supporting elements were inconsistent, incomplete, and did not show the DOE approvals required by DOE 5440.1D. The only site-wide NEPA document was outdated and inadequate and the NEPA document review processes were cumbersome and time-consuming.

Planning, Integration, and Coordination (1 of 1 site, 2 of 10 findings). The site contractor and the Field Office had not incorporated NEPA early enough in decision making and project planning processes at the site. Therefore, NEPA was not used as an effective planning tool. The CERCLA/RCRA compliance program at the site was being implemented without a strategy or procedure to integrate NEPA.

8.3.1 Noteworthy Practices

Noteworthy practices are listed in this section. Since noteworthy practices are, by definition, "exceptional practices," and would therefore usually be unique to a single DOE site, no further analysis is provided here for these items. An indepth analysis of noteworthy practices within DOE site system can be found in *Noteworthy Practices* (DOE 1992).

One noteworthy practice was identified at the site and related to a facility access information system. This system provided an easy-to-use method of identifying access requirements for specific facilities and areas within facilities, including those related to physical hazards, radiation hazards, personnel monitoring, security, personal protective equipment, medical evaluation, and training.

TABLE 8.5. Summary of S&H Key Concerns for the EM Site

S&H Key Concern Discipline	K-25	TOTAL
Noncompliance	0	0
S&H Programs	1	1
Oversight	0	0
Management Systems & Resources	3	3
TOTAL	4	4

8.3.2 Key Concerns (total: 4 key concerns)

Key concerns for S&H are summarized above in Table 8.5. The key concerns were reviewed, analyzed, and sorted to determine whether common trends existed. Because S&H key concerns typically represented common issues from several of the disciplines, the overriding issue was identified. Based on that determination, the key concern was placed into 1 of the 4 key concern disciplines: identified noncompliance; missing, deficient, or ineffective programs; ineffective oversight by DOE; and ineffective contractor management system or organizational structure.

Ineffective Contractor Management System or Organizational Structure (1 of 1 sites, 3 of 4 key concerns). The Tiger Team identified the lack of involvement of safety professionals in line management activities having a potential impact on safety and quality as a key concern. Procedures were inadequate or nonexistent and there was not a safety envelope that reflected current site activities.

TABLE 8.7. Summary of S&H Concerns for the EM Site

S&H Concern Discipline	K-25	TOTAL
Organizational & Administration	10	10
Quality Verification	16	16
Operations	6	6
Maintenance	7	7
Training & Certification	8	8
Auxiliary Systems	5	5
Emergency Preparedness	19	19
Technical Support	3	3
Packaging & Transportation	3	3
Nuclear Criticality	9	9
Security/Safety Interface	5	5
Experimental Activities	0	0
Site/Facility Safety	3	3
Radiological Protection	20	20
Personnel Protection	0	0
Worker Safety	6	6
Industrial Hygiene	14	14
Occupational Safety	8	8
Fire Protection	15	15
Medical Services	8	8
TOTAL	165	165

The following sections summarize and analyze S&H concerns across the EM site, as shown above in Table 8.7. Each of the following sections focuses on 1 S&H discipline and its performance areas.

materials, inspection procedures, and control of special processes. Consideration was given to documentation of adequate procedures and the qualification of personnel, procedures, and equipment.

For this analysis, 5 performance areas were identified: materials and process control, audits and oversight, programs and program implementation, procedures, and training and certification.

Materials and Process Control (1 of 1 site, 5 of 16 concerns). The site's materials and controls processes did not meet DOE and NQA-1 requirements. Measurement and test equipment inspection use was not traceable; nonconforming items were not controlled or segregated; inspection requirements were not documented; and responsibility for controlling measurement and test equipment was not indicated on status tags.

Audits and Oversight (1 of 1 site, 4 of 16 concerns). One concern stated that the compliance-based QA audit program did not assess the effectiveness of the program under review. Corrective action programs were not effectively implemented, and corrective action procedures were not followed.

Programs and Program Implementation (1 of 1 site, 3 of 16 concerns). QA programs did not fully comply with DOE and NQA-1 requirements. The concerns focused on line management commitment to quality, procedure control and compliance, corrective action, and process control. Programs lacked requirements for analysis of quality performance, evaluation and archiving of qualifications, configuration verification, and documentation of corrective action of nonconformance reports.

Procedures (1 of 1 site, 3 of 16 concerns). Procedures did not meet DOE and NQA-1 requirements. Some written procedures at the site were outdated. Other procedures did not adequately define methods.

Training and Certification (1 of 1 site, 1 of 16 concerns). Inspector qualifications and certifications did not meet DOE and NQA-1 requirements. Certification and qualification records did not reflect recertification of nondestructive test inspectors.

8.3.6 Operations (total: 6 concerns)

For this discipline, the Tiger Teams reviewed activities related to safe and reliable operation of systems and equipment. Aspects of this discipline encompass safe, reliable conduct of operations; effective guidance for normal and abnormal facility operations; personnel knowledge of both operational status and the effect of non-operational systems and equipment; personnel ability to control systems and equipment; provision of proper equipment in a clean, orderly, well-designed environment; and effective and accurate transfers of information between shift personnel.

For this analysis, 7 performance areas were identified: policies, programs, and procedures; communication; worker qualifications and operation activities;

Planning, Scheduling, and Control of Maintenance Activities (1 of 1 site, 2 of 7 concerns). Maintenance activities were not always planned, scheduled, or controlled as required by DOE Orders. The most frequently cited DOE Order was DOE 4330.4A.

Equipment Maintenance (1 of 1 site, 1 of 7 concerns). Some equipment important to facility operations was not maintained in a reliable condition.

8.3.8 Training and Certification (total: 8 concerns)

For this discipline, the Tiger Teams reviewed training organization and administration for the ability to identify training needs and ensure that needs are met; quality of training for reactor and nuclear facility operations (with nuclear criticality safety and simulator training/facility exercises), personnel protection, maintenance, quality control inspector, nondestructive examination technician, radiological protection, and supervisory and managerial skills; and the support provided by training facilities, equipment, and materials.

For this analysis, 6 performance areas were identified: training and certification programs, facilities and equipment, examinations, records, DOE/Field/Area/Site Office training and certification, and management of programs. The EM findings were sorted into the first 3 performance areas.

Training and Certification Programs (1 of 1 site, 4 of 8 concerns). Training and certification programs at the site were missing many required elements of a completely functional program. The site training and certification program did not meet the requirements of DOE Orders. Resource allocation issues were noted in several areas. Facilities provided for training at the site were marginal and did not help to fulfill DOE's goals in the training and certification area.

Training Facilities and Equipment (1 of 1 site, 3 of 8 concerns). Training facilities at the site did not effectively support the training objectives of DOE. Of particular note was the lack of classroom space for training classes.

Training and Qualification Exams (1 of 1 site, 1 of 8 concerns). Training and certification examinations at the site were not always conducted, and, when conducted, did not fully meet DOE policies and requirements. The examination and certification process at the site did not ensure that a defined level of proficiency was achieved. Examinations did not have adequate scope to test the students' knowledge of the entire subject area. Examination results were not always reviewed with the trainee after the examinations were graded. This was noted in the site's carcinogen control awareness training and other programs. Passing grades for some courses appeared to be arbitrarily assigned.

8.3.9 Auxiliary Systems (total: 5 concerns)

For this discipline, the Tiger Teams reviewed systems for effluent holdup and treatment, solid hazardous wastes, ventilation, electricity, water, emergency power, heat removal, engineered safety, and coolant cleanup. Under this

plume dissipation projections rather than required field monitoring. Predetermined protective actions were established but had not been integrated with event categorization and class determination. Resource allocation for the staffing level of the fire department did not meet the requirements shown in the site emergency plan.

Compliance with Federal and DOE Requirements (1 of 1 site, 6 of 19 concerns). Programs or elements of programs required by DOE Orders were missing or not fully in place. Emergency plans and implementing procedures were defined but not incorporated into a developed and fully compliant program. Concerns were identified regarding incomplete hazards assessments, emergency action levels, classification, and protective action programs.

Emergency Facilities and Available Resources (1 of 1 site, 4 of 19 concerns). Emergency facilities and resources did not meet DOE requirements for emergency preparedness. The emergency exercise observed by the Tiger Team identified habitability concerns in the Emergency Operations Center, deficiencies in radio communication support and the plant public address system, and problems with the dose model in use. The primary Emergency Operations Center was not hardened (i.e., shielded and ventilated) to be habitable following an emergency. The site's radio communication system did not provide reliable support of emergency response personnel, and the public address system could not provide timely notification to all building occupants. The HARM II atmospheric dispersion model could not develop viable plume projections and could not incorporate topography and environmental transport and diffusion as required by DOE 5500.3A.

Training Programs (1 of 1 site, 1 of 19 concerns). The site's emergency response training program was not fully developed as required by DOE 5500.3A. The interim emergency preparedness training program did not fully meet DOE requirements.

8.3.11 Technical Support (total: 3 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of implementation and control for technical support activities, technical support procedures and documents, and equipment performance testing and monitoring. Technical support services required for facility modifications were evaluated for proper design, review, control, implementation, and timely documentation. Efforts to minimize the environmental impact of operations were assessed, as well as the conformance of packaging and transportation functions to existing standards and regulations. For reactors only, technical services in engineering activities and criticality safety were evaluated for comprehensiveness and efficiency.

For this analysis, 5 performance areas were identified: safety-related issues, facility modifications, policies and procedures, regulatory compliance, and documentation. The EM findings were sorted into the first 2 performance areas.

For this analysis, 2 performance areas were identified: oversight and nuclear criticality safety programs, and criticality safety procedures and monitoring.

Oversight and Nuclear Criticality Safety Programs (1 of 1 site, 6 of 9 concerns). Management of the site had not yet initiated an independent review and appraisal system to satisfy all nuclear criticality safety requirements of DOE Orders. The site also had not yet achieved a system of formal qualification and certification of personnel with nuclear criticality safety responsibilities. Additionally, the site's local DOE Field Office did not completely satisfy the periodic nuclear criticality safety appraisal requirements of DOE.

Criticality Safety Procedures and Monitoring (1 of 1 site, 3 of 9 concerns). A complete analysis of the site operations with fissile materials to confirm compliance with the double contingency principle was not performed per DOE requirements. Nuclear criticality safety procedures were not always reviewed as required by site and DOE policies, nor were they reviewed annually after issuance. Fissile material storage onsite did not satisfy all DOE requirements. Some emergency exits on the site did not fully comply with DOE orders.

8.3.14 Security/Safety Interface (total: 5 concerns)

For this discipline, the Tiger Teams reviewed safety aspects of security/safeguards improvements and modifications to ensure that safety is not compromised in such areas as emergency access and egress, and weapons and other protective force equipment. Safety authorities and responsibilities for security/safeguards emergencies were evaluated for clear definition and understanding among all involved parties.

For this analysis, 5 performance areas were identified: safety of security, safety of improvements, facility training and planning for security/safeguard emergencies, review of security operations, and emergency access and egress. One unique concern addressed safety of security issues resulting from poor security vehicle maintenance. The EM concerns were sorted into the first 4 performance areas.

Safety of Security Activities (1 of 1 site, 2 of 5 concerns). Security force practices and equipment potentially endangered personnel safety. One concern resulted from the poor operating conditions of the security patrol vehicles. The second concern related to the appropriateness of the type of weapons used by the security forces at various stations within the site.

Safety of Improvements (1 of 1 site, 1 of 5 concerns). Improvements or modifications to the security system (facility and procedures) were not formally reviewed for operational safety before they were implemented. In effect, the security and safety groups did not formally approve a recent security project for safety concerns and had not completed a formal system for the approval process.

Radiological Protection Procedures (1 of 1 site, 10 of 20 concerns). Procedures concerning radiological area posting, and internal and external dosimetry did not fully comply with DOE requirements. Posting of airborne radioactivity and contamination areas was not in compliance with site policies. Implementation of procedures related to contamination control, radiation work permits, source control, and release of materials to the public was not complete and in compliance with DOE Orders. External radiation dosimetry for measurement of dose to the lens of the eye had not been formally addressed by the site. In addition, the site's personnel nuclear accident dosimetry program did not comply with accuracy requirements of the DOE Orders. Further, the internal dosimetry program at the site lacked formality and staff oversight. For example, the site laboratory analytical capabilities did not meet DOE requirements for bioassay programs.

Radiological Monitoring (1 of 1 site, 4 of 20 concerns). Instrumentation used for radiological monitoring did not fully meet DOE requirements. A program to inventory, track, trend, and calibrate fixed and portable radiation survey instruments had not been fully implemented by the site, as required by DOE Orders. Further, a sufficient quantity of operational and calibrated instruments may not have been available for use by the site in the event of an emergency, as required by the site emergency plan and DOE Orders.

Oversight of Radiological Protection Programs (1 of 1 site, 3 of 20 concerns). Site management had not fully implemented DOE policies and requirements. Contractor management at the site had not fully delineated authorities, responsibilities, and operating policies and procedures for radiological protection. Independent audits and management reviews of the radiological protection program did not meet the requirements of DOE Orders. As a result, a program to maintain exposures ALARA had not been implemented at the worker level.

Exposure Control Program (1 of 1 site, 3 of 20 concerns). External and internal radiation exposure control programs did not fully comply with DOE requirements. The site's radiation source control program was not sufficiently developed to minimize radiation exposure resulting from inadvertent contact or improper use of sources. In addition, measures taken to control the spread of contamination were not adequate to minimize internal radiation exposure and did not fully comply with requirements of DOE Orders. Records and reports of occupational radiation exposure at the site also did not meet requirements.

8.3.18 Personnel Protection

This discipline was not assessed at the EM site.

8.3.19 Worker Safety and Health (total: 6 concerns)

For this discipline, the Tiger Teams reviewed the identification, evaluation, and control of environmental stresses in the workplace; the appropriateness of surveillance to measure safety and health performance; compliance with health standards and safety standards for general industry and for construction

fields. Deficiencies included the following: respirators were issued and used before a job hazards analysis was conducted; written procedures covering the use of portable fresh air breathing stations were incomplete; respiratory protection training was incomplete; systems of accountability and control of respirators and replacement cartridges were inadequate; and respirators were improperly stored and maintained.

Hazard Identification, Evaluation, and Control (1 of 1 site, 5 of 14 concerns). The site did not have a comprehensive exposure identification, evaluation, and control strategy. The site lacked a formal strategy to help identify, evaluate, and control potential occupational exposures to chemical biological and physical agents. The site did not have a program to evaluate employee exposures to electromagnetic fields. The site also did not emphasize policies that required management to consider product substitution, engineering controls, and administrative controls as the primary means to control health hazards.

Staffing, Resources, Administration and Oversight Requirements (1 of 1 site, 3 of 14 concerns). The industrial hygiene department failed to properly oversee or administer industrial hygiene functions. The industrial hygiene program was deficient in staffing, resources, administration, and oversight. The industrial hygiene department had not implemented an oversight program as required by DOE 5482.1B or a QA program according to DOE 5480.10. The industrial hygiene program was not formally linked to the medical department, nor did the industrial hygiene department ensure that professional/technical staff maintain professional qualifications related to their assignments.

Information Management, Records, and Documentation (1 of 1 site, 1 of 14 concerns). There was 1 concern related to inadequacies in recordkeeping and management systems.

8.3.21 Fire Protection (total: 15 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation and control of fire protection equipment and activities; the adequacy of life safety provisions against the effects of fire; the adequacy of protection to the public from hazardous materials released as the result of an onsite fire; the adequacy of measured taken to prevent shutdown of operations and reduce property loss; the capacity of the Fire Department to terminate and mitigate the effects of a fire; and the effectiveness of the fire protection engineering program.

For this analysis, 6 performance areas were identified: facilities and equipment, policies/procedures, Life Safety Code, surveillance/inspections/reviews, organization and administration, and training and resources. The EM concerns were sorted into the first 5 performance areas.

Facilities and Equipment (1 of 1 site, 5 of 15 concerns). The concerns focused on the lack of fire runoff control programs and the lack of conformance with DOE standards for buildings, improper fire suppression systems, and delays in repairs to fire protection systems.

8.3.23 Occupational Safety (total: 8 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of organizational and administrative implementation of the occupational safety program; the appropriateness of procedures and documentation; the identification, evaluation, control, and communication of environmental stresses in the workplace; the appropriateness of surveillance to measure occupational safety performance; and the adequacy of information communicated to site/facility personnel about physical stresses that may be encountered in the work environment.

For this analysis, 9 performance areas were identified: inspections, audits, and Job Safety Analyses (JSAs); testing, inspection, and maintenance; contractor and construction safety; lockout/tagout; confined space entry; personal protective equipment; communication of S&H roles, responsibilities, and programs; S&H training and expertise; and accident investigation and record-keeping. Of the total concerns, 2 did not fit into an identified performance area; the remainder were sorted into the first 4 performance areas.

Inspections/Audits and Job Safety Analyses (1 of 1 site, 2 of 8 concerns). A formal safety inspection program, including staffing, prioritization, scheduling, and inspection procedures had not been established in accordance with DOE 5483.1A. In addition, the facility had not developed a program or system to ensure that appropriate corrective action was identified, implemented, and documented for identified deficiencies as required by DOE 5483.1A. Compressed gas cylinder storage areas were not inspected, and contractor safety deficiencies and concerns were not followed up in a formal manner.

Testing, Inspection, and Maintenance (1 of 1 site, 2 of 8 concerns). The test, inspection, and maintenance program for facility equipment did not fully comply with DOE and OSHA requirements. The test, inspection, and maintenance program was inconsistently implemented from facility to facility. Portable equipment and tools and electrical cords had not received safety inspections required by site procedures. About 300 (7%) of the 4300 pieces of equipment in the equipment test and inspection program were overdue for inspection. In addition, oxygen monitors in several buildings were past due for calibration.

Contractor and Construction Safety (1 of 1 site, 1 of 8 concerns). One concern identified inadequacies in contractor and construction safety practices.

Lockout/Tagout (1 of 1 site, 1 of 8 concerns). One concern addressed inadequacies in lockout/tagout safety procedures.

SYNOPSIS: CONSERVATION AND RENEWABLE ENERGY (CE)

The Office of the Assistant Secretary for Conservation and Renewable Energy (CE) is responsible for formulating and directing programs designed to increase the production and utilization of renewable energy (solar, biomass, wind, geothermal, alcohol fuels, etc.) and improving the energy efficiency of transportation, buildings, industrial systems, and related processes through support of long-term, high-risk R&D activities. The Tiger Team Assessment for the National Renewable Energy Laboratory, formerly called the Solar Energy Research Institute, is covered below.

This synopsis briefly describes the findings from the analysis of the CE site from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H).

MANAGEMENT AND ORGANIZATION (CE)

The root causes focused on the need for a culture change to an ES&H emphasis, led by management. Key findings addressed the need to improve formality of operations, program commitment, and organizational structure. Issues in the findings were lack of management responsiveness to ES&H concerns, lack of guidance, lack of ES&H programs or incomplete programs (e.g., in ES&H training, conduct of operations, and quality assurance). Long-range plans needed to be developed to address ES&H issues.

ENVIRONMENT (CE)

Three key findings were noted in the Tiger Team Assessment:

- The site lacked a comprehensive and formalized environmental management program.
- The site had not developed a consistent program to ensure National Environmental Policy Act (NEPA) compliance across all programs and projects.
- The lack of a comprehensive quality assurance (QA) plan, trained environmental personnel, and sufficient internal and external audits resulted in deficiencies in the delegating staff responsibilities and undetected sampling and reporting errors.

Findings in the disciplines indicated a lack of programs and systems. The site had no formal procedures for managing air and water permits and no systems to monitor and track air emissions or surface water/drinking water. The groundwater findings noted deficiencies in monitoring and protection programs.

Deficiencies existed in the waste management facility, the inactive waste site and waste characterization programs, and the toxic and chemical materials and

9.0 CONSERVATION AND RENEWABLE ENERGY (CE)

This review and summary of 1 Conservation and Renewable Energy (CE) site is part of a larger analysis focused on the final 19 Tiger Team Assessments. The CE site is the National Renewable Energy Laboratory (NREL), formerly called the Solar Energy Research Institute.

Following the Tiger Team methodologies and categories, this analysis discusses the findings from the perspectives of Management and Organization (M&O), Environment, and Safety and Health (S&H). Within each perspective, findings are categorized by disciplines: 7 disciplines for M&O, 9 for Environment, and 20 for S&H. No new data were developed as a result of this analysis.

Within M&O, key findings, root cause analysis, and findings are discussed. For Environment, key findings and findings are discussed. For S&H, key concerns and concerns are discussed. Key concerns are those that either address (1) a "clear and present" danger to people or significant risk or (2) substantial noncompliance with DOE Orders (referred to as Category I and II in the Tiger Team Assessments).

In order to identify trends in the Tiger Team Assessment data, the data from each discipline were consolidated into areas of similar issues, and then summarized. In order to consolidate the data, the basic components that defined each discipline were determined. All the findings in a particular discipline, across all the sites in a particular analysis, were then sorted into the basic components that were identified for that discipline. This allowed individual findings that addressed similar issues to be grouped together into larger categories, and overall trends to be identified. For the purposes of this report, the basic components identified for each discipline are called performance areas. The example used is for the findings section; however, the same method was used to identify trends in concerns, key findings, and key concerns.

The numbers in parentheses after each discipline or performance area give 2 sets of information. The first set of numbers indicates the number of sites having a finding(s) or concern(s) and the number of sites assessed. The second set of numbers indicates the number of concerns/findings and total number for that discipline. For example, (1 of 1 site, 4 of 16 concerns) means that the CE site had a concern in this discipline or performance area and 4 of the 16 total concerns identified by the Tiger Team Assessments are discussed in that subsection. For the overall discussion of each discipline, the total number of findings or concerns are shown in the heading.

9.1 MANAGEMENT AND ORGANIZATION

The purpose of this section is to summarize the common trends in the M&O root causes, key findings, and findings identified when the final CE Tiger Team Assessment was conducted; to identify any unique or unusual findings or key findings that could be significant; and to list any noteworthy practices.

facility management away from a programmatic orientation. Management had not embraced the ES&H initiatives of the Secretary and provided the leadership and guidance needed to ensure that the programs were being implemented. ES&H programs had not been emphasized at senior management levels; this had resulted in a lack of formality in programs, inadequate staffing levels, and training issues. A number of laboratory facilities at the site were inadequate.

TABLE 9.1. Summary of M&O Key Findings for the CE Site

M&O Key Finding Discipline	NREL	TOTAL
Program Evaluation	0	0
ES&H Planning	0	0
Formality of Operations	1	1
Resources & Training	1	1
ES&H Program Commitment	1	1
Organizational Structure	1	1
TOTAL	4	4

9.1.3 Key Findings (total: 4 key findings)

The evaluation of the key findings determined any common trends in the characteristics that define key findings, so that CE could use this knowledge in planning its strategy to achieve ES&H excellence. In evaluating the CE M&O key findings, each M&O key finding was reviewed, analyzed, and sorted according to similar themes. M&O key findings typically represented a synthesis of many issues. In sorting the key findings, a determination was made as to the overriding issue being communicated and the key finding was then assigned to a discipline. Key findings are summarized above in Table 9.1.

Formality of Operations (1 of 1 site, 1 of 4 key findings). The key finding addressed the need for a more committed effort to formalize, integrate, and develop more comprehensive ES&H programs and procedures, as well as the need to improve the documentation of the ongoing activities.

Resources and Training (1 of 1 site, 1 of 4 key findings). The key finding was unique in that it focused on the fact that 1 building's laboratory facilities were inadequate because of the design of the building.

ES&H Program Commitment (1 of 1 site, 1 of 4 key findings). The key finding focused on the need to have implementing guidance, adequate staffing levels,

For this discipline, the Tiger Teams assessed the commitment to environmental excellence demonstrated by formal environmental policy, top management support, and line responsibility. The existence and content of environmental policy were evaluated, including issuance of formal environmental policy statements that reflect the facility's goals, guidance to attain those goals, and the commitment of senior management. Top management support was assessed based on demonstrated commitment to environmental programs and performance. Line responsibility was evaluated based on demonstrated sense of responsibility of managers and operating personnel at all levels for environmental protection.

For this analysis, 3 performance areas were identified: management support, ES&H policy, and cooperative attitude.

Analysis indicated the need to improve ES&H policy guidance to ensure consistent understanding and implementation. In addition, management support for ES&H programs needed to be strengthened to reflect the DOE priority's on ES&H excellence.

Management Support (1 of 1 site, 2 of 4 findings). The findings focused on site management's lack of responsiveness to ES&H concerns, specifically the lack of demonstrated management "ownership" of ES&H programs and commitment to compliance.

ES&H Policy (1 of 1 site, 1 of 4 findings). The finding identified the lack of ES&H policy guidance provided by CE for applicability and implementation of DOE ES&H directives.

Cooperative Attitude (1 of 1 site, 1 of 4 findings). The finding addressed the lack of utilization of third-party safety reviews.

9.1.6 Resources and Training (total: 3 findings)

For this discipline, the Tiger Teams assessed the comprehensiveness of ES&H human resources management plans and the adequacy and effectiveness of ES&H training programs. The Tiger Teams looked at whether environmental staffing resources were sufficient and how complete the organization's systems were for identifying and satisfying employees' needs for ES&H training and opportunities for career development. The assessment also included the adequacy and maintenance of facilities and equipment and the effectiveness of management information systems.

For this analysis, 3 performance areas were identified: facilities and equipment, training, and human resources. CE findings were sorted into the first 2 performance areas.

Analysis indicated a need to develop and implement a comprehensive ES&H training program.

Facilities and Equipment (1 of 1 site, 2 of 3 findings). The findings identified inadequate facilities and maintenance at the site.

9.1.9 Communications (total: 1 finding)

For this discipline, the Tiger Teams reviewed the existence and effectiveness of internal and external communications systems. The effectiveness of internal communications systems was evaluated for the understanding of roles and responsibilities and the awareness of ES&H policies, procedures, and programs throughout the organization. The extent and effectiveness of external communications were assessed through the evaluation of the relationships the facility had with oversight agencies and citizen and environmental groups.

For this analysis, 2 performance areas were identified: internal communications and external communications. The CE finding was assigned to internal communications.

Internal Communications (1 of 1 site, 1 of 1 finding). The finding addressed inadequacies in the implementation of vertical and horizontal channels of communication.

9.1.10 ES&H Planning (total: 2 findings)

For this discipline, the Tiger Teams evaluated management systems for their ability to ensure that ES&H issues, resources, and needs were systematically included, reviewed, and effectively prioritized in all budgetary, financial and strategic planning efforts.

For this analysis, 2 performance areas were identified: planning systems and programs, and budgeting systems and programs. The 2 CE findings were assigned to the first of these performance areas.

Analysis indicated a need to more systematically provide for ES&H and National Environmental Policy Act (NEPA) review of work statements and project proposals and a need to develop better long-range plans for ES&H requirements.

Planning Systems and Programs (1 of 1 site, 2 of 2 findings). One of these findings addressed inadequate ES&H and NEPA reviews of work statements and project proposals. One of the findings addressed the need to better develop long-range plans for ES&H issues and programs.

9.2 ENVIRONMENT

This section summarizes noteworthy practices, key findings, and findings in the Environmental perspective for the CE site. The scope of the environmental analysis included all of the 9 disciplines normally appraised during a Tiger Team Assessment. When a discipline was not assessed at one or more of the sites, this fact is noted in the analysis.

Findings are divided into compliance findings (CFs) and best management practice findings (BMPFs). Compliance findings represent conditions that, in the judgment of the subteam, may not satisfy the requirements of environmental regulations, DOE Orders (including internal DOE directive memoranda, where

appropriate one of the 5 disciplines that were used for the key finding analysis: formality of environmental programs; environmental quality assurance and oversight; inactive waste site identification, investigation, and remediation; toxic and chemical materials; and waste management.

An analysis was performed on the 3 key findings representing significant environmental program weaknesses at the site. These 3 findings are a compilation of the 39 findings identified in the environmental section. However, each key finding was determined to be indicative of large programmatic issues that existed at this site.

Formality of Environmental Programs (1 of 1 site, 2 of 3 key findings). The site lacked a comprehensive and formalized environmental management program with policies, procedures, and training sufficient to ensure compliance with Federal, state, and local laws and regulations and with DOE Orders. The Field Office, the Area Office, and the site had not developed a consistent program to ensure NEPA compliance across all site programs and projects. NEPA responsibilities were not understood by the site staff, and documentation prior to 1990 was inadequately or improperly reviewed and/or approved.

Environmental QA and Oversight (1 of 1 site, 1 of 3 key findings). Specific staff responsibilities for QA had not been delegated, and sampling errors and reporting inaccuracies had not been identified and corrected due to insufficient internal and external audits. The lack of a comprehensive QA plan and trained environmental personnel contributed to these deficiencies.

TABLE 9.4. Summary of Environment Findings for the CE Site

Environment Finding Discipline	NREL	TOTAL
Air	4	4
Surface/Drinking Water	5	5
Groundwater/Soil, Sediment & Biota	3	3
Waste Management	5	5
Toxic Chemicals & Materials	6	6
QA/QC	5	5
Radiation	5	5
Inactive Waste Sites	2	2
NEPA	4	4
TOTAL	39	39

For this analysis, 4 performance areas were identified: DOE Orders and EO programs, National Pollutant Discharge Elimination System (NPDES) programs and systems, SPCC planning, and drinking water.

Findings consisted of 4 CFs and 1 BMPF. The site posed relatively low risk to the surface water/drinking water pathway. Most findings addressed the site's lack of monitoring and surveillance programs to ensure compliance with the local sewer authority regulations and with DOE Orders. These findings resulted from a lack of understanding by site personnel of the risk associated with site operations.

DOE Orders and EO Programs (1 of 1 site, 2 of 5 findings). The 2 CFs in this performance area noted that the site did not conduct periodic sampling of wastewater effluent to verify compliance with local effluent discharge regulations and had not characterized baseline surface water quality in accordance with DOE 5400.1.

NPDES Programs and systems (1 of 1 site, 1 of 5 findings). The site had not consistently submitted detailed written reports to the local sanitation district regarding accidental releases.

SPCC Planning (1 of 1 site, 1 of 5 findings). The site had not developed a spill prevention plan or implemented spill prevention measures as required by local regulations.

Drinking Water (1 of 1 site, 1 of 5 findings). The single BMPF addressed the absence of backflow prevention devices at one of the laboratories to protect the potable water supply.

9.2.5 Groundwater/Soil, Sediment, and Biota (total: 3 findings)

For this discipline, the Tiger Teams evaluated both the programmatic and technical status of groundwater protection and monitoring as it related to regulations, industry guidance, and best management practices; the environmental monitoring programs of these media; the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and programs and procedures established to prevent future contamination and prevent the spread of contamination from currently contaminated areas to clean areas. Regulations include the requirements of DOE, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/SARA, and state regulations.

All identified groundwater program deficiencies fell under Groundwater Protection Management Program (GPMP) and GPMP Plan general requirements, since they comprised the site-wide groundwater management, protection, and monitoring programs. Within the GPMP, the findings can be grouped into 4 performance areas: groundwater monitoring and surveillance; sampling procedures; well construction, maintenance, and abandonment; and hydrogeologic characterization.

findings that related to satellite and hazardous waste accumulation areas resulted from a lack of adequate procedures to ensure that labeling, inspections, and other miscellaneous operations were conducted in compliance with applicable Federal and state regulations.

Waste Management Program (1 of 1 site, 2 of 5 findings). The waste minimization program plan did not meet the requirements of DOE 5400.1 with respect to annual goals and the documentation of annual changes in waste volume and toxicity. The site also lacked a waste management program plan that defined a comprehensive waste management system, including roles and responsibilities, policies, procedures, and training.

9.2.7 Toxic and Chemical Materials (total: 6 findings)

For this discipline, the Tiger Teams evaluated compliance with regard to TSCA, FIFRA, HMTA, DOE Orders, applicable state regulations, internal policies and administrative memoranda, and best management practices. The use, storage, and disposal of PCBs and pesticides were compared to regulations promulgated under TSCA and FIFRA, respectively, as well as state requirements. The receiving, handling, and storage of chemicals were assessed for compliance with DOE Orders, Federal and state regulations, and best management practices.

For this analysis, 4 performance areas were identified: PCB management, toxic and chemical materials management, pesticide management, and Pollution Prevention Awareness Plans (PPAPs).

One CF and 5 BMPFs were observed. One BMPF was found in each of the following areas: toxic and chemical materials (TCM) management, pesticides management, and asbestos management. Two BMPFs were observed in polychlorinated biphenyl (PCB) management. The single CF noted was in the Pollution Prevention Awareness Program (PPAP) Plan. The findings indicated a lack of formal, comprehensive policies and procedures at the CE site. These findings all indicated programmatic deficiencies.

The site lacked formality in the management of TCM, PCBs, pesticides, and asbestos; this increased the potential for mismanagement, improper control, noncompliant storage, and inconsistent oversight at the site.

PCB Management (1 of 1 site, 2 of 6 findings). The site lacked formal procedures for the identification, tracking, proper storage, and disposal of PCBs.

Toxic and Chemical Materials Management (1 of 1 site, 1 of 6 findings). The site had no written procedures for the transportation of hazardous materials and substances to ensure compliance with HMTA and DOE 5480.3.

Pesticide Management (1 of 1 site, 1 of 6 findings). The site did not have comprehensive written policies and procedures for the application and use of pesticides and herbicides at the permanent site.

and accelerator produced), and mixed radioactive wastes. Decontamination and decommissioning (D&D) programs and waste management plans (including implementation of DOE 5820.2A) were also assessed.

For this analysis, 6 performance areas were identified: radioactive and mixed waste management, radiological reporting requirements, protection of the public, protection of the environment, SARs, and radiological emergency planning. The 4 CFs and 1 BMPF at CE were in the first 2 performance areas.

Radioactive and Mixed Waste Management (1 of 1 site, 3 of 5 findings). The 3 CFs focused on a lack of acceptance criteria for low-level waste, disposal of low-level waste at non-DOE facilities, lack of a formal D&D program, and lack of a waste management plan. The findings documented a lack of compliance with DOE 5820.2A.

Radiological Reporting Requirements (1 of 1 site, 2 of 5 findings). There were 1 CF and 1 BMPF. The findings focused on lack of submission of ODIS reports, lack of complete reporting in Annual Site Environmental Reports, and lack of documentation in Emergency Management Plans as required by DOE 5400.5, 5400.1, and 5820.2A.

9.2.10 Inactive Waste Sites (IWSs) (total: 2 findings)

For this discipline, the Tiger Teams assessed the identification and evaluation of inactive waste sites (IWSs) and releases of hazardous substances from site operations, site-wide integration and resource planning of environmental restoration activities, CERCLA and National Contingency Plan (NCP) release notification and remedial response requirements, real property transfer and site development planning requirements, hazardous chemical tracking and reporting programs for the SARA Title III, 40 CFR 300 et seq., and DOE 5400.4 requirements as well as adherence to best management practices.

For this analysis, 3 performance areas were developed: preliminary assessment and site characterization, hazardous chemical reporting, and regulatory compliance. The CE findings were sorted into the first 2 performance areas.

The BMPFs addressed incomplete identification and evaluation of IWSs and releases of hazardous substances from site operations, and SARA Title III compliance reporting and hazardous chemical inventory tracking programs.

Preliminary Assessment and Site Characterization (1 of 1 site, 1 of 2 findings). The site had conducted preliminary assessments on previously identified potential IWSs. Investigations performed lacked important technical requirements to completely characterize IWSs and subsurface contaminant migration patterns. Formal, documented, periodic appraisals and audits were not performed on environmental restoration activities to determine whether additional field investigations were warranted. Furthermore, the site had not developed policies or procedures to ensure that potential IWSs were systematically evaluated and consistently characterized in accordance with established guidelines.

9.3 SAFETY AND HEALTH

The purpose of this section is to summarize noteworthy practices, key concerns, Category I and II concerns, and concerns in the Safety and Health (S&H) perspective when the final CE Tiger Team Assessment was conducted.

The subdivisions of this section begin with noteworthy practices (9.3.1), key concerns (9.3.2), and Category I and II concerns (9.3.3). The subdivisions that follow (9.3.4 through 9.3.17) discuss findings from the EM assessment by discipline.

The S&H perspective includes 21 disciplines: organization and administration (9.3.4), quality verification (9.3.5), operations (9.3.6), maintenance (9.3.7), training and certification (9.3.8), auxiliary systems (9.3.9), emergency preparedness (9.3.10), technical support (9.3.11), site/facility safety review (9.3.12), radiological protection (9.3.13), personnel protection (9.3.14), worker S&H (OSHA) compliance (9.3.15), fire protection (9.3.16), and medical services (9.3.17).

Seven disciplines were not applicable to the CE site; these were either covered under other disciplines (industrial hygiene and occupational safety under personnel protection, radiological protection under environmental radiation, packaging and transportation under technical support) or not addressed (nuclear criticality, safety/security interface, and experimental activities).

9.3.1 Noteworthy Practices

No noteworthy practices were identified during the Tiger Team analysis of CE.

TABLE 9.5. Summary of S&H Key Concerns for the CE Site

S&H Key Concern Discipline	NREL	TOTAL
Noncompliance	0	0
S&H Programs	5	5
Oversight	0	0
Management Systems & Resources	1	1
TOTAL	6	6

9.3.2 Key Concerns (total: 6 key concerns)

Key concerns for S&H are shown above in Table 9.5. The key concerns were reviewed, analyzed, and sorted to determine whether common trends existed. Because S&H key concerns typically represented common issues from several of

TABLE 9.7. Summary of S&H Concerns at the CE Site

S&H Concern Discipline	NREL	TOTAL
Organizational & Administration	8	8
Quality Verification	10	10
Operations	1	1
Maintenance	17	17
Training & Certification	3	3
Auxiliary Systems	6	6
Emergency Preparedness	6	6
Technical Support	7	7
Packaging & Transportation	N/A	N/A
Nuclear Criticality	N/A	N/A
Security/Safety Interface	N/A	N/A
Experimental Activities	N/A	N/A
Site/Facility Safety	4	4
Radiological Protection	N/A	N/A
Personnel Protection	6	6
Worker Safety	12	12
Industrial Hygiene	N/A	N/A
Occupational Safety	N/A	N/A
Fire Protection	6	6
Medical Services	4	4
TOTAL	90	90

The following sections summarize and analyze S&H concerns across the EM site, as shown in Table 9.7. Each of the following sections focuses on 1 S&H discipline and its performance areas.

For this analysis, 5 performance areas were identified: programs and program implementation, audits and oversight, materials and process control, procedures, and training and certification.

These concerns focus primarily on the absence of a site-wide QA program and of a quality assurance engineer or certified lead auditor.

Programs and Program Implementation (1 of 1 site, 4 of 10 concerns). QA programs did not fully comply with DOE requirements. Major areas of concern included lack of an approved QA program, lack of an approved QA oversight program for the site and for contractors, and lack of independence of quality assurance representatives. The site had no formal policy to identify and control the use or disposition of hardware, materials, parts, and components and no policy to ensure that incorrect/defective items were not used. The concerns noted in this report revealed a lack of the resources required to support and implement a QA program.

Audits and Oversight (1 of 1 site, 2 of 10 concerns). Management had not conducted periodic audits to ensure the quality of its operations. Management had failed to periodically audit the effectiveness of its QA program, and its line or staff organizations did not provide independent verification and oversight of QA activities.

Materials and Process Control (1 of 1 site, 2 of 10 concerns). Materials and controls processes did not meet DOE regulations. The site did not provide for the control or verification of purchased material, equipment, or services; or for the selection and control of suppliers. Receiving and pre-installation inspections were not independently verified.

Procedures (1 of 1 site, 1 of 10 concerns). The concern identified a lack of written inspection procedures that provided for documentation and evaluation of inspection results.

Training and Certification (1 of 1 site, 1 of 10 concerns). Training processes did not meet DOE requirements. The concern stated that formal QA training requirements have not been provided as required by DOE and DOE 5700.6B. Site personnel had not received formal QA training. QA audit training had not been offered and no personnel were certified lead auditors.

9.3.6 Operations (total: 1 concern)

For this discipline, the Tiger Teams reviewed activities related to safe and reliable operation of systems and equipment. Aspects of this discipline encompass safe, reliable conduct of operations; effective guidance for normal and abnormal facility operations; personnel knowledge of both operational status and the effect of non-operational systems and equipment; personnel ability to control systems and equipment; provision of proper equipment in a clean, orderly, well-designed environment; and effective and accurate transfers of information between shift personnel.

9.3.8 Training and Certification (total: 3 concerns)

For this discipline, the Tiger Teams reviewed training organization and administration for the ability to identify training needs and ensure that needs are met; quality of training for reactor and nuclear facility operations (with nuclear criticality safety and simulator training/facility exercises), personnel protection, maintenance, quality control inspector, nondestructive examination technician, radiological protection, and supervisory and managerial skills; and the support provided by training facilities, equipment, and materials.

For this analysis, 6 performance areas were identified: training and certification programs, facilities and equipment, records, DOE/Field/Area/Site Office training and certification, examinations, and management of programs. The CE concerns were sorted into the first 2 performance areas.

The major issue noted by the Tiger Team for the CE site was that training and certification programs did not contain all the required elements to achieve DOE's policies and objectives.

Training and Certification Programs (1 of 1 site, 2 of 3 concerns). Training and certification programs at the CE site did not contain all of the essential elements and did not have sufficient resources to achieve DOE's policies and objectives. The CE site did not have a documented training and certification program. There were no training plans, policies, or procedures. The general employee and personnel protection classes did not ensure that the requisite knowledge and practical factors required for qualification were achieved by students. Many courses required attendance only once, rather than periodically, to refresh and reinforce knowledge and skills. In addition, there were no permanent training facilities at the CE site, and the temporary facilities were not adequate to support the needs of the training and certification program.

Training Facilities and Equipment (1 of 1 site, 1 of 3 concerns). Training facilities and equipment did not meet the training needs of the site. Of particular note was the lack of dedicated classroom space for training classes. Mockups and practical training exercises were rarely performed.

9.3.9 Auxiliary Systems (total: 6 concerns)

For this discipline, the Tiger Teams reviewed systems for effluent holdup and treatment, solid hazardous wastes, ventilation, electricity, water, emergency power, heat removal, engineered safety, and coolant cleanup. Under this discipline, criteria are assessed against functional criteria for the structural, confinement, and primary process system of the facility. Each of the auxiliary systems has its own set of criteria for safe operation and compliance with regulations.

For this analysis, 4 performance areas were identified: ventilation systems, policies and procedures, emergency power systems, and waste systems. The CE concerns were sorted into the first 2 performance areas.

9.3.11 Technical Support (total: 7 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of implementation and control for technical support activities, technical support procedures and documents, and equipment performance testing and monitoring. Technical support services required for facility modifications were evaluated for proper design, review, control, implementation, and timely documentation. Efforts to minimize the environmental impact of operations were assessed, as well as the conformance of packaging and transportation functions to existing standards and regulations. For reactors only, technical services in engineering activities and criticality safety were evaluated for comprehensiveness and efficiency.

For this analysis, 5 performance areas were identified: safety issues, regulatory compliance, facility modifications, policies and procedures, and documentation. The CE concerns were sorted into the first 4 performance areas.

Safety Issues (1 of 1 site, 2 of 7 concerns). Activities involving risks were not consistently covered by formal safety analysis reviews. The site lacked the process to conduct formal safety analysis reviews of activities involving hazardous and risk-related activities. The testing and monitoring of safety-related equipment was not performed as a formal focused activity nor was it documented through the use of safety analysis.

Regulatory Compliance (1 of 1 site, 2 of 7 concerns). The site lacked consistent application of formal reviews and procedures as required by DOE. The site lacked the review process to analyze the combined risks for multiple activities. Also, the packaging and transportation of hazardous materials was performed without formal documentation and appropriate training of operating personnel.

Facility Modifications (1 of 1 site, 2 of 7 concerns). Formalized procedures and interfaces did not effectively support facility modification activities. There was a lack of formal procedures for controlling facility modifications and, as a result, modifications were not reviewed to ensure the safe operation of the site. Current status of ventilation and exhaust systems had not been properly verified and formal programs were not in place governing the emissions of these effluents to the environment.

Policies and Procedures (1 of 1 site, 1 of 7 concerns). The site had not fully developed effective operating policies and procedures. The site lacked the proper policies and procedures for effectively controlling facility modification activities to ensure the safety and health of operating personnel. The current status and configuration of technical support activities had not been properly verified in a formal program to characterize and verify the control of environmental releases from experimental laboratories.

9.3.12 Site/Facility Safety Review (total: 4 concerns)

For this discipline, the Tiger Teams reviewed the availability of a Safety Review Committee; the clear definition and understanding of items to be

deficiencies in the implementation of the site's respiratory protection program and hazard communication program. Concerns included ineffective surveillance over the issuance, storage, maintenance, and use of respirators, and labeling, material safety data sheet management, and employee training under the site's hazard communication program. The Tiger Team also identified a lack of communication and encouragement between line management and the work force; as a result, employees did not take an active role in identifying, controlling, and preventing occupational hazards and injuries.

Management of Occupational Hazards (1 of 1 site, 2 of 6 concerns). The site had not developed a technically based and effectively managed system to identify, evaluate, control, and monitor chemical, physical, biological, and environmental hazards. The Tiger Team identified noise, chemical exposures, and ergonomics as several occupational hazards requiring improved management. A causal factor for the lack of control over these hazards was an ineffective system of documented periodic safety inspections, audits, and reviews of facilities, operations, and procedures. An added concern was that the site had not established a proactive system to effectively respond to, correct, and develop strategies to prevent the recurrence of previously identified occupational hazards.

Compliance with Federal and DOE Requirements (1 of 1 site, 1 of 6 concerns). Written S&H programs, policies, and procedures did not fully comply with Federal and DOE requirements. The site had not established an effectively managed and enforced worker exposure monitoring program. A program did not exist to identify and monitor all employees and operations that presented the risk of exposure to carcinogenic or toxic chemicals (e.g., benzene, formaldehyde, arsenic, and chromium). The existing employee medical monitoring program did not provide for documenting key information such as employee exposure history. The Tiger Team also identified deficiencies in the site's program to manage occupational exposure to hazardous chemicals in laboratories. Delayed implementation of the site's chemical hygiene plan and ineffective worker training had resulted in difficulties in enforcing proper chemical handling and storage practices and issuance and use of proper personal protective equipment.

9.3.15 Worker S&H (OSHA) Compliance (total: 12 concerns)

For this discipline, the Tiger Teams reviewed the identification, evaluation, and control of environmental stresses in the workplace; the appropriateness of surveillance to measure safety and health performance; compliance with health standards and safety standards for general industry and for construction industry; and the adequacy of information communicated to site/facility personnel about chemical, physical, and biological stresses that may be encountered in the work environment.

For this analysis, 4 performance areas were identified: compliance with Federal and DOE requirements, program implementation, S&H training, and S&H management systems. The CE concerns were sorted into the first 2 performance areas.

Fire Protection Programs and Policies (1 of 1 site, 1 of 6 concerns). Concerns focused on the lack of fire protection engineering program, lack of program to ensure proper fire protection upgrades, and lack of a strong property protection program.

9.3.17 Medical Services (total: 4 concerns)

For this discipline, the Tiger Teams reviewed the effectiveness of the organizational and administrative implementation and control of the medical services program; the appropriateness of procedures and documentation; the availability and adequacy of medical treatment and facilities and competency of staff; the effectiveness of reviews and audits; and the adequacy of information provided to personnel about the medical hazards that may be encountered and the medical services that are available.

For this analysis, 6 performance areas were identified: medical facilities and equipment, staffing/training, medical program design, management support, procedures and documentation, and review/audit. The CE concerns were sorted into the first 3 performance areas.

Medical Facilities and Equipment (1 of 1 site, 2 of 4 concerns). There were two concerns in this performance area which focused on the need for larger, better equipped facilities to provide medical care, and the lack of adequate audiometric and pulmonary equipment.

Staffing/Training and Awareness (1 of 1 site, 1 of 4 concerns). The concern focused on the lack of staff.

Medical Program Design (1 of 1 site, 1 of 4 concerns). The focus of the concern was on the lack of a system to ensure that the medical department conducts surveillance for all workplace hazards.

APPENDIX A

BIBLIOGRAPHY

APPENDIX A

BIBLIOGRAPHY

U.S. Department of Energy (DOE). May 1991. *Analysis of Findings from the First Sixteen Tiger Team Assessments*. DOE/EH-0191, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). May 1992. *Noteworthy Practices, as Identified by the U.S. Department of Energy Environmental, Safety, and Health First 31 Tiger Team Assessments*. DOE/EH-0269, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). June 1992. *Self-Assessment Guidance Document*. DOE, Office of Special Projects, Washington, D.C.

U.S. Department of Energy (DOE). October 1990. *Tiger Team Assessment of Ames Laboratory*. DOE/EH-0264, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). October 1990. *Tiger Team Assessment of Argonne National Laboratory*. DOE/EH-0147P, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). April 1991. *Tiger Team Assessment of Energy Technology Engineering Center*. DOE/EH-0, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). June 1992. *Tiger Team Assessment of Fermi National Accelerator Laboratory*. DOE/EH-0250, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). August 1991. *Tiger Team Assessment of Idaho National Engineering Laboratory*. DOE/EH-0178, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). February 1991. *Tiger Team Assessment of Lawrence Berkeley Laboratory*. DOE/EH-0164, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). November 1991. *Tiger Team Assessment of Los Alamos National Laboratory*. DOE/EH-0204, National Technical Information Service, Springfield, Virginia.

U.S. Department of Energy (DOE). June 1991. *Tiger Team Assessment of Morgantown Energy Technology Center*. DOE/EH-0177, National Technical Information Service, Springfield, Virginia.

LIST OF APPLICABLE DOE AIR REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
SEN 6D	Department Organization and Management Arrangements	DOE
SEN-29	Performance Indicators and Trending Program for DOE Operations	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.2A	Environmental Compliance Issue Coordination	DOE
DOE 5400.5	Radiation Protection of the Public and the Environment	DOE
DOE 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE
DOE 5480.1B	Environmental Safety and Health Program for DOE Operations	DOE
DOE 5480.19	Conduct of Operations for DOE Facilities	DOE
DOE 5482.1B	Environmental, Safety and Health Appraisal Program	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.3	Reactor and Nonreactor Nuclear Facility Emergency Planning, Preparedness and Response Program for DOE Operations	DOE
DOE 5500.5	Radiation Protection of the Public and the Environment	DOE
DOE 6430.1A	General Design Criteria	DOE
Memorandum July 22, 1991	Environmental Audit Performance Objectives and Criteria (draft)	DOE

LIST OF APPLICABLE DOE SURFACE WATER/DRINKING WATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 4330.4A	Maintenance Management Program	DOE
DOE 5000.3A	Occurrence Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.5	Radiological Protection of the Public and the Environment	DOE
DOE 5480.4	Environmental Protection, Safety, and Health Protection Standards	DOE
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 6430.1A	General Design Criteria	DOE
10 CFR 1022	Compliance with Floodplain/Wetlands Environmental Review Requirements	DOE

LIST OF APPLICABLE DOE WASTE MANAGEMENT REGULATION/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 5000.3A	Occurrence Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Regulations	DOE
DOE 5400.2A	Environmental Compliance Issue Coordination	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE 5400.5	Radiological Protection of the Public and the Environment	DOE
DOE 5480.1B	Environmental, Safety, and Health Program for Department of Energy Operations	DOE
DOE 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste	DOE
DOE 5480.4	Environmental Protection, Safety, and Health Protection Standards	DOE
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.2A	Emergency Notification, Reporting, and Response Levels	DOE
DOE 5700.6C	Quality Assurance	DOE

LIST OF APPLICABLE DOE TOXIC AND CHEMICAL MATERIALS REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 1540.2	Hazardous Materials Program Procedures	DOE
DOE 4330.4A	Maintenance Management Program	DOE
DOE 5000.3A	Occurrence Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.1B	Environmental Safety and Health Program for DOE Operations	DOE
DOE 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste	DOE
DOE 5480.4	Environmental Protection, Safety, and Health Protection Standards	DOE
DOE 5480.10	Contractor Industrial Hygiene Program	DOE
DOE 5480.19	Conduct of Operations	DOE
DOE 5482.1	Environmental, Safety and Health Appraisal Program	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.2A	Emergency Notification, Reporting, and Response Levels	DOE
DOE 5700.6B	Quality Assurance	DOE
DOE 5700.6C	Quality Assurance	DOE
DOE 6430.1A	General Design Criteria	DOE
DOE/EV/06194 Rev. 5	DOE Explosive Safety Manual	DOE

LIST OF APPLICABLE DOE QUALITY ASSURANCE REGULATION/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
SAN MD 5700.6B	Quality Assurance	DOE
DOE 6430.1A	General Design Criteria	DOE
DOE/EH-0173T	Environmental Regulations Guide for Radiological Effluent Monitoring and Environmental Surveillance	DOE
NQA-1-1989	QA Programs Requirements for Nuclear Facilities	DOE

LIST OF APPLICABLE DOE RADIATION REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 5480.19	Conduct of Operations for DOE Facilities	DOE
DOE 5480.20	Personnel Selection, Qualification, Training & Staffing Requirements at DOE Reactor and Nonreactor Facilities	DOE
DOE 5481.1B	Safety Analysis and Review System	DOE
DOE 5482.1B	Environmental, Safety and Health Appraisal Program	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.3	Reactor and Nonreactor Nuclear Facility Emergency Planning, Preparedness and Response Program for DOE Operations	DOE
DOE 5500.3A	Emergency Planning	DOE
DOE 5700.6B	Quality Assurance	DOE
DOE 5700.6C	Quality Assurance	DOE
DOE 5820.2A	Radioactive Waste Management	DOE
DOE 6430.1A	General Design Criteria	DOE
DOE 6430.1B	General Design Criteria	DOE
DOE/EH-0070	External Dose-Rate Conversion Factors for Calculation of Dose to the Public	DOE
DOE/EH-0071	Internal Dose Conversion Factors for Calculation of Dose to the Public	DOE
DOE/EH-0125	Environmental Audit Manual - Volume 1, Section 15	DOE
DOE/EH-0173T	Environmental Regulations Guide for Radiological Effluent Monitoring and Environmental Surveillance	DOE

LIST OF APPLICABLE DOE INACTIVE WASTE SITES AND RELEASES
REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 4300.1A	Real Estate (Real Property) Management, Chapter III 1.g(18)	DOE
DOE 4300.1B	Site Development Planning	DOE
DOE 4320.1B	Site Development Planning	DOE
DOE 4700.1	Project Management System	DOE
DOE 5000.3A	Occurrences Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.2A	Environmental Compliance Issue Coordination	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE 5400.5	Radiological Protection of the Public and the Environment	DOE
DOE 5480.4	Environmental, Safety & Health Protection Standards	DOE
DOE 5480.19	Conduct of Operations for DOE Facilities	DOE
DOE 5482.1B	Environmental, Safety and Health Appraisal Program	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.2A	Emergency Notification, Reporting and Response Levels	DOE
DOE 5700.2C	Cost Estimating, Analysis, and Standardization	DOE

LIST OF DOE APPLICABLE NATIONAL ENVIRONMENTAL POLICY ACT REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
P.L. 91-190	National Environmental Policy Act	U.S.Congress
P.L. 93-205	The Endangered Species Act	U.S.Congress
DOE 4700.1	Project Management System	DOE
DOE 5100.3	Field Budget Process	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE 5400.1C	NEPA Compliance Program	DOE
DOE 5440.1C	NEPA	DOE
DOE 5440.1D	NEPA	DOE
DOE 5484.1	Environmental Protection, Safety, & Health Protection Information Reporting Requirements	DOE
DOE 5700.7B	Work Authorization System	DOE
52 FR 47662-47670; 55 FR 37174-37179	DOE Compliance with NEPA; Amendments to the DOE NEPA Guidelines	DOE
SEN-14-89	Clean Coal Technology Demonstration Program Implementation Arrangements	DOE
SEN-15-90	Secretary of Energy Notice - NEPA	DOE
---	Interim Procedural Guidance for Implementation of SEN-15-90 (March 15, 1990); September 20, 1990	DOE
10 CFR 1021	Compliance with NEPA	DOE
10 CFR 1022	Compliance with Floodplain/Wetlands Environmental Review Requirements	DOE

LIST OF DOE APPLICABLE ENVIRONMENTAL MONITORING REGULATIONS/ REQUIREMENTS/ GUIDELINES

Regulations/ Requirements/ Guidelines	Section/Title	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE

LIST OF APPLICABLE FEDERAL AIR REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/ TITLE	AUTHORITY
Public Law 42 U.S. Code 7401	Clean Air Act Amendments 1990	EPA
EPA 20T-2003	Managing Asbestos in Place: A Building Owners Guide to Operation and Maintenance Programs for Asbestos Containing Materials	EPA
EPA-45-/2-78-027R	Guideline on Air Quality Models (Revised)	EPA
EPA 450/4-87-007	Ambient Monitoring Guidelines for PSD	EPA
EPA-450/4-87-013	On-Site Meteorological Program Guidance for Regulatory Modeling Applications	EPA
EPA-600/4-77-027a	Quality Assurance Handbook Measurement System	EPA
Titles III-IV	Clean Air Act Amendments of 1990	EPA
Volume IV	Quality Assurance Handbook for Air Pollution Measurement Systems (Meteorological Measurements)	EPA
ANS-2.5, N179 November 1979	Standard for Obtaining Meteorological Information at Nuclear Power Sites	EPA

LIST OF APPLICABLE STATE AIR REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/ TITLE	AUTHORITY
Oklahoma Administrative Code 481:0501	Oklahoma Air Pollution Control Regulations	Oklahoma Air Quality Service
IDAQB FPR Permit	FPR Permit Conditions	IDAQB
IDAPA 16.01.1011,01	Provisions Governing Toxic Substances	IDAQB
IDAPA 16.01.1012	Procedures and Requirements for Permits to Construct and Operating Permits	IDAQB
IDAPA 16.01.1101	Air Quality Standards and Area Classifications	IDAQB
IDAPA 16.01.1201	Visible Emissions	IDAQB
IDAPA 16.01.1251	Rules for Control of Fugitive Dust	IDAQB
IDAPA 16.01.1252	General Rules for Control of Fugitive Dust	IDAQB
IDAPA 16.01.1605	Fugitive Dust Control	IDAQB
IDAPA 16.01.1952	Regulations of Standards of Performance for New Stationary Sources applicability	IDAQB
VAPCD Permits	Permits 271, 290, 1124	VAPCD
VAPCD Rules and Regulations		VAPCD
Regulations	Bay Area Air Quality Management District Rules and Regulations	BAAQMD
Chapter 7:27	New Jersey Administrative Code-Air Pollution Control	NJDEP
Air Pollution Control Regulations 1200-3-1 to 1200-3-24	Air Pollution Control Regulations: General Provisions, Standards, Permits, Monitoring, Recordkeeping and Reporting, Hazardous Air Pollutants, et. al.	Tennessee

LIST OF APPLICABLE INDUSTRY STANDARDS/ REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/ TITLE	AUTHORITY
Policies and Procedures	Environment, Safety, and Health Organization, November 1990	SERI
NQA-1	Quality Assurance Program Requirements for Nuclear Facilities	ANSI/ASME
ANSI N13.1-1969	Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities	ANSI
ASME NQA-1-1989	Quality Assurance Program for Nuclear Facilities	ANSI/ASME

LIST OF APPLICABLE STATE SOIL REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
California Fish and Game Code, Chapter 1.5	California Endangered Species Act	California Department of Fish and Game
California Public Resources Code, Division 3	California Laws of Conservation of Petroleum and Gas	California Department of Conservation, Division of Oil and Gas
14 CCR, Chapter 4, Division 2	Development, Regulation, and Conservation of Oil and Gas Resources	California Department of Conservation

LIST OF APPLICABLE FEDERAL SURFACE WATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
40 CFR 129	Toxic Pollutant Effluent Standards	EPA
40 CFR 136	Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA
40 CFR 141/142 Safe Drinking Water Act	National Primary Drinking Water Regulations	EPA
40 CFR 143, Safe Drinking Water Act	National Secondary Drinking Water Regulations	EPA
40 CFR 230	Interim Regulations on Discharge of Fill Materials into Navigable Waters	EPA
40 CFR 403	Pretreatment Standards	EPA
40 CFR 433	Effluent Guidelines and Standards for Metal Finishing	EPA
40 CFR 435	Oil and Gas Extraction Point Source Category	EPA
Executive Order 11988	Floodplain Management	U.S. President
43 Federal Register 6030	Floodplain Management Guidance for Implementing EO 11988	U.S. Water Resources Council
Docket No. VI-91-1328	EPA Administrative Order to UC/LANL	EPA
EBMUD Ordinance No. 311	Wastewater Control Ordinance	EBMUD

LIST OF APPLICABLE STATE SURFACE WATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
California Harbors and Navigation Code, Division 1.5, Navigable Waters, Chapters 3 and 4	California Oil Pollution Control Acts	CSWRCB
Code of Colorado Regulations, Title 5, Chapter 1002, Article 2	Colorado Discharge Permit System Regulations	CDH
Code of Colorado Regulations, Title 5, Chapter 1002, Article 5	Colorado Water Quality Standards	BOH
Code of Colorado Regulations, Title 5, Chapter 1003, Article 8	Colorado Primary Drinking Water Regulations	CDH
Colorado Revised Statutes, Title 25, Article 8	Colorado Water Quality Control Act	CDH
ID 5480.1 Chapter XII	Prevention, Control, and Abatement of Environmental Pollution	ID
ID 01-08	Idaho Drinking Water Regulations	IDDHW
ID 01-17	Idaho Wastewater-Land Application Permit Regulations	IDDHW
ID 41-49	Idaho Petroleum Trust Fund Act	IDDHW
ID 39-36	Idaho Water Pollution Control Law	IDDHW
ID 01-02	Idaho Water Quality Standards and Wastewater Treatment Requirements	IDDHW
ID 01-03	Regulations for Individual/ Subsurface Sewage Disposal Systems	IDDHW

LIST OF APPLICABLE STATE SURFACE WATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
NMSA Ch. 74, Article 6	New Mexico Water Quality Act	NMED
WQCC 82-1 Amendment 7	New Mexico Water Quality Control Commission Regulations	NMED
Title 74, Article 6	New Mexico Water Quality Control Commission Regulation	State of New Mexico, EID
State of Oklahoma	State Plumbing Code, Chapter 10, (Water Distribution)	State of Oklahoma
PA Statutes, Title 35 Chapter 5	Pennsylvania Clean Streams Law	PaDER
PA Statutes, Title 35 Chapter 5	Pennsylvania Safe Drinking Water Act	PaDER
PA Statutes, Title 35	Pennsylvania Storage Tank and Spill Prevention Act	PaDER
25 PA Code Chapter 75	Pennsylvania Solid Waste Standards	PaDER
25 PA Code Chapter 16	Pennsylvania Water Quality Standards	PaDER
25 PA Code Article II	Pennsylvania Water Resources Regulations	PaDER
25 PA Code Chapter 94	Pennsylvania Pretreatment Regulations	PaDER
25 PA Code Chapter 109	Pennsylvania Safe Drinking Water Regulations	PaDER
25 PA Code Chapter 92	Pennsylvania Discharge Elimination System	PaDER
PVWSD Resolution	Pretreatment/Industrial Waste Control Resolution	PVWSD
TN 69-3-101 through 129	Tennessee Water Quality Control Act	TN
TN 1200-1-6	Regulations to Govern Sewage Disposal Systems	TDHE

LIST OF APPLICABLE FEDERAL GROUNDWATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
40 CFR 260-280	Hazardous Waste Regulations	EPA
40 CFR 264 and 265	Standards and Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	EPA
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan	EPA
OSWER Directive 9283.1-2	Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites	EPA
OSWER Directive 9355.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document Guidance for Conducting Remedial	EPA
OSWER Directive 9355.3	Operation and Maintenance Inspection Guide (RCRA) Groundwater Monitoring Systems	EPA
OSWER Directive 9355.3-01	Investigations and Feasibility Studies Under CERCLA	EPA
OSWER Directive 9355.0-14	Compendium of Superfund Field Operations	OWRB
OWSER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OSWER Directive 9950.2	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OSWER Directive 9950.3	Operation and Maintenance Inspection Guide (RCRA) Groundwater Monitoring Systems	EPA
OSWER Directive 9502.00-6D	RCRA Facility Investigation (RFI) Guidance	EPA

LIST OF APPLICABLE STATE GROUNDWATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
CRS Section 37-91-102	Water Well Construction and Pump Installation Rules	CDWR
23 CCR, Sections 2050-2836	California Water Regulations	State of California
22 CCR, Division 4, Chapters 15-17	California Drinking Water Quality Standards	State of California
14 CCR, Division 2, Chapter 4	Development, Regulation, and Conservation of Oil and Gas Resources	California Department of Conservation, Division of Oil and Gas
California Public Resource Code	California Laws for Conservation of Petroleum and Gas	California Department of Conservation, Division of Oil and Gas
California Health and Safety Code, Division 5	California Drinking Water Act of 1989	State of California
California Health and Safety Code, Division 20, Section 25249.5	California Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65)	State of California
California State Water Resources Control Board Article 7	Underground Storage Tank Closure Requirements	CWQCB
California Department of Water Resources, Bulletin 74-90	California Well Standards, Part III	CDWR
Chapter 1543 Health and Safety Code	Toxic Pits Cleanup Act of California	
California Code of Regulations Title 22 Division 4, Chapter 15-17	California Drinking Water Regulations	State of California
California Code of Regulations, Title 23, Division 3, Chapter 15	Discharges to Land	State of California
California Water Code, Sections 13000-13806	California Porter-Cologne Water Quality Act	California Water Resources Control Board

LIST OF APPLICABLE STATE GROUNDWATER REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
PA Code, Title 25, Subchapter 75.264	New and Existing Hazardous Waste Management Facilities (HWMF) Applying for a Permit (Groundwater Monitoring)	PaDER
PA Code, Title 25, Chapter 78	Oil & Gas Operators and Owners-Abandonment	PaDER
EG&G	ERP Directive 2.4, Characterization Process in the Environmental Program	EG&G
Bulletin 74-81	Water Well Standards	Department of Water Resources
TDHE Rule 1200-4-9	Water Well Licensing	TDHE-TGWMB
TDCDWR Chapter 0400	Rules and Regulations Pertaining to Groundwater Development and the Licensing of Water Well Contractors and Pump Setters	TDCDWR
TDHE Rule 1200 1-11.05	Interim Status Standards for Owners and Operators of Existing Hazardous Waste Treatment, Storage and Disposal Facilities	TDHE
Tennessee Code Title 69 Chapter 11	Water Wells	DPH-DWQC
Tennessee Code Title 69 Chapter 3	The Water Quality Control Act of 1977	DPH-DWQC

LIST OF APPLICABLE FEDERAL WASTE MANAGEMENT REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
42 U.S.C. 6905 et seq.	Resource Conservation and Recovery Act	EPA
54 Federal Register 25056, June 12, 1989	Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program	EPA
RCRA Part B Operating Permit, TNHW-15	K-1435 Toxic Substances Control Act Incinerator, RCRA Part B Operating Permit issued September 28, 1987	State of Tennessee
RCRA Part B Operating Permit, #TNHW-056-065	Storage of Hazardous Waste in 10 Vaults at K-25 Site, RCRA Part B Operating Permit issued October 2, 1990	State of Tennessee
INPO-85-017	Guidelines for the Conduct of Operations at Nuclear Power Stations	INPO
CRS Title 25	Underground Storage Tank Law	DOH
CRS Title 6, Title 7	Underground Storage Tank Regulations	DOH
CHWMR 261, 262, 264, 265	Regulations Applicable to Small Quantity Generators of Hazardous Wastes	DOH

LIST OF APPLICABLE STATE WASTE MANAGEMENT REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
LANL AR 10-8	Waste Minimization	BED
NJAC 58:10A	New Jersey Underground Storage of Hazardous Substances (14B-1-13 and 15)	NJDEP
NJAC 7:26	New Jersey Solid and Hazardous Waste Management Regulations	NJDEP
IAD #393	"Satellite and 90 Day Accumulation Area Management"	NMES
SO-TSCA/AP-400	TSCA Incinerator Operations Division Training Requirements	NMES
NMSWA	New Mexico Solid Waste Act	NMED
NMSWMR	New Mexico Hazardous Solid Waste Management Regulations	NMED
NMHWMR	New Mexico Hazardous Waste Management Regulations	NMED
NMUSTR	New Mexico Underground Storage Tank Regulations	NMED
Oklahoma Statutes Annotated, Title 17, Section 301-317	Oklahoma Underground Storage Tanks Act	Oklahoma Corporation Commission
Oklahoma Statutes Annotated, Title 17, Chapter 15	Oklahoma Petroleum Indemnity Act	Oklahoma Corporation Commission
Oklahoma Statutes Annotated, Title 63, Public Health and Safety, Article 20	Oklahoma Controlled Industrial Waste Disposal Act	Oklahoma State Department of Health
Oklahoma Statutes Annotated, Title 63, Public Health and Safety, Chapter 47	Oklahoma Solid Waste Management Act	Oklahoma State Department of Health
Chapters 1-9	Oklahoma Solid Waste Management Regulations	Oklahoma State Department of Health

LIST OF APPLICABLE FEDERAL TOXIC AND CHEMICAL MATERIALS REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
20 CFR 1910	Occupational Safety and Health Standards	OSHA
29 CFR 1910	Hazardous Waste Storage	OSHA
40 CFR 61, Subpart M	(NESHAP) National Emission Standards for Hazardous Air Pollutants-Asbestos	EPA
49 CFR 100-179	Hazardous Materials Program Procedures	DOT
40 CFR 112	Oil Pollution Prevention (CWA)	EPA
40 CFR 122	EPA Administered Permit Programs: National Pollutant Discharge Elimination System	EPA
40 CFR 125	Criteria and Standard for the NPDES	EPA
40 CFR 129	Toxic Pollutant Effluent Standards	EPA
40 CFR 131	Water Quality Standards	EPA
40 CFR 165	(FIFRA) Pesticide Storage/Disposal Regulations	EPA
40 CFR 171	(FIFRA) Pesticide Storage/Disposal Regulations	EPA
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan	EPA
40 CFR 355	Emergency Planning and Notification	EPA
40 CFR 370	Hazardous Chemical Reporting: Community Right-to-Know Act	EPA
40 CFR 372	Toxic Chemical Release Reporting	EPA

LIST OF APPLICABLE INDUSTRY TOXIC AND CHEMICAL MATERIALS REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
NQA-1	Quality Assurance Programs for Nuclear Facilities	ANSI/ASME
ESH-1	Management of PCB's	MMES
ESS-EP-125	Management of PCB's	MMES
K-HA-252/R2	Waste Acceptance Plan and Analytical Protocol for the Toxic Substance Control Act Incinerator	MMES
K/HS-338	The Spill Prevention Control and Countermeasures Plan for the Oak Ridge K-25 Site	MMES
SOP-Draft	Handling and Storage of Hazardous Waste	MMES
SOP-Draft	Hazardous Waste Manifest and Tracking	MMES
SOP-TS0008	Waste Storage Inspection Requirements	MMES
SOP 800.55	Operation of Oil Skimmer Stations	MMES
SPP-345	Secondary Containment for Oil and Hazardous Materials	MMES
SPP-371	Tank Labeling	MMES
TSCA-AP-400K-1435	Incinerator Operations Division Training Program	MMES

LIST OF APPLICABLE STATE TOXIC AND CHEMICAL MATERIALS REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
Pesticide Use and Application Rules and Regulations	State of Idaho Department of Agriculture	
LANL AR 1-9	Hazardous Communication	LANL
LANL AR 6-1	Chemicals	LANL
LANL AR 6-3	Use of Chemical Carcinogens	LANL
LANL AR 6-5	Flammable and Combustible Liquids	LANL
LANL AR 6-9	Safe Handling of Hazardous Gases	LANL
LANL AR 9-1	Air Pollution Control	LANL
LANL AR 9-4	Accidental Oil, Chemical and Airborne Releases	LANL
LANL AR 10-4	Polychlorinated Biphenyls	LANL
LA-UR-91-2830	Guide to ES&H Management Structure (GEMS)	LANL
NMSA 74-4E	Hazardous Chemicals Information Act	State of New Mexico
New Mexico Pesticide Control Act	Chapter 76, Article 4, Section 5, Storage	State of New Mexico
SWMR-2, Section 402	New Mexico Solid Waste Management Regulations	State of New Mexico
AQCR 751	New Mexico Air Quality Control Regulations	State of New Mexico
PUB 3000	Laboratory Safety	LBL
PUB 3070	Hazardous Materials Training	LBL
Procedure 745	Draft Hazardous Waste Handling Facility Guidelines (January 1, 1991)	LBL

LIST OF APPLICABLE FEDERAL QUALITY ASSURANCE REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
10 CFR 20	Standards for Protection Against Radiation	NRC
10 CFR 39	Licenses and Radiation Safety Requirements for Well Logging	NRC
10 CFR 50 APP. B	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants	NRC
US NRC Reg. Guide 8.25	Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Samples	NRC
10 CFR 834 (Draft)	Radiation Protection of the Public and the Environment	EPA
40 CFR 60	Standard Performance for New Stationary Sources	EPA
40 CFR 61 (Subpart H)	National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities	EPA
40 CFR 141	Safe Drinking Water Act	EPA
40 CFR 191	Environmental Standards for Radioactive Wastes	EPA
40 CFR 300	Emergency Planning and Community Right-to-Know (EPCRA, also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, Section 313: Toxic Chemical Release Reporting	EPA
40 CFR 302 and 355	Reporting Quantity Adjustment - Radionuclides	EPA
40 CFR 302 and 355	Reporting Continuous Releases of Hazardous Substances	EPA
49 CFR 172	Hazardous Materials Tables, Hazardous Materials Communications and Emergency Response Information Regulations	DOT

LIST OF APPLICABLE FEDERAL QUALITY ASSURANCE REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
QAMS-005/80	Interim Guidelines and Specifications for Preparing QA Project Plans	EPA
14 CCR, Division 2, Chapter 2	Implementation of the California Environmental Quality Act of 1970	EPA
NEIC (National Enforcement Investigation Center)	NEIC Policies and Procedures Manual	EPA
EPA-520/1-88-020	Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion - Federal Guidance Report No. 11	EPA
UO-NPRC Policy and Procedures Manual	Series 18.0 - Environmental Services	UO-NPRC
UO-NPRC Policy and Procedures Manual	Series 22.0 - Quality Assurance	UO-NPRC

LIST OF APPLICABLE INDUSTRY QUALITY ASSURANCE REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
AL 5700.6B, Rev. II	General Operations Quality Assurance	AL
ANSI N13.1-1969	American National Standards Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities	ANSI
ANSI/ANS-10.3-1986	Guidelines for the Documentation of Digital Computer Programs	ANSI/ANS
Applied Environmental Inc.	Sampling & Analysis QA Program Plan	AE
ASME NQA-1-1989	Quality Assurance Program Requirements for Nuclear Facilities	ASME
ES&H Manual Volume 14	Sandia National Laboratories ES&H Quality Assurance Program	SNL

LIST OF APPLICABLE FEDERAL INACTIVE WASTE SITES AND RELEASES REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
OSWER Directive 9355.3-01	Investigations and Feasibility Studies Under CERCLA	EPA
OSWER Directive 9355.0-14	Compendium of Superfund Field Operations	OWRB
OSWER Directive 9355.30-01	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	EPA
OWSER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
CERCLA/SARA	Section 103-Notices, Penalties	EPA
CERCLA/SARA	Section 120-Federal Facilities	EPA
CERCLA/SARA	Title III Emergency Planning and Community Right to Know	EPA
CERCLA/SARA Section 104	Response Authorities	EPA
CERCLA/SARA Section 107	Liabilities	EPA
RCRA Section 103	Preliminary Notification	EPA
RCRA	Section 3016 - Inventory of Federal Agency Hazardous Waste Facilities	EPA
RCRA Section 3004 (a)	Continuing Releases at Permitted Facilities	EPA
RCRA Section 3008 (h)	Interim Status Corrective Action Orders	EPA
EPA/530-SW-89-031	RCRA Facility Investigation Guidance	EPA

LIST OF APPLICABLE STATE INACTIVE WASTE SITES AND RELEASES REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
California Health and Safety Code, Chapter 6.95 Division 19	Hazardous Materials Release Response Plans and Inventory	California Office of Emergency Services
Title 22 California Code of Regulations	Hazardous Waste Management Regulations	California Environmental Protection Agency
LANL	Environmental Restoration Installation Work Plan	LANL
LANL-ER-AP-QP	Administrative and Quality Procedures for Environmental Restoration	LANL
California Health and Safety Code, Chapter 6.8, Division 20	Section 25319.5/Preliminary Endangerment Assessment	DHS
OAC Title 785	Oklahoma Water Resources Board Rules	OWRB
ID 5481.1A	Safety Analyses and Review System	ID
EG&G PD 1.8	Administrative Record	EG&G
EG&G PD 6.2	Evaluation of Safety Analyses/ Operational Safety Requirements in ERP	EG&G
Technical Operations Procedure 20.015	Occurrence Reporting and Processing of Operations Information	PPPL
Environmental Protection Operations Procedure OP-EP-03	Environmental Spill Control Procedures	PPPL
NJAC Title 7 Chapter 1E	New Jersey Rules on Discharge of Petroleum and Other Hazardous Substances	NJDEP

LIST OF APPLICABLE FEDERAL NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REGULATIONS/ REQUIREMENTS/ GUIDELINES

REGULATIONS/ REQUIREMENTS/ GUIDELINES	SECTIONS/TITLE	AUTHORITY
42 U.S.C. 4321 et seq.	National Environmental Policy Act	U.S. Congress
40 CFR 1500-1508 (November 28, 1978)	Regulations for Implementing the Procedural Requirements of NEPA	Council on Env. Quality (QEC)
46 FR 18026	Forty Most Asked Questions Concerning CEQ's NEPA Regulations	CEQ
OSWER Directive 9355.0-14	Compendium of Superfund Field Operations	OWRB
OWSER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
Executive Order 11988	Floodplain Management	U.S. President
Executive Order 11990	Protection of Wetlands	U.S. President
SW-846	Test Methods for Evaluation of Solid Waste, Physical Chemical Methods	EPA
P.L. 91-90 (January 1, 1970)	National Environmental Policy Act	U.S. Congress
P.L. 93-205 (12/28/73) as amended	The Endangered Species Act	U.S. Congress