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

Tiger Team Assessment of the Ames Laboratory Washington, DC 20585

March 1992

DISCLAIMER

PREFACE

This report documents the Tiger Team Assessment of the Ames Laboratory (Ames), located in Ames, Iowa. Ames is operated for the U.S. Department of Energy (DOE) by Iowa State University. The assessment was conducted from February 10 to March 5, 1992, under the auspices of the Office of Special Projects, Office of the Assistant Secretary for Environment, Safety and Health, Headquarters, DOE.

The assessment was comprehensive, encompassing Environment, Safety, and Health (ES&H) disciplines; management practices; and contractor and DOE self-assessments. Compliance with applicable Federal, State of Iowa, and local regulations; applicable DOE Orders; best management practices; and internal requirements at Ames Laboratory were assessed. In addition, an evaluation of the adequacy and effectiveness of DOE and the site contractor's management of ES&H/quality assurance programs was conducted.

The content of this report has been reviewed for factual accuracy by representatives of the Office of Energy Research, Headquarters, DOE; the DOE Chicago Field Office (CH); and Federal, State of Iowa, and local regulatory agencies.

The Ames Laboratory Tiger Team Assessment Program is part of a larger, comprehensive DOE Tiger Team Independent Assessment Program being conducted throughout the Department for DOE facilities. The program is part of a 10-point initiative announced by the Secretary of Energy, Admiral James D. Watkins, U.S. Navy (Retired), on June 27, 1989, to conduct independent compliance oversight and management assessments of ES&H programs and waste management operations at DOE facilities. The objective of these initiatives is to provide the Secretary with information on the compliance status of DOE facilities with regard to ES&H management programs, response actions to address the identified problem areas, adequacy of DOE and contractor ES&H management programs, and DOE-wide ES&H compliance trends and root causes.

March 1992
Washington, DC

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TIGER TEAM ASSESSMENT REPORT

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

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ADO	Ames Associate Director for Operations
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
Ames	Ames Laboratory
AMPEP	Assistant Manager for Projects and Energy Programs
AMLM	Assistant Manager for Laboratory Management
AMSS	Assistant Manager for Safety and Security
ANSI	American National Standards Institute
ASC	ISU Applied Sciences Center
ASER	Annual Site Environmental Report
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BES	Basic Energy Sciences, Office of Energy Research
BMPF	Best Management Practice Finding
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environment Response, Compensation, and Liability Act
CF	Compliance Finding
CFR	Code of Federal Regulations
CH	DOE Field Office, Chicago
CWA	Clean Water Act
CX	Categorical Exclusion
DCG	Derived Concentration Guides
DEAR	Department of Energy Acquisition Regulation
DOE	U.S. Department of Energy
DP	DOE Office of Defense Programs
EA	Environmental Assessment
EMP	Environmental Monitoring Plan
EPCRA	Emergency Planning and Community Right to Know
ES&H	Environment, Safety, and Health
ES&HG	Ames Environment, Safety and Health Group
EH	DOE Office of Environment, Safety and Health
EPA	Environment Protection Agency
ER	DOE Office of Energy Research
ESHD	CH Environment, Safety and Health Division
FAR	Federal Acquisition Regulation
FE	DOE Office of Fossil Energy
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
GPP	General Plant Projects
HAP	Hazardous Air Pollutants
HAZMAT	Hazardous Material
HEPA	High-efficiency Particulate Air
HMTA	Hazardous Materials Transportation Act

HSCA	Hazardous Substances Control Act
IAC	Iowa Administrative Code
IDNR	Iowa Department of Natural Resources
INPO	Institute of Nuclear Power Operations
IPRT	Institute for Physical Research and Technology
ISU	Iowa State University
Laboratory	Ames Laboratory
LMO/CO	Laboratory Management Officer/Contracting Officer
M&TE	Measurement and Test Equipment
MPC	Materials Preparation Center
MSDS	Material Safety Data Sheet
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NO_x	Nitrogen Oxide
NUSF	Net Usable Square Feet
OAS	Office of Assessment and Support, Office of Energy Research
OSHA	Occupational Safety and Health Act (or Administration)
OSP	DOE Office of Special Projects
PCB	Polychorinated Biphenyls
PDQ	Position Descriptions
PRP	Potentially Responsible Party
PSO	Program Secretarial Officer
QA	Quality Assurance
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
S&H	Safety and Health
SAO	CH Self-Assessment Officer
SAR	Safety Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
SDWA	Safe Drinking Water Act
SEN	Secretary of Energy Notice
SH&PP	Safety, Health and Plant Protection
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasures
SRC	Ames Safety Review Committee
TSA	Technical Safety Appraisal
TSD	Treatment, Storage, and Disposal
University	Iowa State University

VOC	Volatile Organic Compounds
WAS	Work Authorization Statement
WFO	Work For Others
WPCP	Ames Water Pollution Control Plant
WSC	Waste and Surplus Chemicals

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report documents the results of the U.S. Department of Energy's (DOE) Tiger Team assessment of Ames Laboratory (Ames) conducted from February 10 through March 5, 1992. This assessment also included the DOE Headquarters, Office of Energy Research (ER); DOE Chicago Field Office (CH); and Iowa State University (ISU). The main purpose of the assessment was to provide the Secretary of Energy with the status of Environment, Safety, and Health (ES&H) programs at Ames. This Tiger Team assessment was conducted by approximately 40 professionals from DOE, its contractors, and consultants. A significant number of the members had participated on one or more previous DOE Tiger Team assessments.

The Tiger Team has concluded that neither curtailment nor cessation of any operation at Ames is warranted as a result of the findings and concerns detailed in this assessment. However, the number and breadth of findings and concerns reflect conditions which warrant aggressive management attention and oversight. Many of the findings and concerns resulting from the assessment were identified in recent self-assessment reviews conducted by CH and Ames in preparation for the Tiger Team, although in the absence of detailed corrective action plans, it is difficult to ascertain management's understanding of the complexity and magnitude of the actions which will be required.

To better grasp the scope and complexity of ES&H issues at this site, it is useful to understand its current mission and history. Ames is a research facility operated for DOE by ISU and dedicated to experimental and theoretical research in the physical, mathematical, and engineering sciences. In executing this mission, Ames prepares high-purity metals, alloys, compounds, and crystals. While Ames' present mission is perceived as low-risk in terms of ES&H, its initial mission was much different. Ames was founded in the early days of the nation's atomic energy program because of ISU's expertise in separating and purifying uranium. During and immediately following World War II, ISU was under contract to the Manhattan District of the U.S. Army Corps of Engineers to produce pure uranium and thorium. Uranium production continued at Ames during the war years, so that by the end of 1945, more than 1,000 tons of pure uranium had been produced and delivered. In 1947, Ames was established as an Atomic Energy Commission-funded laboratory under a contract with ISU. In 1961, a laboratory research reactor was constructed near the present complex on land leased from the State of Iowa and was operated from 1966 until 1977. In 1981, the reactor was decontaminated and decommissioned; the lease was subsequently terminated; and the associated buildings were turned over to ISU.

From its inception, Ames has been recognized as a national center of excellence in its areas of expertise and has received numerous national and DOE awards. For example, Ames has been the recipient of five R&D-100 awards from Research and Development Magazine since 1984. This reputation for excellence, coupled with the perceived low-risk mission, has resulted in a largely autonomous operation. Little emphasis had been placed upon ES&H performance until the site began preparation for the Tiger Team. Thus, fundamental management systems, programs, and procedures are not in place, and the overall level of compliance is low.

This situation has been exacerbated by the lack of consistent and aggressive oversight from CH, ER, and ISU. While CH readily admits that Ames has been assigned a low priority for oversight because of the perceived low-risk nature of its mission and the existence of a good safety record, this lack of emphasis has contributed significantly to the deficiencies addressed in this report. Ames and CH have recently identified the extent of noncompliance. However, Ames does not appear to have a full appreciation and understanding of the magnitude and complexity of the actions and resources which will be required to correct those deficiencies and to develop, implement, and sustain a comprehensive, fully integrated ES&H program.

In addition, ER has not held its program line managers fully accountable for ES&H. While the need for such responsibility and authority appears to have been recognized, the ER oversight and assessment program is still in the early stages despite the fact that key Secretarial initiatives have been in place for 2 years.

In terms of the ISU role, Ames has traditionally performed its work autonomously with very little, if any, ISU oversight and guidance. Ames' independent management structure dates from the inception of its DOE and predecessor agency mission primarily because of ISU's interpretation of the contract as requiring Ames to be autonomous. However, in practice, ISU and Ames are informally closely intertwined in utilization of physical facilities and in sharing of human resources, usually without structured agreements which clearly delineate ISU/Ames/DOE ES&H roles and responsibilities. The Team believes that ISU's ES&H oversight role could and should be productively strengthened and that informal arrangements for resource sharing should be formalized which establishes a clear understanding of the respective ES&H responsibilities. ISU and CH do acknowledge that ISU should take a greater role in Ames' ES&H management. This transition, however, is in the formative stage and is not formally defined or uniformly understood.

In spite of its late start, Ames' management has made visible progress in increasing ES&H awareness among staff and in redefining or initiating programs to attain compliance and achieve excellence. In recognition of a significant shortage of trained ES&H staff and a limited operating budget, Ames' management has expressed a determination to strengthen their staff and realign resources to better respond to the new DOE culture. This is evidenced by the positive commitment shown in preparing for the Tiger Team. The Ames Laboratory Director initiated a "rolling" standdown, resulting in a major cleanup effort. In addition, a widespread hazards communication effort was undertaken to increase awareness among Ames' personnel. These actions, as well as the high degree of cooperation and interest shown during the review, are viewed as important "first steps" in bringing Ames into compliance.

In examining Ames' and DOE's ES&H management deficiencies, the Tiger Team concluded that the probable root causes of the findings and concerns identified in this report are as follows:

- Laboratory management and staff are not sufficiently knowledgeable of ES&H requirements to develop and implement a comprehensive ES&H program.

- Oversight of ES&H activities at Ames has not been effective in assuring that the DOE ES&H requirements have been properly interpreted, uniformly applied, and accurately communicated to Ames.

- The management principles and practices at Ames have not been effective in achieving the objectives embodied in the DOE ES&H initiatives.

The self-assessment performed by Ames is judged to be fairly comprehensive. However, since there is not a corrective action plan, it is difficult to determine if Ames recognizes the complexity and magnitude of the findings and the corrective actions that are necessary. Ames identified 75 percent of the environmental findings, 65 percent of the safety and health concerns, and 100 percent of the management findings developed by the Tiger Team. CH also performed a thorough self-assessment that included its oversight activities and the ES&H performance of Ames. The CH ES&H assessment of Ames is of high quality and provides recommendations for a corrective action plan. This is an indication of CH's emerging acceptance of "ownership" of important issues at the site. CH identified 25 percent of the safety and health concerns and 80 percent of the management findings. It is noteworthy that CH and Ames performed their self-assessments using only in-house staff.

Key environmental concerns are as follows:

- Ames does not have a defined program for management of hazardous, mixed, and radioactive waste and does not fully meet the requirements of Resource Conservation and Recovery Act and DOE Orders. Roles and responsibilities for waste management activities are not defined, and policies governing the various aspects of a comprehensive waste management program have not been established.

- CH has not provided Ames with oversight and guidance necessary to ensure that the environmental protection programs are established, implemented, and maintained, or that DOE Orders and regulations are understood and implemented.

- Ames has not implemented an effective Environmental Quality Assurance Program to manage its site operations. The program lacks in the areas of field and laboratory quality control, recordkeeping and chain-of-custody procedures, audits/corrective actions, surveillance reporting, and data validation and verification.

- Ames is not effectively managing its toxic and chemical materials throughout the Laboratory. This includes hazard identification, storage of incompatible materials, provisions for secondary containment, and assessment of potential mechanisms for hazardous materials release.

- Ames environmental compliance and protection activities lack formality. Formalized policies, plans, and procedures have not been developed to ensure compliance with Federal, State of Iowa and local regulations, and DOE Orders.

- Ames has limited personnel with environmental protection and compliance experience, and the available personnel do not have adequate training and expertise to perform effectively.

The appraisal by the Safety and Health Subteam of activities at Ames Laboratory indicated that during the past 6 months Ames management has initiated a sincere effort to enhance and upgrade the ES&H program. The objective of this initiative is to achieve an acceptable ES&H performance level with respect to the improved safety culture stipulated for all DOE sites. The entire effort is in the very early stages of formulation and implementation. Deficiencies in the ES&H program are apparent, as confirmed by the Ames self-assessment, and much improvement is required before the ES&H program performance at Ames can be judged acceptable. Areas that require special attention are indicated by the Safety and Health Subteam's key concerns, which follow:

- Ames Laboratory has no enforced policy on the preparation and use of formal procedures.

- Independent safety appraisal and review are not integral parts of the ES&H program at Ames.

- The Ames training program neither fulfills the needs of the Laboratory nor meets DOE requirements.

- Emergency preparedness has not been properly addressed at Ames.

- The Federally mandated Conduct of Operations program is not yet implemented at Ames.

- Ames does not have an effective quality assurance program.

- Radiation control practices at Ames do not always provide necessary radiological protection to employees and do not meet requirements of DOE Orders.

The Safety and Health Subteam appraisal identified a total of 126 concerns, 8 of which were designated as Category II. (There were no Category I concerns.) The 118 Category III concerns were distributed throughout all of the 15 functional areas examined, and 4 of these were addressed to the Chicago Field Office.

In the management area, one noteworthy practice in the area of an ES&H educational initiative was identified by the Management Subteam. The following are the key findings:

- Ames does not currently have a comprehensive, fully integrated environmental, safety, and health program which meets the requirements, objectives, and expectations set forth by the Secretary of Energy.

- Ames does not have an effective, self-initiated, strategic and subordinate implementation planning process.

- Neither the Chicago Field Office nor Ames has conducted the sustained and vigorous oversight necessary to ensure the application of DOE ES&H requirements to the operations of Ames.

- Ames does not have an effective environmental, safety, and health training program which includes planning, scheduling, standards, and an effective validation process.

The probable root causes, the key findings and key concerns, and noteworthy practices are more fully delineated in Chapter 2.0 of this report. Environmental findings, Safety and Health concerns, and the Management findings are detailed in Chapters 3.0, 4.0, and 5.0, respectively.

Ames' management has considerable work to do to achieve overall staff acceptance and "ownership" of the ES&H program and personal accountability for its implementation. By so doing, Ames will change the value that permeates the work atmosphere to one of full acceptance of ES&H as an integral part of doing first-class science.

Ames has met challenges of this sort on past occasions in response to governmental and scientific imperatives. With the help of DOE, there is reason to believe that it can do so again.

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1.0

INTRODUCTION

1.0 INTRODUCTION

On June 27, 1989, Secretary of Energy Admiral James D. Watkins, U.S. Navy (Retired), announced a 10-point program to strengthen Environment, Safety, and Health (ES&H) and waste management operations in the U.S. Department of Energy (DOE). One of the initiatives involved conducting independent Tiger Team Assessments at DOE operating facilities. The Office of Special Projects in the Office of the Assistant Secretary for Environment, Safety and Health (EH) has the responsibility for conducting Tiger Team Assessments for the Secretary of Energy.

This report documents the Tiger Team Assessment of the buildings, facilities, and activities at the Ames Laboratory (Ames), located on the Iowa State University (ISU) campus in Ames, Iowa. Ames is the thirty-first DOE site to be reviewed by a Tiger Team. One of DOE's national laboratories, Ames, which is operated by ISU, was established in 1947 as a result of the Manhattan Project. Ames conducts basic research in materials and chemical sciences and related research in materials reliability and nondestructive evaluation. In support of its mission, Ames maintains capabilities for preparing high-purity metals, alloys, compounds, and single crystals. Additional capabilities are maintained in high-energy physics; nuclear physics; applied mathematics; and engineering, environmental, and coal preparation sciences. Extensive cooperation with ISU is achieved through faculty appointments, graduate student training, and facility sharing programs.

The contract administration and oversight of Ames is assigned to the DOE Chicago Field Office (CH). The major DOE program office with primary programmatic responsibility for Ames is the Office of Energy Research (ER).

The 12 research program areas at Ames are as follows: Applied Mathematical Sciences, Engineering and Applied Nondestructive Evaluation, Environmental Sciences, Experimental Nuclear Physics, Fossil Energy, Fundamental Interactions, High-Energy Physics, Materials Chemistry, Metallurgy and Ceramics, Processes and Techniques, Safeguards and Security, and Condensed Matter Physics.

1.1 PURPOSE

The purpose of the Ames Tiger Team Assessment is to provide the Secretary of Energy with concise information on the following:

- current ES&H compliance status at the site, including deficiencies;
- root causes for noncompliance;
- adequacy of DOE and site contractors' ES&H management programs;
- adequacy of response plans developed to address identified problem areas; and
- adequacy of ES&H self-assessment and the institutionalization of the self-assessment process within the Ames organization and CH.

This information will assist DOE in determining trends in ES&H compliance and probable root causes and the effectiveness of the self-assessment process, as well as provide guidance for management to implement corrective actions.

1.2 SCOPE

The scope of the Ames Tiger Team Assessment included an evaluation of applicable site management systems, facilities, and operations in the context of ES&H. The ES&H areas were reviewed to determine the following:

- compliance with applicable Federal, state, and local regulations, requirements, permits, agreements, and enforcement actions;
- compliance with DOE Order requirements for ES&H activities;
- compliance with Occupational Safety and Health Administration/Act (OSHA) regulations and standards as applicable under DOE Orders;
- adequacy of CH and Ames ES&H management programs, including policy and procedures, internal oversight, planning and budgeting, organization, resources, training, and quality assurance;
- conformance with applicable "best" and "accepted industry practices";
- identification of root causes;
- identification of noteworthy practices; and
- adequacy of the self-assessment process to identify, track, and resolve significant ES&H issues.

1.3 APPROACH

The Ames Tiger Team Assessment was conducted in accordance with the Tiger Team Guidance Manual (February 1990), applicable DOE Orders and guidance material, and generally accepted audit techniques. The assessment was conducted by a team of specialists from various DOE offices and support contractors. The team was managed by DOE officials who served as Tiger Team Leader, Deputy Tiger Team Leader, and three Subteam Leaders, one each for the three disciplines of Environment, Safety and Health (S&H), and Management. Team members, with their areas of responsibility and work-related experience, are identified in Appendix A.

Each subteam focused on major facilities, operations, and systems to conduct comprehensive evaluations that were representative of the overall status of ES&H programs at Ames.

The Environmental Subteam performed its assessment consistent with the DOE Environmental Audit Program Guidance (January 1992), in addition to The Tiger Team Guidance Manual. These documents were used as tools in preparing for the assessment and were supplemented with current regulations, regulatory guidance documents, and references applicable to identifying best management practices. The objective was to assess current environmental compliance status at the site with regard to Federal, state, and local regulations; DOE Orders;

agreements and consent decrees; and applicable permits. The environmental assessment examined site performance against best or accepted industry practices and evaluated the adequacy of DOE and contractor environmental program management and resources.

The S&H Subteam, which conducted a separate Technical Safety Appraisal (TSA) under the leadership of an experienced team leader, reviewed major facilities operated by Ames, using TSA protocols delineated in DOE 5482.1B and the "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites" (June 1990). Performance objectives used for the safety and health assessment are derived from DOE Orders, Secretary of Energy Notices (SENs), other DOE policy statements, industry standards, and lessons learned within the nuclear industry.

The objectives of the Management Subteam were to determine the effectiveness of DOE and contractor ES&H program management and to identify underlying probable root causes for observed weaknesses or deficiencies. The subteam conducted its assessment in accordance with the recent draft "Management Performance Objectives and Criteria for Tiger Team Assessments" (August 15, 1991) and the Tiger Team Guidance Manual. The Management Subteam coordinated with the Environmental and S&H Subteams to share information and ideas on management issues identified during the course of the Tiger Team Assessment, as well as to identify management issues that were common to the findings of all subteams.

A Self-Assessment Work Group under the leadership of a member of the Management Subteam evaluated the ER, CH, and Ames self-assessment activities and programs. The Work Group conducted its evaluation in accordance with SEN-6D-91 and the Secretary's memorandum and attachments subject: "Guidance on Environment, Safety, and Health (ES&H) Self-Assessment," July 31, 1990.

A systematic approach was implemented to perform analyses of probable root causes. This approach, depicted in Figure 1-1, began with the collection of detailed background information and assessment data, as well as onsite observations, that were analyzed by the individual subteams to develop their findings and concerns. Then findings and concerns were then integrated by the subteams through further analysis and refinement into a set of key findings. These findings and concerns were integrated by the subteams through further analysis and refinement into a set of key findings. The last step in the process was the collective determination, based on both key findings and identified causal factors, of a set of probable root causes.

The Tiger Team Assessment process includes four distinct phases: preassessment planning, onsite activities, reporting, and corrective action plan review.

1.3.1 Preassessment Site Planning

Planning for the assessment included the issuance of an introduction and information request memorandum, a preassessment site visit, an initial review of the requested documentation provided to the Tiger Team by the site contractors, and development of an assessment agenda.

The preassessment site visit was conducted January 22-23, 1992, by the Tiger Team Leader; the Deputy Tiger Team Leader; the Environmental, S&H, and

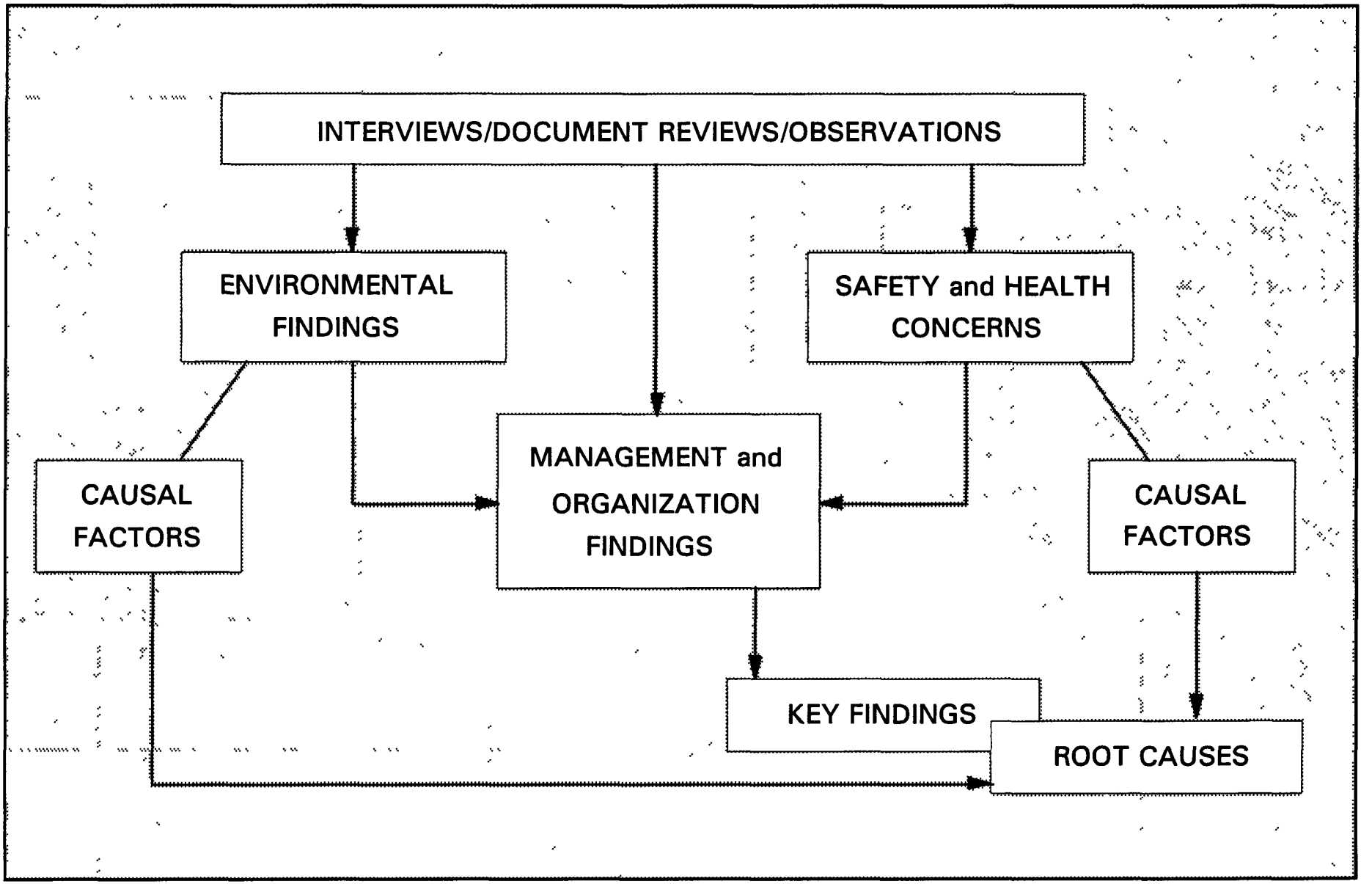

FIGURE 1-1

AMES TIGER TEAM ASSESSMENT APPROACH

Management Subteam Leaders; and representatives from the Office of Special Projects, the Office of Energy Research, and CH.

The Acting Manager of CH and senior managers of the site involved with activities at Ames provided overviews of site operations and ES&H programs. The Tiger Team Leader, Deputy Tiger Team Leader, and Subteam Leaders discussed the Tiger Team Assessment program and necessary support requirements for the onsite assessment. Federal, state, and local regulators were invited, as well as trade union representatives. Representatives of local agencies and union representatives participated in the preassessment activity.

The assessment approach and agenda were provided to the site contractors and DOE Field Offices before initiation of the assessment so that counterparts could be identified for each technical area to be reviewed.

1.3.2 Onsite Activities

Onsite activities for the assessment took place from February 10 through March 5, 1992. These activities included field observations; document reviews; and observations of routine operations, emergency exercises, and observations of the physical condition of the site and facilities. In addition, reviews were conducted of previous audits and assessments, and interviews were conducted with DOE and Ames personnel, as well as personnel from Federal, state, and local regulatory agencies.

Using these sources of information, the Tiger Team developed issues that are reported as findings (Environmental and Management Subteams), concerns (S&H Subteam), or noteworthy practices. Section 1.3.3 discusses this development process in more detail.

The Tiger Team process was conducted in an open manner with Ames and CH personnel to enhance communication and to ensure the accuracy of information and issues. During the process, all three subteams conducted daily debriefing sessions that were open to site personnel. The daily debriefing sessions were well attended, and site personnel actively participated in the sessions. In addition, the Tiger Team Leader held daily meetings with the Ames senior manager to provide a summary overview of team progress and to discuss major issues identified by the subteams. Before the closeout briefing, each subteam provided draft findings and concerns to DOE and Ames site personnel to conduct factual accuracy reviews.

1.3.3 Report Preparation

Section 2.0 is an overall summary of the key Tiger Team Assessment findings, concerns, noteworthy practices, and probable root causes as identified by the subteams. Sections 3.0 through 5.0 contain the Environmental, S&H, and Management findings and concerns, respectively. Section 6.0 is an evaluation of the ER, CH, and Ames self-assessment programs and reports.

For the Environmental Subteam, each identified issue is categorized as either a "compliance finding," or "best management practice finding." Compliance findings are conditions that, in the judgment of the Assessment Team, may not satisfy applicable ES&H regulations, DOE Orders (including internal DOE memoranda, where referenced, and draft DOE Orders), internal ES&H site operating standards, enforcement actions, agreements with regulatory agencies,

or permit conditions. Best management practice findings are derived from regulatory agency guidance, draft DOE Orders, accepted industry practices, and professional judgment. Each finding is prefaced by a statement of an applicable performance objective. Performance objectives for compliance findings are derived from promulgated regulations and final DOE Orders, consent orders, agreements, and permit conditions. Performance objectives for best management practice findings are derived from regulatory agency guidance, accepted industry practices, and professional judgment. Findings for the Environmental and Management Subteams are not necessarily arranged in order of relative significance.

The S&H Subteam employed a reporting format that maintains consistency and integrity with the TSA process. Each identified issue is developed into a "concern," which is supported by "findings," and has the characteristics of being explicit (stating the problem), measurable (auditable), and justifiable. A concern addresses a situation that, in the judgment of the subteam, meets one or more of the following criteria: (1) reflects less than full compliance with a DOE safety and health requirement or mandatory safety standard; (2) threatens to compromise safe operations; or (3) if properly addressed, would substantially enhance the excellence of that particular situation even though that part of the operation was judged to have a currently acceptable margin of safety. Because this last category addresses the excellence of the operation, more concerns are reported than would result from a strictly compliance-oriented assessment. Each concern is categorized by its seriousness, potential hazard level, and compliance status. Findings and concerns are prefaced by a statement of the performance objective in each discipline area.

The objective of the OSHA portion of the appraisal of facilities at Ames was to measure safety and health in the workplace against DOE-prescribed OSHA regulations. General Industry Standards (29 CFR 1910) and Construction Industry Standards (29 CFR 1926) were used as criteria. A full report of the OSHA assessment is provided in Appendix F.

The Management Subteam evaluated the effectiveness of management structure, processes, and systems relative to ES&H programs to identify findings and to develop probable root causes based on findings and concerns developed by all subteams. Management Subteam findings were derived from analysis of key management areas that affect ES&H activities and considered DOE policy and Orders, generally accepted management principles, and industry standards. Each finding is supported by a summary and discussion, which identifies further detail as to the background, factual basis, and, where appropriate, management implications of the finding.

In addition to identifying findings and concerns, the subteams looked for exceptional practices in accomplishing performance objectives or meeting ES&H objectives. Any noted exceptional practices, which may have general application at other DOE facilities, are identified as "noteworthy practices" and are documented for the purpose of information transfer.

This assessment reflects a fixed point in time. Improvements in the ES&H areas that were planned, but were not completed at the time of this assessment, are identified as findings or concerns to provide a complete and accurate picture of the site's conditions from the onset of the assessment.

This report was transmitted to the Acting Manager of CH, site contractor management personnel, DOE Headquarters Program Senior Officials (including the Office of Energy Research; the Office of the Assistant Secretary for Environment, Safety and Health; and the Office of General Counsel), Federal and State of Iowa regulators, and trade union representatives for technical and factual accuracy review. This final report has incorporated those review comments, suggested changes, and modifications, as appropriate.

1.3.4 Corrective Action Plan and Process

CH and Ames will prepare a draft action plan that addresses the findings and concerns identified by the Tiger Team Assessment. The draft action plan will be submitted by the Acting Manager of CH to the Office of Energy Research for submission to the Assistant Secretary for Environment, Safety and Health for review and concurrence. The Secretary will approve the final action plan and direct its implementation.

1.4 SITE DESCRIPTION

Ames is located on the Iowa State University campus in central Iowa (Figure 1-2). The integration of Ames with the buildings and activities of Iowa State University has significant implications for site planning and utilization. For example, streets and street lighting, parking and traffic control, railway spurs, general infrastructure, landscaping and grounds maintenance, the telecommunications system, ordinary waste disposal, and utilities are provided or maintained by ISU, either against the contractor's overhead fee or on a direct-charge basis.

Government-owned buildings at the Ames site are located on approximately 10 acres of land owned by ISU and leased to the Federal government on a long-term (99-year) basis. However, the impact of any major changes in Ames' activities and physical facilities on general ISU operations must, of necessity, be carefully analyzed. The interests of Ames in overall ISU site planning considerations are represented by interactions of officers and senior staff members of Ames with major ISU committees and bodies that are responsible for campus planning, physical facilities, long-range development, and space utilization.

The organization that ultimately became the Ames Laboratory originated as part of the Office of Scientific Research and Development in the early days of the atomic energy program. The initial work at Ames was carried out in the ISU Chemistry Building in 1942 and involved the development of a process for the production of uranium metal in large quantities.

After completion of these early uranium production efforts at Ames, Iowa State University established the Institute for Atomic Research in 1945. With the creation of the Atomic Energy Commission (AEC), Ames was established in 1947 as one of the AEC's multiprogram laboratories and was to be operated by ISU through the Institute. In 1949, ISU completed (and still owns) the 3-story Office and Laboratory Building, consisting of about 14,000 net usable square feet (nusf) designed to provide facilities for the new Institute and for Ames. This building currently houses Ames' executive offices and portions of the environmental sciences and chemical sciences efforts; the remainder of the building is used for ISU functions.

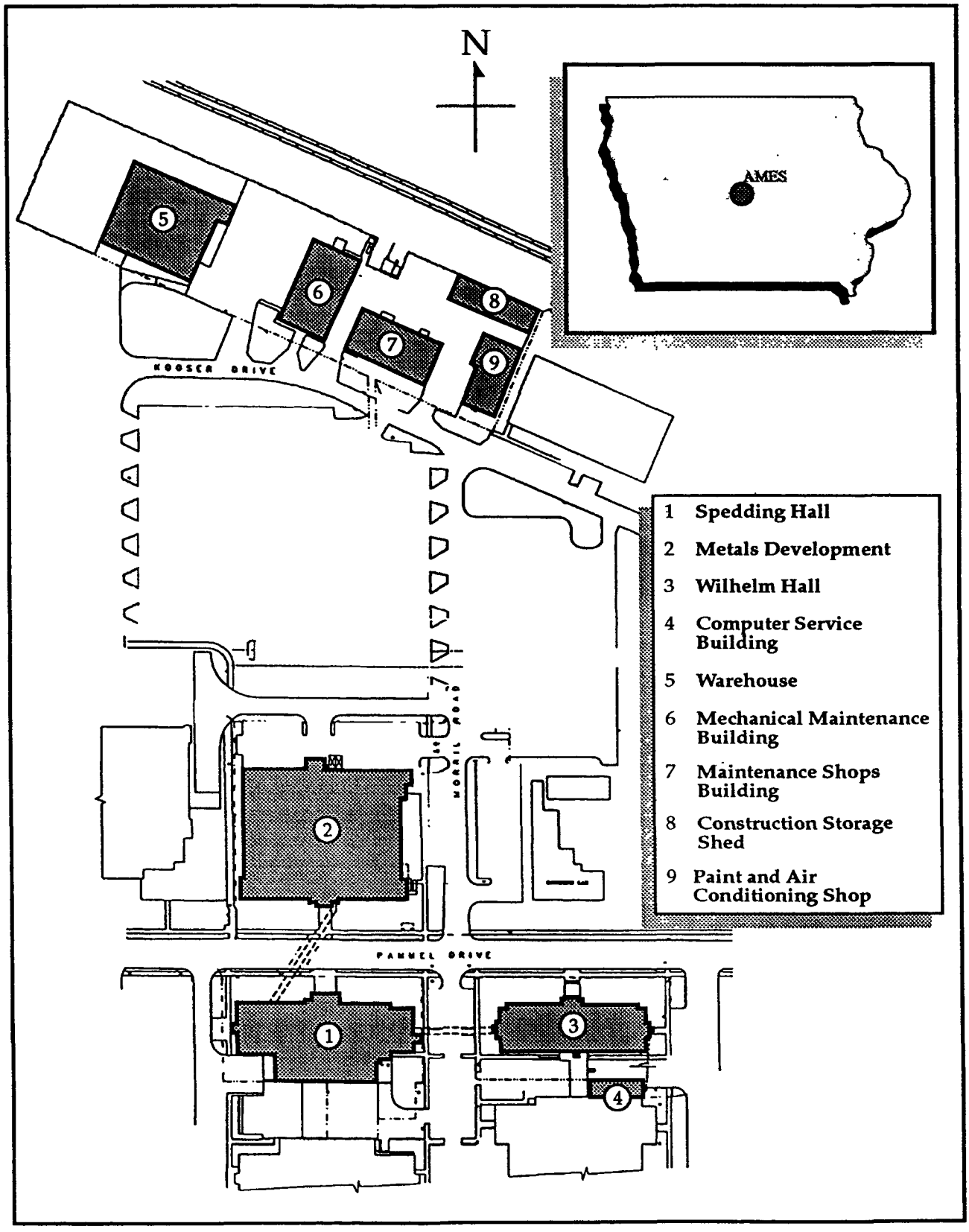

Figure 1-2 LOCATION OF AMES LABORATORY

Expansion of Ames was accommodated in new buildings funded by the AEC. The Metallurgy Building, completed in 1949 and later renamed Wilhelm Hall, contains approximately 33,000 nusf in a 4-story brick structure. The building provides light laboratory space for both experimental and theoretical groups. A small (approximately 2,000 nusf) vehicle garage adjacent to Wilhelm Hall was also completed in 1949 and has since been remodeled to house the Administrative Division's computer services groups.

The Research Building, renamed Spedding Hall, was constructed between 1950 and 1952. This 5-story brick structure, which contains nearly 65,000 nusf, is designed for laboratory use; however, approximately 15,000 nusf have been assigned to administrative departments and support functions due to the lack of other facilities.

To accommodate materials processing and large fabrications operations, the Metals Development Building, a single and 2-story structure containing nearly 35,500 nusf of floor space, was completed in 1960.

During the 1960s, small auxiliary buildings were constructed with General Plant Projects (GPP) funds to support the research activities of Ames. These are listed in Table 1-1, along with the dates of their completion.

TABLE 1-1
AMES LABORATORY SUPPORT FACILITIES

Facility	Date	Area(nusf)
Mechanical Maintenance Building	1964	8,000
Warehouse	1966, 1970	16,000
Maintenance Shops	1967	6,500
Construction Storage Shed	1967	4,200
Paint and Air Conditioning Shop	1968	4,000
		TOTAL 38,700

Although the Metals Development Building was expanded in 1967 for shop facilities and light laboratory space (5,500 nusf), in 1984 for engineering offices (3,000 nusf), and in 1988 for electronics and computer services (3,300 nusf), a period of over 30 years has elapsed since construction for research activities at Ames has been funded. The new space acquired by Ames through the small additions mentioned above was funded by regular GPP allocations. The distribution of the space used for Ames operations between the federally-owned buildings on the main site, University-owned buildings adjacent to the main site, and buildings offsite is provided in Table 1-2.

TABLE 1-2
LABORATORY SPACE DISTRIBUTION[1]

Location	Area (nusf)
Main Site	147,300
Leased - University	30,000[2]
Leased - Off Site	5,300[3]
	TOTAL 182,600

[1] Excludes the support facilities listed in the previous table and which are all located on the main site.

[2] Approximate area, specific space (room, building, and area) is listed in the annual space rental agreement submitted to DOE.

[3] Recently leased to accommodate ER/WM Advanced Technology Development activities.

2.0

KEY FINDINGS, ROOT CAUSES, AND NOTEWORTHY PRACTICES

2.0 KEY FINDINGS, ROOT CAUSES, AND NOTEWORTHY PRACTICES

2.1 ENVIRONMENTAL

The Environmental Subteam identified 53 findings as part of the Tiger Team Assessment. While none of these present an immediate risk to public health or the environment or warrant an immediate cessation of operations, taken together they represent a serious deficiency in the environmental protection program at the Ames Laboratory (Ames). Forty-seven findings reflect problems that result from not meeting the requirements of Federal, state, or local laws and regulations; U.S. Department of Energy (DOE) Orders; and DOE Field Office, Chicago (CH) or onsite contractors' directives or procedures. Six findings reflect conditions where best management practices are not employed.

From these 53 findings, the Environmental Subteam identified the following four key findings. Each key finding is supported by a group of findings presented in Section 3.5 and represents an important program concern.

2.1.1 Key Findings

- **Waste Management.** Ames does not have a defined program for the management of hazardous, mixed, and radioactive waste. As a result, Ames does not meet the requirements of the Resource Conservation and Recovery Act (RCRA) or DOE Orders. The ES&H Group at Ames is charged with ensuring proper waste management; however, there are no definition of roles and responsibilities within the group and no concerted effort to respond to evolving regulatory requirements caused by changes in the amount and characteristics of waste generated at Ames. Policies governing the various aspects of a comprehensive waste management program have not been established by Ames. Waste management activities also suffers from a lack of formalized procedures. The only waste management procedure at Ames pertains to satellite accumulation area management; however, this procedure is not consistently applied or implemented. There are no formal procedures at Ames for tracking of monthly hazardous and mixed waste generation; waste characterization; recordkeeping and reporting; temporary hazardous and mixed waste storage area management; and packaging and transport of hazardous waste. Many of the deficiencies in Ames' waste management activities can be attributed to a lack of qualified personnel and sufficient personnel resources. Interviews of personnel at Ames with waste management responsibility revealed a general lack of understanding of RCRA requirements. The personnel at Ames with waste management responsibility are also required to perform other duties, which impacts their ability to implement proper waste management.

- **Quality Assurance and Oversight.** Environmental Quality Assurance (EQA) has not been included as a component of the Ames Quality Assurance Program (QAP). The Ames QAP focuses primarily on safety and health and plant protection and does not provide measures by which environmental quality assurance can be assessed. Elements of EQA that have not been addressed in the QAP include field and laboratory quality control, recordkeeping and chain-of-custody procedures, audits/corrective action, surveillance reporting, and

data validation and verification. Additional aspects of EQA that are necessary in maintaining environmental programs include auditing and developing Environmental Protection Program Plans as required by DOE Orders. Ames has not developed an effective auditing program and has not established and implemented a corrective action program to track and bring to closure deficiencies identified in the audits.

The lack of EQA as part of environmental planning and programs at Ames is due to several factors directly related to the knowledge of individuals at Ames who possess the responsibility to carry out such activities. Interviews with Ames personnel responsible for EQA revealed that they were unfamiliar with practices needed to maintain verifiable and defensible documentation and the need to incorporate quality assurance in all aspects of environmental programs. In addition, CH has not instituted a formal program of oversight or guidance necessary to ensure that environmental plans and actions are established, implemented, and maintained, or that DOE Orders and regulations are understood and implemented.

- **Toxic and Chemical Materials Management.** Ames has not developed a comprehensive program to effectively manage toxic and chemical materials (TCM). This includes hazard identification, storage of incompatible materials, provisions for secondary containment, and assessment of potential mechanisms for hazardous materials release. A comprehensive program is essential since there is storage of TCM throughout Ames. The management of peroxide chemicals at Ames is also inadequate, and PCB management practices do not meet the requirements for labeling, storage, and inventory of PCB containing materials. The lack of comprehensive TCM management has resulted in fragmented line responsibilities, poor practices for the storage of TCM, inconsistent recordkeeping and documentation, and inadequate training for researchers, ISU professors, or graduate students.

- **Environmental Policies, Plans, Procedures, and Knowledge Base.** Ames' environmental compliance and protection activities are generally lacking in their formality. Formalized policies, plans, and procedures have not been established to ensure compliance with Federal, state, and local regulations, and DOE Orders. None of the environmental protection documents specifically required by DOE 5400.1 were found by the Tiger Team to be of sufficient scope or quality. These include: the Waste Minimization Plan, the Pollution Prevention Awareness Plan, the Environmental Monitoring Plan, and the Groundwater Protection Management Plan. These plans have not been effectively developed and comprehensively implemented by Ames. Most of Ames operations relating to environmental protection and compliance are conducted without formalized or adequate procedures. This concern is most significant in the areas of waste management, TCM management, inactive waste site characterization, environmental monitoring, and NEPA compliance. Additionally, documentation related to environmental protection and compliance was found to be chronically deficient at Ames. The lack of formality of Ames' environmental activities is partially the result of limited

environmental expertise. Ames has insufficient staff to establish, implement, and oversee effective environmental programs. Available personnel do not have the necessary environmental expertise, and have not received sufficient training.

2.1.2 Causal Factors

The Environmental Subteam attempted to identify apparent causal factors that contributed to the occurrence of individual findings. Establishing the predominant causal factors assists management in the formulation of probable root causes. CH and Ames are expected to develop and implement corrective actions for individual causal factors identified in each finding.

Twelve causal factors were identified as contributing to the occurrence of the Environmental Subteam findings. In most instances, more than one causal factor is identified for each finding. A summary of individual causal factors identified for each finding is presented in Chapter 3.0 (Table 3-2). Each of these causal factors is defined in Appendix G. The four causal factors that appear most frequently are policy implementation, training, procedure, and appraisal/audits/reviews.

A discussion of the four causal factors follows:

- Policy implementation appeared in 62 percent of the findings. Federal, state, and local laws and regulations or DOE Orders were not implemented or fully implemented. This causal factor was evident in all of the environmental disciplines.

- Training appeared in 32 percent of the findings. Ames does not have an effective personnel training program on implementing site policy. This causal factor was most evident in all of the disciplines except quality assurance.

- Procedure appeared in 26 percent of the findings. Ames has not developed and implemented procedures to ensure environmental protection and compliance. This causal factor was represented in the air, surface water/drinking water, groundwater, waste management, toxic and chemical materials, and inactive waste sites disciplines.

- Appraisals/audits/reviews (a secondary causal factor) appeared in 25 percent of the findings. Ames has failed to identify inaccuracies and program deficiencies because it has not instituted a formal and comprehensive program of audits, surveillance, and work product review for environmental activities. This causal factor was most evident in the disciplines of air, waste management, toxic and chemical materials, radiation, and NEPA and reflected a lack of oversight by DOE (CH and ER).

2.2 SAFETY AND HEALTH

2.2.1 Key Concerns

The S&H Subteam identified a total of 126 concerns that were distributed throughout the 15 functional areas examined. Four of the concerns (all Category III) were addressed to CH. No concerns were designated as Category I. Eight concerns, all addressed to Ames Laboratory, were designated as Category II; the remainder (118) were designated as Category III. The eight Category II concerns addressed the following:

- Welding on structural components without specifications or procedures;
- The lack of an effective emergency preparedness program;
- Prolonged operation of radiological systems that violate DOE Orders;
- Reliance solely on administrative controls to prevent exposure from x-ray diffraction units;
- Improper posting of radiation control areas;
- Absence of a program to ensure control of radiation contamination;
- Deficiencies in personnel protection monitoring; and
- Improper storage of flammable solvents.

Of the 126 concerns, 91 (72 percent) were judged to represent noncompliance with DOE Orders or mandatory standards (Compliance Level 1), and 34 (27 percent) were judged to present a potentially serious hazard (Hazard Level 1).

From these 126 concerns, 7 key concerns were derived on the basis of their impact on safety at the Ames Laboratory. These key findings are as follows:

- **Ames Laboratory has no enforced policy on the preparation and use of formal procedures.** Management has not reviewed Laboratory activities to ensure that all required formal procedures are available. Formal guidance has not been provided for the preparation of operating procedures. Ames has not established formal procedures for recording maintenance activities. Operating and maintenance procedures are not formally reviewed by technical support personnel. Multiple lockout/tagout procedures are in effect in different parts of the technical operations organization.
- **Independent safety appraisal and review are not integral parts of the ES&H program at Ames.** The ES&H Group is not independent as defined by DOE 5480.1B. No independent safety review system that meets requirements of DOE 5482.1B is in place. Ames Laboratory does not provide routine independent audits of its packaging and transportation activities. Activities involving radioactive

materials do not receive independent overview by radiation protection professionals.

- **The Ames training program neither fulfills the needs of the Laboratory nor meets DOE requirements.** The training program is not formalized or fully functional as required by DOE 5480.19. Training facilities, equipment, and materials do not provide necessary support to the Ames training program. The Laboratory has not developed a training program for managers, supervisors, and instructors. Personnel performing maintenance inspections of hoisting and rigging equipment are not formally trained for this activity. Ames has no training program for personnel engaged in packaging and transportation activities. The Laboratory does not meet training requirements for hazardous waste operations or emergency response as stipulated by 29 CFR 1910.120.

- **Emergency preparedness has not been properly addressed at the Ames Laboratory.** The Laboratory has not developed an emergency preparedness program that complies with DOE 5500.1B and other DOE Orders. The exercise and drill program does not comply with Department of Energy requirements. The Emergency Operations Center is not properly equipped to direct emergency response activities. Ames Laboratory has not developed a fire hazard analysis for each facility owned by DOE.

- **The federally mandated Conduct of Operations program is not yet implemented at the Ames Laboratory.** Technical operations management at Ames Laboratory has not established a system of administrative controls as required by DOE 5480.19. Authorized user lists are not developed or maintained for all equipment. Ames has no approved, institutional plan or program for performing ongoing self-assessments. No formal policy or procedure exists governing use of procedures.

- **Ames Laboratory does not have an effective quality assurance program.** The documented quality assurance program does not include all elements required by DOE 5700.6C and ASME NQA-1-1989. CH does not provide effective oversight of quality assurance activities. Verification of purchased materials, equipment, and services is not quality controlled. No formal calibration program for measurement and test equipment is in place. Controls are not established to prescribe standard materials and equipment for performing structural welding tasks for which DOE Orders and mandatory standards require certification.

- **Radiation control practices at the Ames Laboratory do not always provide necessary radiological protection to employees and do not meet the requirements of DOE Orders.** Prolonged operation in violation of DOE 5480.11 is not reported, investigated, or ameliorated under the incident reporting system as required by DOE 5000.aG. Many of the x-ray diffraction units rely on administrative controls rather than physical barriers to prevent dangerous extremity exposures. Posting of areas for radiation control and labeling of radioactive material does not comply with the requirements of DOE 5480.11. Ames Laboratory has not

established a program to ensure control of radioactive contamination as required by DOE 5480.11. CH has not performed the onsite assessment required to validate the Laboratory dosimetry program as required by DOE 5480.15.

2.2.2 Noteworthy Practice

A Noteworthy Practice has been defined as an exceptionally good way of accomplishing an S&H performance objective or some aspect thereof that is not currently employed at other DOE facilities, but should be emulated. The TSA Team did not find a practice or program that met this criteria, but did identify a program recognized by the team as exemplary. The following is therefore presented for information purposes only.

Ames has written a Safety Reminder (SREM) system, a DOS program for computers, to generate and track periodic safety-related tasks. SREM automatically generates reminders of recurring safety tasks and generates weekly notices for each item on system until it is entered as completed.

Users can easily add or edit reminder notices. Also, comments can be added when safety checks are recorded. A word search can be made to recall comments of particular occurrences. A list of all or selected reminders can be obtained at any time. Several users can use the same data base, sorting by users initials (author of reminder notice). The data base is written in a compiled language and therefore can be distributed and run without licensing restrictions.

Although there are a variety of manual and computerized systems to remind users of safety checks and to document their performance, SREM appears to be an especially economical approach in terms of initial investment and ongoing time commitment. The automatic generation of weekly reminders is particularly helpful.

Copies of the program may be obtained from:

Dr. R. A. Jacobson
Ames Laboratory
Iowa State University
Ames, IA 50010
Phone: (515) 294-1144

2.3 MANAGEMENT AND ORGANIZATION

2.3.1 Key Findings

The Management Subteam developed a total of 19 findings. The observations and conclusions contained in those findings have been captured in four key findings which reflect a composite of the most significant ES&H related issues observed by the Management Subteam.

- **Ames does not currently have a comprehensive, fully integrated, environmental, safety, and health program which meets the requirements, objectives and expectations set forth by the Secretary of Energy.** The Secretary of Energy's stated objectives related to ES&H have now been a matter of record for some period

of time. DOE Orders, Directives, and guidelines have been finalized and issued to accomplish those objectives. Moreover, Tiger Team reports from numerous other DOE installations have been available for some time which clearly identify the expectations of the Department. However, Ames has only recently begun to address the actions which will be required to establish a fully effective ES&H program. It has only been in the last few months that many members of the staff have sought out the DOE Orders and Directives.

As a result, many of the fundamental elements necessary to establish a comprehensive ES&H program which will satisfy DOE requirements have not yet been developed. Basic management, control, or support systems such as quality assurance, strategic planning, directive systems, comprehensive policies and procedures, management information systems, and corrective action management systems that would normally be expected to be present in a mature ES&H program either do not exist or do not meet DOE standards and criteria. Ames has some elements of an ES&H program in place and has recognized the need for significant changes or improvements as a result of their recent self-assessment. However, it is not apparent that they have considered the application of any extensive intermediate or compensatory actions which could be applied to improve their ES&H posture until longer term or permanent solutions can be developed and applied.

- **Ames does not have an effective, self-initiated, strategic and subordinate implementation planning process.** Strategic planning at Ames has generally been limited to annual institutional plans prepared in response to a request from the Headquarters Program Organization. These are generally financially oriented and lack specificity with respect to end objectives and a means of accomplishment. Although these plans are, no doubt, useful to DOE Headquarters at the macro level, they are not a substitute for self-generated internal strategic planning which deals with both a strategic vision as well as more narrowly defined short and long-term goals and objectives. Such planning would provide the basis for subordinate implementation plans at an even more detailed level by staff and operating or research organizations within Ames. This type of a planning effort provides the framework for the development and establishment of a comprehensive program which fully integrates ES&H requirements with programmatic objectives. It also provides a basis for well reasoned decisions regarding trade-offs between program and ES&H considerations as well as a means of prioritizing and scheduling specific actions to be taken and resources which will be required to support those actions. Furthermore, without such planning it is unlikely that Ames will be adequately prepared to manage and direct the substantial effort which will be required to initiate the significant number of remedial actions which must be taken in response to the Ames self-assessment and the Tiger Team findings.

- **Neither the Chicago Field Office nor Ames have conducted the sustained and vigorous oversight necessary to ensure the application of DOE ES&H requirements to the operations of Ames.**

Based upon the significant number of findings and concerns developed by the Tiger Team, the CH FY91 Summary Appraisal Report, and the Ames and CH Self-Assessment Reports, it is apparent that the Ames' ES&H oversight program has not been an effective management tool to ensure that DOE ES&H requirements are consistently and uniformly applied. There are no formal, uniform, procedural requirements for managers to conduct oversight reviews of their own internal line operations and workplaces. Although they are performed from time to time, they are generally informal and usually focus on housekeeping and safe work practices by individual employees. In some cases this responsibility has been further assigned to the organizational Safety Coordinator and Safety Representatives. However, many of these individuals have not yet been properly trained to examine some of the more subtle ES&H aspects of their operational areas such as potential environmental and health impacts.

The Environment, Safety and Health Group (ES&HG) functions as the policy makers, provides staff support and guidance to the line organizations, and serves as the independent oversight or enforcement arm of Ames to ensure compliance by the line and staff organizations. Since the same ES&H professional could potentially be involved in all three functions, Ames essentially does not have an independent system of checks and balances. This problem is further compounded by the fact that Ames does not yet have a fully operational Quality Assurance program which could potentially provide an oversight capability with some greater degree of independence and objectivity. Moreover, the Internal Audit Group does not have the ES&H expertise to provide any assistance to Director of Ames in the evaluation of ES&H programs.

Furthermore, there have been no internal appraisals of safety or environmental functional areas conducted by Ames for over 2 years, and none have been scheduled in the immediate future. Similarly, there have been no triennial reviews of the independent review and appraisal system and there are none scheduled at this time. The Ames Safety Manual, which sets forth the responsibilities of the ES&HG, states that they are responsible for reviewing, auditing, and assuring the adequacy of Ames ES&H programs. However, there are no other implementing policies or procedures which set forth the process and mechanisms or the roles, responsibilities, and authorities by which these duties are to be carried out. There is also no evidence of any formal risk analysis or assessments to determine the priorities which should be applied in the scheduling of appraisals, inspections, surveillances, etc.

The Chicago Field Office line management organization responsible for Ames has not provided effective oversight of ES&H related functions on a continuing basis. Independent oversight appraisals conducted by the CH Environment, Safety and Health Division (ES&HD) have identified many of the longstanding ES&H deficiencies at Ames. However, there is little evidence that the findings and information reflected in those reports has been utilized by the CH line management organization to bring about needed changes in the operations and programs at Ames.

- **Ames does not have an effective environmental, safety, and health training program which includes planning, scheduling, standards, and an effective validation process.** The ES&H training program at Ames is decentralized, uncoordinated, and does not reflect careful planning, analysis, and structure to ensure that all personnel are trained and knowledgeable to carry out their ES&H responsibilities effectively. Moreover, there is no formal validation process to determine whether or not the training which has been provided was effective in accomplishing the objectives and is being consistently applied in the work place.

  There have been no apparent attempts to develop a profile of each organization to identify the potential hazards and risks inherent in the work place, to examine the training which has been provided, and to prepare a master plan and schedule to fill any voids in core training or which may have occurred because of personnel transfers, reassignment of responsibilities, or new hires. The importance of ES&H training has been recognized by Ames management and they have hired an individual to develop an overall training program. However, efforts and activities associated with employee and management training have been highly fragmented, inconsistent, and often ineffective.

  Some training has been provided in specialized areas such as Quality Assurance and Conduct of Operations. However, since the development of these programs is still in the formative stages, an overall employee training program has not yet been prepared.

  Safety Coordinators and Safety Representatives are considered to be a important element of the Ames' overall line ES&H program. However, no effort has been made to develop a core training program to prepare these individuals for such an assignment and to ensure that they fully understand their responsibilities, duties, and authorities which also includes providing training to other staff members of their parent organization.

  As new ES&H policies and procedures are issued, there does not appear to be any effort made for training or indoctrination to assure that they are understood and will be uniformly applied. For example, a stop work/restart policy was recently issued and placed in the Ames Safety Manual. However, very few of the individuals that have been granted this authority have a common understanding of what "stop work" really means and the circumstances under which it is to be applied. The requirements for restart are even less well understood.

2.3.2 Noteworthy Practice

The Management Subteam identified one noteworthy practice. This involved Ames initiating an accredited ES&H graduate level course at Iowa State University. Details of this course are described in Section 5.6.

2.4 PROBABLE ROOT CAUSES

The Tiger Team conducted an integrated root cause analysis which considered the combined findings, concerns and causal factors identified by each of the three subteams. Although there are an extensive number of contributing factors, the team identified the three most probable root causes of the deficiencies disclosed in the Tiger Team report.

- **Laboratory management and staff are not sufficiently knowledgeable of ES&H requirements to develop and implement a comprehensive ES&H program.** There has not been an aggressive systematic effort to identify and understand the mandatory provisions of all applicable Federal, State of Iowa, and DOE requirements at any level of the Laboratory organization. As a result, early attempts to design new systems, programs or controls are generally not well founded. Deficiencies in the existing systems and practices were identified and cataloged in the Ames self-assessment report. However, the Laboratory has not demonstrated a full appreciation and understanding of the magnitude and complexity of the actions and resources which will be required to correct these deficiencies and to develop, implement, and sustain a comprehensive, fully integrated, ES&H program.

- **Oversight of ES&H activities at Ames has not been effective in assuring that the DOE ES&H requirements have been properly interpreted, uniformly applied, and accurately communicated to Ames.** Although appraisals conducted by CH have identified deficiencies in the ES&H programs, Ames has, until recent months, generally received favorable ratings regarding its ES&H programs. This, together with a perception of low risk and a good safety record, has led to complacency, particularly on the part of Ames, resulting in serious deficiencies which have existed over an extended period of time. Remedial actions developed in response to CH appraisal findings generally focused on individual elements or transactions, and there is little evidence that CH line management has addressed the cumulative effect of those findings in order to implement an aggressive corrective actions program.

  ER and ISU oversight organizations as well as State and Federal regulatory and compliance organizations have not been a major factor in ensuring that the Laboratory's programs comply with applicable ES&H requirements and guidelines.

- **The management principles and practices at Ames have not been effective in achieving the objectives embodied in the DOE ES&H initiatives.** These initiatives require formalized and rigorous management processes to ensure the consistent and uniform application of requirements; a strong system of checks and balances; personal accountability for compliance; clearly defined roles, responsibilities and authorities; procedural-based controls on operations; documented programs for training; and ongoing self-assessment. The existing management systems and methods of operation have served the Laboratory well over the years and have resulted in significant and widely recognized scientific achievements. However, accommodations in the current management

system must be made to integrate the necessary elements of an effective ES&H program and to escalate ES&H to the same level of importance as research programs. ES&H requirements can no longer be treated as an appendage to, rather than an integral part of, research programs.

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3.0

ENVIRONMENTAL ASSESSMENT

3.0 ENVIRONMENTAL ASSESSMENT

3.1 PURPOSE

The purpose of the environmental portion of the Tiger Team Assessment is to provide the Secretary of Energy with information on current environmental compliance status and associated vulnerabilities of each facility, root causes for noncompliance, adequacy of DOE and site contractor environmental management programs, and response actions to address identified problem areas. The results of the assessment will aid in tracking DOE-wide environmental compliance trends.

3.2 SCOPE

The scope of the Ames environmental assessment was comprehensive, covering all environmental media and all Federal, state, and local regulations and requirements; DOE Orders; and internal requirements of DOE Field Office, Chicago (CH) and the contractor operating onsite. Best management practices were also covered. The environmental disciplines addressed in this assessment included air; surface water/drinking water; groundwater/soils, sediments, and biota; waste management; toxic and chemical materials; quality assurance; radiation; inactive waste sites; and requirements of the National Environmental Policy Act (NEPA).

3.3 APPROACH

The environmental assessment of Ames was conducted in accordance with the Tiger Team Guidance Manual (February 1990) and the DOE Environmental Audit Program Guidance (January 1992), and followed accepted audit techniques. The assessment was conducted by an Environmental Subteam managed by a Team Leader and a Deputy Team Leader from the DOE Office of Environmental Audit and technical specialists from DOE support contractors. The names, responsibilities, affiliations, and biographical sketches of subteam members are provided in Appendix A-2.

The environmental assessment of Ames included three phases: planning and preparation, field activities, and reporting. During the planning and preparation phase, an information request letter was sent to the site. A pre-assessment site visit was then conducted. Information gathered from both the response to the letter and the pre-assessment site visit formed the basis for the Environmental Subteam's Assessment Plan, provided in Appendix B, and onsite agenda. Once onsite, the subteam members modified the original agenda as more information was obtained and additional areas of interest were identified. This daily agenda, which reflects the Ames areas covered by the Environmental Subteam, is included as Appendix C.

The field activities for Ames took place from February 11 through February 20, 1992. These activities included review of internal documents and reports from previous audits and assessments; interviews with DOE and site contractor personnel and personnel from Federal and state regulatory agencies; and inspections and observations of facilities and operations. The Environmental Subteam held daily debriefings which were open to DOE, site personnel, and regulatory agency representatives. Using these sources of information, the Environmental Subteam developed findings as discussed in Sections 3.4 and 3.5. The findings development procedure included validation employing a formal

Factual Accuracy Review process in conjunction with CH and Ames personnel. The third phase of the assessment was final report preparation.

The Environmental Subteam identified findings in two categories: 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 agreements with regulatory agencies, permit conditions, or site directives/procedures/action plans. Best management practice findings represent situations where, in the judgment of the Environmental Subteam, sound accepted management practices are not being employed.

No Noteworthy Practices were identified as part of this assessment. A Noteworthy Practice is a finding which, in the judgment of assessment team, will have general application at other DOE facilities/operations. However, the lack of Noteworthy Practices is not an indication of a deficiency.

3.4 ENVIRONMENTAL ASSESSMENT SUMMARY

The Environmental Subteam identified fifty-three (53) findings in the assessment of the Ames. Table 3-1 presents the title of each finding. None of the findings represent situations that present an immediate threat to public health or the environment, or that require an immediate cessation of operations. Forty-seven (47) of the findings reflect problems that may not meet the requirements of Federal, state, or local regulations or DOE Orders; or Ames directives or procedures. Six (6) findings represent conditions where best management practices have not been employed. A breakdown of environmental findings by technical discipline is presented graphically in Figure 3-1. A listing of the causal factors identified for each of the environmental findings is presented in Table 3-2. The frequency of occurrence for the identified causal factors is presented in Figure 3-2.

As part of the environmental assessment of Ames, the Environmental Subteam reviewed other recent reports related to environmental compliance. Most important among those are the Ames Self-Assessment and the CH Environment, Safety and Health (ES&H) Assessment of Ames. The Environmental Subteam evaluated the effectiveness of these Assessments in relation to the Tiger Team environmental assessment findings. Table 3-1 presents a summary of the results of the evaluation. Tiger Team findings are categorized as having been fully identified, partially identified, or not identified by the Ames and CH Assessments. Of the 53 environmental findings identified by the Environmental Subteam, 31 percent were fully identified, 44 percent were partially identified, and 25 percent were not identified in the Ames Self-Assessment Report; 21 percent were fully identified, 40 percent were partially identified, and 39 percent were not identified in the CH ES&H Assessment Report. The Self-Assessment Programs are discussed further in Section 6.0 of this report.

The Environmental Survey Preliminary Report, March 1989, identified 12 applicable findings. As of March 1992, six of these findings have been completely corrected. The other six findings, in the judgment of the Environmental Subteam, have not been completely resolved and are reflected in this assessment report.

TABLE 3-1
ENVIRONMENTAL FINDINGS

PAGE	FINDING NUMBER	FINDING TITLE	CH ES&H ASSESSMENT OF AMES	AMES SELF-ASSESSMENT
AIR (A)				
3-21	A/CF-1	Ambient Air Surveillance Program	P	F
3-23	A/CF-2	Meteorological Monitoring Program	P	F
3-25	A/CF-3	Air Emission Control	N	N
3-27	A/CF-4	Airborne Effluent Control HEPA Systems	P	P
3-28	A/CF-5	Air Permit Status	F	F
3-30	A/CF-6	National Emission Standards for Hazardous Air Pollutants (NESHAP) Compliance	P	P
3-32	A/BMPF-1	Air Emission Inventory	N	F
SURFACE WATER (SW)				
3-38	SW/CF-1	Wastewater Effluent Monitoring Plan	N	P
3-40	SW/CF-2	Backflow Prevention Devices	P	P
3-41	SW/BMPF-1	Potential Releases to the Sanitary Sewer System	F	F
3-43	SW/BMPF-2	Lead in Drinking Water	F	F
GROUNDWATER (GW)				
3-49	GW/CF-1	Soil and Groundwater Sampling Procedures	N	P
3-51	GW/CF-2	Groundwater Management Planning	P	P
WASTE MANAGEMENT (WM)				
3-60	WM/CF-1	Unpermitted Hazardous and Mixed Waste Storage	P	P
3-63	WM/CF-2	EPA Identification Numbers	P	N

TABLE 3-1
ENVIRONMENTAL FINDINGS

PAGE	FINDING NUMBER	FINDING TITLE	CH ES&H ASSESSMENT OF AMES	AMES SELF-ASSESSMENT
WASTE MANAGEMENT (Continued)				
3-65	WM/CF-3	Waste Characterization	P	P
3-68	WM/CF-4	Recordkeeping and Reporting	P	P
3-69	WM/CF-5	Personnel Training	P	P
3-71	WM/CF-6	Satellite Accumulation Areas	P	P
3-74	WM/CF-7	Temporary Hazardous and Mixed Waste Storage Areas	P	P
3-76	WM/CF-8	Hazardous and Mixed Waste Packaging and Transport	F	F
3-78	WM/CF-9	Waste Minimization	N	N
3-80	WM/CF-10	Radioactive Waste Disposal Management System	P	P
3-82	WM/BMPF-1	Oversight of Offsite Hazardous Waste Treatment, Storage, and Disposal Facilities	F	P
TOXIC AND CHEMICAL MATERIALS (TCM)				
3-88	TCM/CF-1	Toxic and Chemical Materials Management Program	P	P
3-92	TCM/CF-2	Management of Peroxide-Forming Chemicals	P	P
3-94	TCM/CF-3	Management of Polychlorinated Biphenyls	P	P
3-97	TCM/CF-4	Pollution Prevention Awareness Program Plan	N	N
QUALITY ASSURANCE (QA)				
3-102	QA/CF-1	DOE Oversight of Environmental Activities	N/A	N/A
3-104	QA/CF-2	Ames Environmental Quality Assurance (QA) Program	F	F
3-106	QA/CF-3	Environmental Quality Assurance (QA) Planning Documentation	P	P
3-108	QA/CF-4	Environmental Monitoring Plan	F	P

TABLE 3-1
ENVIRONMENTAL FINDINGS

PAGE	FINDING NUMBER	FINDING TITLE	CH ES&H ASSESSMENT OF AMES	AMES SELF-ASSESSMENT
QUALITY ASSURANCE (Continued)				
3-109	QA/CF-5	Internal Quality Assurance (QA) Audits and Corrective Action	N	F
3-111	QA/CF-6	Training of Environmental Personnel	N	N
3-113	QA/CF-7	Calibration and Traceability of Standards	N	N
3-115	QA/CF-8	Environmental Records	N	N
3-117	QA/CF-9	Independence of Quality Assurance (QA) Committee/QA Committee Manager	N	N
3-119	QA/CF-10	Environmental Quality Assurance (QA) Procedures	N	F
3-120	QA/CF-11	Quality Assurance (QA) Overview of Environmental Procurement	N	F
RADIATION (RAD)				
3-127	RAD/CF-1	Radiological Effluent Monitoring and Environmental Surveillance Programs	N	N
3-130	RAD/CF-2	Release of Real and Personal Property	P	P
3-132	RAD/CF-3	Demonstration of Compliance with Public Dose Limits	P	P
3-134	RAD/CF-4	Environmental ALARA Program	F	F
INACTIVE WASTE SITES (IWS)				
3-140	IWS/CF-1	Inactive Waste Site Program Planning	N	P
3-143	IWS/CF-2	Inactive Waste Site Identification, Characterization, and Documentation	N	N
3-146	IWS/CF-3	Spill Response	N	N
3-148	IWS/CF-4	Site Development Planning	N	N
3-149	IWS/BMPF-1	Hazardous Materials Inventory and Emergency Coordination	F	F

TABLE 3-1
ENVIRONMENTAL FINDINGS

PAGE	FINDING NUMBER	FINDING TITLE	CH ES&H ASSESSMENT OF AMES	AMES SELF-ASSESSMENT
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)				
3-155	NEPA/CF-1	National Environmental Policy Act (NEPA) Review and Documentation	P	P
3-157	NEPA/CF-2	National Environmental Policy Act (NEPA) Procedures, Tracking, and Recordkeeping	F	F
3-159	NEPA/CF-3	Integration of National Environmental Policy Act (NEPA) in Project Planning and Budget Review	N	F
3-160	NEPA/CF-4	Adequacy of National Environmental Policy Act (NEPA) Documentation	N	N
3-163	NEPA/BMPF-1	National Environmental Policy Act (NEPA) Training and Staff	F	F

F Fully identified
P Partially identified
N Not identified
N/A Not applicable

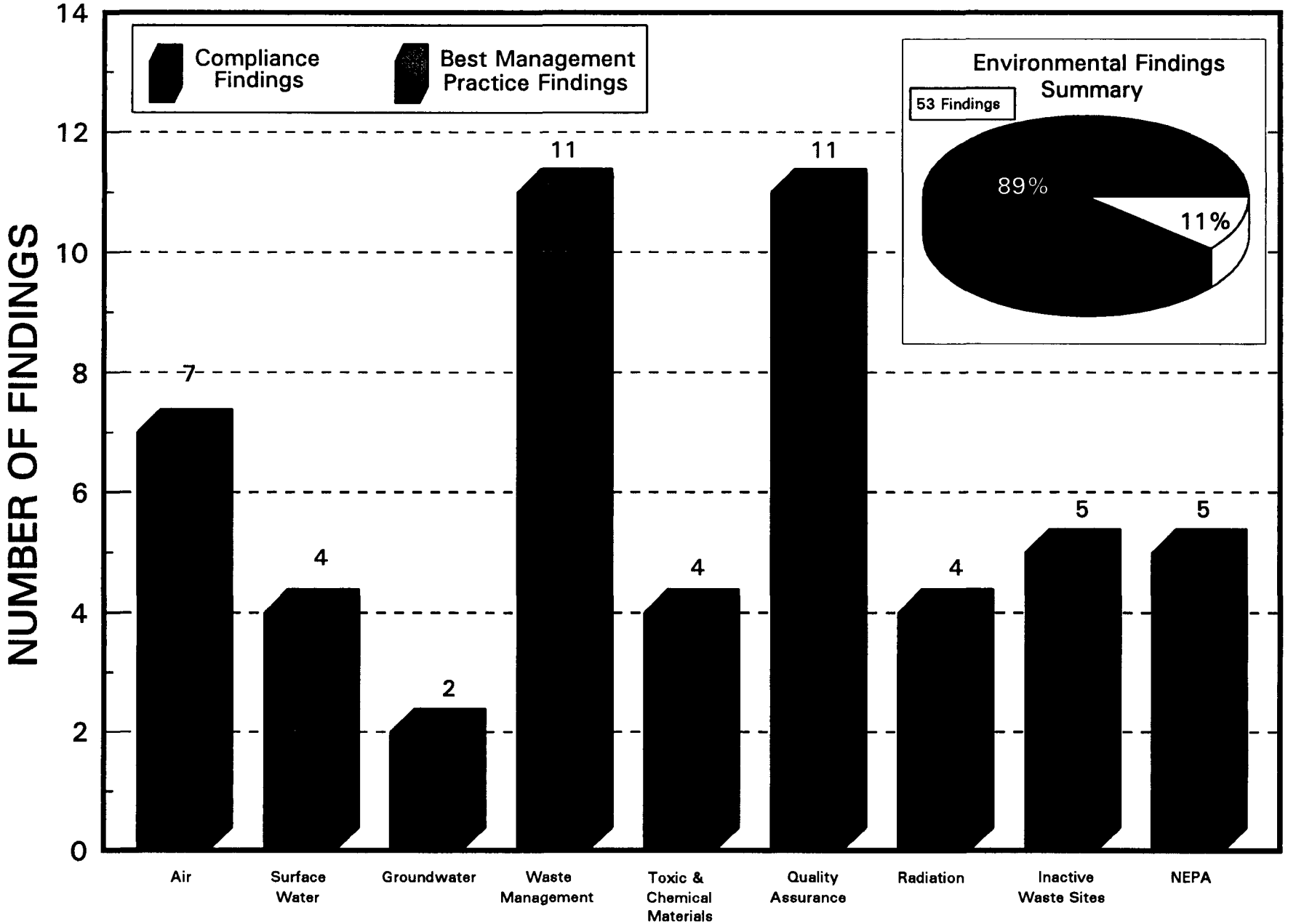

FIGURE 3-1
ENVIRONMENTAL FINDINGS BY DISCIPLINE

TABLE 3-2
SUMMARY OF APPARENT CAUSAL FACTORS IDENTIFIED BY ASSESSMENT FINDING

FINDING NUMBER	APPARENT CAUSAL FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Appraisals/Audits/Reviews	Design	Human Factors	Barriers and Controls	Supervision	QA/QC
AIR (A)														
A/CF-1		✓				✓								
A/CF-2		✓												
A/CF-3			✓			✓		✓						
A/CF-4		✓							✓					
A/CF-5		✓	✓			✓		✓	✓					
A/CF-6		✓				✓			✓					
A/BMPF-1		✓				✓			✓					
SURFACE WATER (SW)														
SW/CF-1	✓													
SW/CF-2		✓	✓											
SW/BMPF-1		✓				✓		✓						
SW/BMPF-2	✓													

TABLE 3-2
SUMMARY OF APPARENT CAUSAL FACTORS IDENTIFIED BY ASSESSMENT FINDING

FINDING NUMBER	APPARENT CAUSAL FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Appraisals/Audits/Reviews	Design	Human Factors	Barriers and Controls	Supervision	QA/QC
GROUNDWATER (GW)														
GW/CF-1			✓	✓		✓								
GW/CF-2		✓		✓		✓								
WASTE MANAGEMENT (WM)														
WM/CF-1				✓			✓					✓		
WM/CF-2				✓										
WM/CF-3			✓	✓										✓
WM/CF-4			✓			✓								
WM/CF-5	✓													
WM/CF-6	✓		✓										✓	
WM/CF-7			✓	✓			✓							
WM/CF-8			✓		✓									
WM/CF-9		✓	✓											
WM/CF-10		✓				✓			✓					
WM/BMPF-1	✓							✓						

TABLE 3-2
SUMMARY OF APPARENT CAUSAL FACTORS IDENTIFIED BY ASSESSMENT FINDING

FINDING NUMBER	APPARENT CAUSAL FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Appraisals/Audits/Reviews	Design	Human Factors	Barriers and Controls	Supervision	QA/QC
TOXIC AND CHEMICAL MATERIALS (TCM)														
TCM/CF-1		✓	✓			✓			✓					
TCM/CF-2		✓				✓		✓	✓					
TCM/CF-3		✓	✓			✓								
TCM/CF-4		✓							✓					
QUALITY ASSURANCE (QA)														
QA/CF-1		✓												
QA/CF-2		✓						✓						
QA/CF-3		✓												
QA/CF-4		✓			✓									
QA/CF-5		✓												
QA/CF-6					✓			✓						
QA/CF-7		✓						✓						
QA/CF-8		✓						✓						

TABLE 3-2
SUMMARY OF APPARENT CAUSAL FACTORS IDENTIFIED BY ASSESSMENT FINDING

FINDING NUMBER	APPARENT CAUSAL FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Appraisals/Audits/Reviews	Design	Human Factors	Barriers and Controls	Supervision	QA/QC
QUALITY ASSURANCE (Continued)														
QA/CF-9		✓						✓						
QA/CF-10		✓												
QA/CF-11		✓						✓						
RADIATION (RAD)														
RAD/CF-1		✓							✓					
RAD/CF-2		✓			✓				✓					
RAD/CF-3		✓							✓					
RAD/CF-4		✓				✓								
INACTIVE WASTE SITES (IWS)														
IWS/CF-1		✓		✓	✓									
IWS/CF-2			✓		✓									
IWS/CF-3	✓					✓								

TABLE 3-2
SUMMARY OF APPARENT CAUSAL FACTORS IDENTIFIED BY ASSESSMENT FINDING

FINDING NUMBER	APPARENT CAUSAL FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Appraisals/Audits/Reviews	Design	Human Factors	Barriers and Controls	Supervision	QA/QC
INACTIVE WASTE SITES (Continued)														
IWS/CF-4					✓									
IWS/BMPF-1			✓			✓								
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)														
NEPA/CF-1		✓							✓					
NEPA/CF-2	✓													
NEPA/CF-3		✓												
NEPA/CF-4				✓		✓			✓					
NEPA/BMPF-1		✓		✓										
TOTAL	7	33	14	9	7	17	2	11	13	0	0	1	1	1

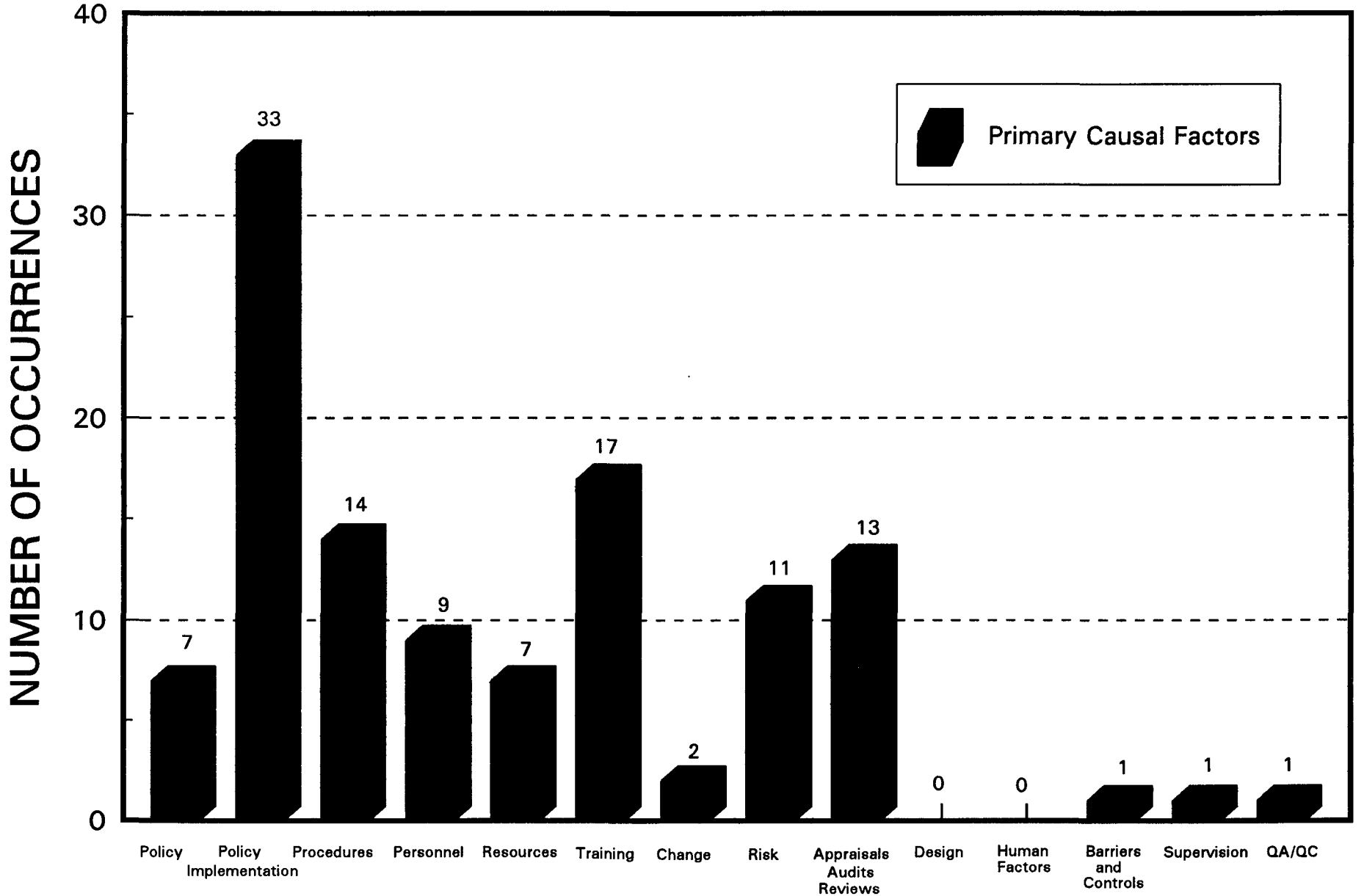

FIGURE 3-2
NUMBER OF FINDINGS PER CAUSAL FACTOR

Environmental Management Structure

The DOE oversight of ES&H activities at Ames is implemented through the designated Ames Laboratory Management Officer/Contracting Officer (ALMO) located at the Argonne, Illinois site, who in turn has been supported by the CH ES&H Division (ESHD). Since the ALMO has no staff reporting to him for ES&H support, he has relied upon the audits performed by CH-ESHD and their followup on corrective actions taken by the Laboratory to assure ES&H compliance by the Laboratory. A recent change to this arrangement is being implemented by CH where ESHD now performs only compliance audits of both the Laboratory and the ALMO. CH ES&H oversight of Ames will now be provided by the ALMO's line organization, Assistant Manager for Laboratory Management (AMLM) at CH. Most CH Area Offices reporting to the AMLM are staffed with ES&H specialists who will be called upon to provide this support to the ALMO.

The responsibility for environmental programs and management of Ames Operations is found in several organizational elements. The ES&H Group is responsible for oversight of Ames and reports to Associate Director, Operations Division (ADOD). The ES&H Group consists of a manager and six professional staff members. This group initiates ES&H policies and assists in implementation of these policies throughout Ames. This group provides technical support to all personnel for ES&H matters. The ADOD has five groups reporting to him which includes: Engineering Services, Facilities Services, ES&H, Scientific Computer Services, and Occupational Medicine.

Performance of Ames Laboratory Environmental Program

Overall, the performance of the Ames environmental program requires considerable improvement to fully comply with Federal, state, and local laws and regulations, and DOE Orders. Programmatic environmental issues at Ames are reasonably understood, as demonstrated by the Ames Laboratory Self-Assessment. Historically, operations have been conducted with a lack of formality, and responsibilities for environmental compliance were fragmented across the site. Many environmental programs at Ames are in the early stages of development. Recently, Ames has concentrated its resources on an overall pre-Tiger Team cleanup and self-assessment activities. Currently, the ES&H Group lacks the necessary environmental expertise to develop effective environmental protection programs and oversee line organizations' implementation of these programs. However, the staff were cooperative and receptive to suggestions from the Tiger Team members.

Environmental Key Findings

- **Waste Management.** Ames does not have a defined program for the management of hazardous, mixed, and radioactive waste. As a result, Ames does not meet the requirements of the Resource Conservation and Recovery Act (RCRA) or DOE Orders. The ES&H Group at Ames is charged with ensuring proper waste management; however, there are no definition of roles and responsibilities within the group and no concerted effort to respond to evolving regulatory requirements caused by changes in the amount and characteristics of waste generated at Ames. Policies governing the various aspects of a comprehensive waste management program have not been established by Ames. Waste management activities also suffers from a lack of formalized procedures. The only waste

management procedure at Ames pertains to satellite accumulation area management; however, this procedure is not consistently applied or implemented. There are no formal procedures at Ames for tracking of monthly hazardous and mixed waste generation; waste characterization; recordkeeping and reporting; temporary hazardous and mixed waste storage area management; and packaging and transport of hazardous waste. Many of the deficiencies in Ames' waste management activities can be attributed to a lack of qualified personnel and sufficient personnel resources. Interviews of personnel at Ames with waste management responsibility revealed a general lack of understanding of RCRA requirements. The personnel at Ames with waste management responsibility are also required to perform other duties, which impacts their ability to implement proper waste management.

- **Quality Assurance and Oversight.** Environmental Quality Assurance (EQA) has not been included as a component of the Ames Quality Assurance Program (QAP). The Ames QAP focuses primarily on safety and health and plant protection and does not provide measures by which environmental quality assurance can be assessed. Elements of EQA that have not been addressed in the QAP include field and laboratory quality control, recordkeeping and chain-of-custody procedures, audits/corrective action, surveillance reporting, and data validation and verification. Additional aspects of EQA that are necessary in maintaining environmental programs include auditing and developing Environmental Protection Program Plans as required by DOE Orders. Ames has not developed an effective auditing program and has not established and implemented a corrective action program to track and bring to closure deficiencies identified in the audits.

  The lack of EQA as part of environmental planning and programs at Ames is due to several factors directly related to the knowledge of individuals at Ames who possess the responsibility to carry out such activities. Interviews with Ames personnel responsible for EQA revealed that they were unfamiliar with practices needed to maintain verifiable and defensible documentation and the need to incorporate quality assurance in all aspects of environmental programs. In addition, CH has not instituted a formal program of oversight or guidance necessary to ensure that environmental plans and actions are established, implemented, and maintained, or that DOE Orders and regulations are understood and implemented.

- **Toxic and Chemical Materials Management.** Ames has not developed a comprehensive program to effectively manage toxic and chemical materials (TCM). This includes hazard identification, storage of incompatible materials, provisions for secondary containment, and assessment of potential mechanisms for hazardous materials release. A comprehensive program is essential since there is storage of TCM throughout Ames. The management of peroxide chemicals at Ames is also inadequate, and PCB management practices do not meet the requirements for labeling, storage, and inventory of PCB containing materials. The lack of comprehensive TCM management has resulted in fragmented line responsibilities, poor practices for the storage of TCM, inconsistent recordkeeping and

documentation, and inadequate training for researchers, ISU professors, or graduate students.

- **Environmental Policies, Plans, Procedures, and Knowledge Base.** Ames' environmental compliance and protection activities are generally lacking in their formality. Formalized policies, plans, and procedures have not been established to ensure compliance with Federal, state, and local regulations, and DOE Orders. None of the environmental protection documents specifically required by DOE 5400.1 were found by the Tiger Team to be of sufficient scope or quality. These include: the Waste Minimization Plan, the Pollution Prevention Awareness Plan, the Environmental Monitoring Plan, and the Groundwater Protection Management Plan. These plans have not been effectively developed and comprehensively implemented by Ames. Most of Ames operations relating to environmental protection and compliance are conducted without formalized or adequate procedures. This concern is most significant in the areas of waste management, TCM management, inactive waste site characterization, environmental monitoring, and NEPA compliance. Additionally, documentation related to environmental protection and compliance was found to be chronically deficient at Ames. The lack of formality of Ames' environmental activities is partially the result of limited environmental expertise. Ames has insufficient staff to establish, implement, and oversee effective environmental programs. Available personnel do not have the necessary environmental expertise, and have not received sufficient training.

3.5 ENVIRONMENTAL FINDINGS

The Environmental Subteam findings are presented in Sections 3.5.1 through 3.5.9. The findings are grouped by discipline and are preceded by an overview. The overview describes the following: the approach taken by the technical specialist in conducting that portion of the assessment, a description of the Ames programs and activities related to that discipline, and overall characterization of strengths and weaknesses of the Ames program, and a brief summary of the findings.

Within each finding, references to other findings, interviews, and documents are presented parenthetically. An example of a referenced finding is (Finding A/CF-1) where "A" represents the air discipline, "CF" represents compliance finding, and "1" is the finding number. An example of a referenced interview is (I-SW-2), where "I" signifies interview, "SW" represents the surface water discipline, and "2" represents the interview number. An example of a referenced document is (WM-3), where "WM" represents the waste management discipline and "3" represents the document number. Appendices D-1 and E-1 list the contacts/interviews and site documents, respectively, the Environmental Subteam used to develop its findings. In addition, causal factors are discussed in each finding, as summarized in Table 3-2. The definitions of the causal factors are presented in Appendix G.

3.5.1 Air

3.5.1.1 Overview

The air assessment at the Ames Laboratory (Ames) consisted of an evaluation of current status and procedures with regard to regulations promulgated by the U.S. Environmental Protection Agency (EPA), the Iowa Department of Natural Resources (IDNR), DOE Orders, operating contractor procedures, and best management practices. The regulations, requirements, and guidelines used in this assessment are presented in Table 3-3.

The general approach to the Ames air assessment included review and observation of air emission sources, emission control equipment (gas cleaning devices), and procedures relating to air quality and meteorological information. The Environment, Safety and Health (ES&H) personnel, research staff, and employees operating and building/repairing equipment were interviewed, and relevant documents were reviewed. Air concerns at Ames are primarily the responsibility of ES&H, although each of the 12 individual scientific programs and the Facilities Service organization conduct operations that have the potential to emit air pollutants.

The Ames site is located in Story County, Iowa. Two Iowa air quality monitoring stations are located in the City of Ames. The entire state is in attainment for all criteria pollutants regulated under the Clean Air Act. Discussions with the IDNR indicate that enforcement and permitting activities of the air program focus on industrial sources that vent directly to the atmosphere. While the state began to include air toxics in its permit reviews a few years ago, it no longer does, since state law prohibits the Iowa air program from being more stringent than Federal requirements. Ames currently has no state or Federal air permits, and no Iowa air inspectors have visited the facility.

Emissions sources at Ames include both radiological and nonradiological sources. The radioactive effluents are discussed further in the radiation section of this assessment.

Emissions are produced by analytical, research, and metals processing laboratories at Ames. These labs use vacuum pumps, lasers, furnace and electron beam melting equipment, gloveboxes, and chemical reactors. While some air streams from these operations are cleaned, these and others vent a range of chemicals and particles to room hoods and ventilation systems, which subsequently emit these pollutants from stacks on the building roofs. Other emission sources include three emergency diesel generators, operated once a month, and several maintenance and machine shops.

Nonradioactive air emissions include volatile organic compounds (VOC) from the use of solvent cleaning and research operations. Nitrogen oxides (NO_x), particulate (PM_{10}), and carbon monoxide (CO) are emitted from the emergency generators. PM_{10} emissions are produced by metal machining and welding, wood-working activities, sandblasting, and polishing as well as research projects involving chemical or metal heating. Hazardous air pollutants (HAP's) at Ames are covered by the newly amended Clean Air Act (CAA). The HAP list includes methanol, perchloroethylene, chromium compounds,

TABLE 3-3
LIST OF AIR
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.2A	Environmental Compliance Issue Coordination	DOE
DOE 5482.1B	Environmental Health and Safety Appraisal Program	DOE
DOE 5484.1	Environmental Protection, Safety and Health Protection Information and Reporting Requirements	DOE
DOE 5500.3A	Planning and Preparedness for Operational Emergencies	DOE
DOE 5500.5	Radiation Protection of the Public and the Environment	DOE
DOE 6430.1A	General Design Criteria	DOE
40 CFR 50-88	Clean Air Act Implementing Regulations, including National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities	EPA
Iowa Code Chapter 455B.131-150	Iowa Air Act	State of Iowa
Iowa Administrative Code Title 567.20-29	Iowa Air Pollution Control Regulations	Iowa Department of Natural Resources

cobaltcompounds, mercury, nickel compounds, acrylamide, carbon tetrachloride, ethylene glycol, chloroform, dimethylformamide, benzene, acetonitrile, methylene chloride, napthalene, nitrobenzene, styrene, hexanes, 1,4 dioxane, perchloroethylene, xylene, and hydrochloric acid. The Ames hazardous material and chemical inventories include information on many of the CAA hazardous air pollutants.

Management of asbestos on the ISU campus, which includes the buildings occupied by Ames, is the responsibility of the ES&H Division of ISU. However, for abatement of asbestos at Ames, the work is managed by Ames staff who have certification with the State of Iowa for overseeing such activities. Ames staff also has taken the responsibility of hiring certified contractors to perform asbestos removal.

Air control equipment includes a dust collector with fabric bags for graphite machining, collectors for two sandblasting machines, and a scrubber to capture metal powders not collected in Ames Materials Preparation Center (MPC) gas atomizer process. There are HEPA filters at some locations to control radionuclide emissions.

There are several air emission controls at Ames which appear to be functioning properly. There are some procedures for operation and routine maintenance, most notably for the laboratory hood vent systems, which are the responsibility of the Facilities Services Group. Table 3-4 presents the air emission sources at Ames Laboratory and their associated abatement devices.

Ames does not conduct air monitoring activities. Meteorological data from the Des Moines airport is currently used for verifying Ames compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart H: National Emission Standards for Emissions of Radionuclides Other than Radon from DOE Facilities (40 CFR 61.90).

Because the total air emissions are relatively low, the air programs currently in place at Ames are generally adequate to comply with current Federal, state, and local regulations. However, Ames has few procedures or systems in place to ensure that they are in compliance and does not have a formal monitoring program which would provide a basis for compliance with DOE 5400.1.

The air portion of the environmental assessment identified six compliance findings and one best management practice finding. The compliance findings relate to the ambient air surveillance program; meteorological monitoring program; air emission controls; airborne effluent control HEPA systems; air permit status; and demonstration of compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). The best management practice finding relates to the absence of an air emissions inventory.

TABLE 3-4
AIR EMISSION SOURCES AT AMES LABORATORY

Description	Building	Abatement Device
Emergency Generators (3)	Wilhelm Hall	None
Gloveboxes (2)	Radioactive Waste Disposal Building	HEPA
Portable sandblasters	Miscellaneous	Self contained bag filters
Paint Spray Booth	Paint and Air Conditioning	Automated dry filter
Woodworking	Maintenance Shop	Simple Cyclone
Melters, arc furnaces	Miscellaneous	None
Electron Beam melters (3)	Materials Preparation Center	Dry filters
High Pressure Gas Atomizer	Materials Preparation Center	Custom wet scrubber
Lasers, including xenon chloride	Miscellaneous	Filters
Graphite Shop	Machine Shop	Baghouse
Enclosed sandblast box	Engineering Shop	Dust collector

3.5.1.2 Compliance Findings

FINDING A/CF-1: Ambient Air Surveillance Program

Performance Objective

DOE 5400.1,"General Environmental Protection Program," Chapter IV, Section 5.b(1), requires that "environmental surveillance shall be conducted to monitor the effects, if any, of DOE activities on onsite and offsite environmental and natural resources. An environmental surveillance screening program shall be undertaken . . . to determine the need for a permanent program." It also requires that a surveillance program use "measurement, monitoring and calculation to determine the effects of the operations on the environment and public health."

DOE 5400.1, Section 8.b, states that Air Surveillance "monitoring programs should be designed to . . . determine representative pollutant concentrations [impacts] at areas where public health and other concerns should be considered . . . where possible, background data should be gathered from existing State and Local Air Monitoring Stations (SLAMS)."

DOE 5500.3A, "Planning and Preparedness for Operational Emergencies," Section 2.b, states that "For each potential Operational Emergency considered, the [hazard] assessment . . . must address environmental transport and diffusion, and exposure considerations."

Finding

Ames has not developed an air quality surveillance program, undertaken a screening program to determine the need for a permanent program, or evaluated whether the transport and diffusion of its emissions have the potential for causing significant pollutant concentrations or hazards, as required by DOE 5400.1 and 5500.3A.

Discussion

Ames has not adopted or implemented a site-specific air surveillance program to measure or calculate the effects of its emissions (I-A-20 and I-A-21). While the cumulative emissions for Ames are relatively low (A-62), no analysis of the potential air quality impacts from these releases has been performed, either to determine representative pollutant concentrations for air releases or to define the highest concentrations ("hazards") and consequences of non-routine releases (I-A-7).

Ames draft Environmental Monitoring Plan begins to address the requirements for an air surveillance program, but is missing much of the detail needed to develop and implement a screening program to assess its need for a permanent air surveillance program (A-26). Also, it does not address the availability of local SLAMS air quality data.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory December 2-13, 1991, and fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation of the requirements of DOE 5400.1 and 5500.3A; and inadequate training of responsible Ames staff in the requirements of the DOE Orders.

FINDING A/CF-2: Meteorological Monitoring Program

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 6, states that "Representative meteorological data are required at DOE facilities to support environmental monitoring activities . . . a meteorological information/monitoring program shall be developed as a specific element of all environmental monitoring plans."

Guidance Document DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," Chapter IV, states that "Each DOE site (facility) *should** establish a meteorological monitoring program that is appropriate to the activities at the site . . . Some sites may choose to establish a meteorological program that makes use of meteorological measurements obtained from offsite sources . . . to be acceptable the data *should** be representative of conditions at the DOE facility and provide statistically valid, hourly data consistent with on-site monitoring requirements."

Finding

Ames does not have a meteorological information/monitoring program as required by DOE 5400.1 and DOE/EH-0173T.

Discussion

DOE requires its facilities to have programs that make meteorological information available to characterize atmospheric transport and diffusion conditions, determine the impact of the site's routine and non-routine air releases, and support environmental surveillance activities. Each program must identify types of meteorological information needed for site environmental protection activities, including its ability to assess emergency consequences throughout the course of any incident.

If data from offsite monitoring stations are to be used in a meteorological program it must be representative of conditions at the facility and provide statistically valid, hourly data consistent with onsite monitoring. Guidance document DOE/EH-0173T defines criteria that should be used for facilities where onsite meteorological measurements are not required for calculating effective dose equivalent. The guidance document requires that the program include a description of local climatology and provide ready access to representative data.

Ames has not operated any meteorological monitoring equipment since 1978 and has not developed a meteorological monitoring program to provide current meteorological information. The draft Ames Environmental Monitoring Plan proposes to use historical Ames data and current data from the Des Moines airport, but it does not propose to perform an analysis of data quality or representativeness (A-26).

Ames has used Des Moines meteorological data in AIRDOS modeling to calculate effective dose equivalents for its demonstration of compliance with 40 CFR 61, Subpart H, "National Emission Standards for Radionuclide Emissions at DOE Facilities" (see Finding R/CF-3). However, Ames has no reasonably current

assessment of the quality and representativeness of this data or whether monitoring data from ISU or other Ames sites would meet current requirements and environmental needs more appropriately. However, it should be noted that for air quality permitting needs, the Iowa Department of Natural Resources (IDNR) accepted the Des Moines data as adequate and representative for the air quality impact analysis of the new boilers at the ISU power plant (I-A-5).

No formal arrangement has been made by Ames to obtain real-time data to monitor plumes from accidental releases or fires involving hazardous materials (I-A-21).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of policy implementation for not meeting the requirements of DOE 5400.1 and DOE guidance.

FINDING A/CF-3: Air Emission Control

Performance Objective

Iowa Administrative Code (IAC) 567-20.1, "Scope of Title," states that "The department has jurisdiction over the atmosphere of the state to prevent, abate and control air pollution by establishing standards for air quality and by regulating potential sources of air pollution through a system of general rules or specific permits."

IAC 567.23, "Emission Standards," regulates open burning, emission opacity from diesel exhausts, fugitive dust, metallurgical melting furnaces, and painting operations.

IAC 567-24.2 requires equipment operators to "maintain and operate the equipment or control equipment . . . in a manner consistent with good practice for minimizing emissions."

DOE 5480.19, "Conduct of Operations," Chapter II, requires that there be effective equipment monitoring to detect abnormal conditions. Chapter VIII requires that DOE equipment and systems be properly maintained and controlled. It also requires formal operating procedures and records systems to control site activities for consistent results in meeting objectives.

DOE 6430.1A, "General Design Criteria," Part 1589, "Air Pollution Control," provides criteria for control, treatment, and disposal of airborne and gaseous wastes from new facilities and modifications after April 1989.

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards." Section 5.f requires that Heads of Field Organizations "ensure that all operations under their authority comply with applicable environmental protection laws and regulations."

Finding

Emission sources at Ames are not reviewed for compliance with Iowa air quality emission standards or DOE requirements. Air emission sources and any associated control equipment are not always routinely maintained to ensure proper operation, as required by Iowa regulations and DOE Orders.

Discussion

The general rules of the Idaho Department of Natural Resources (IDNR) air program include various limitations and broad powers that can be used to reduce or limit emissions from Ames (I-A-28). The individual air emission sources would not necessarily require permits since many are existing sources and are grandfathered under the permitting regulations (see Finding A/CF-5).

Emissions and emission control measures for each potential air pollution source must be evaluated to confirm Ames' compliance with general IDNR air regulations. Types of sources regulated include diesel generators, heaters and melters, other research equipment, and painting booths. Small quantities of emissions may be released from machining and maintenance operations,

materials handling activities, and storage and use of volatile materials. Atmospheric impact of these emissions could potentially be large enough to be regulated. Additionally, once control equipment is in place to limit emissions, it must operate as planned, in accordance with IDNR maintenance and repair requirements.

Specific emission limits apply to several sources at Ames. Ames emergency diesel generators are operated once a month (I-A-18) and are subject to IAC 567.23.3.d. which limits visible air contaminants in the exhaust plume to 40 percent opacity. Particulate emissions from electric melt furnaces, such as those found in the Materials Preparation Center (MPC), are limited to 0.1 grain per standard cubic foot of exhaust gas under IAC 567.23.4(5). Section 23.4(13), "Painting and surface coating operations," limits particulate matter (paint droplets) to "0.01 grain per standard cubic foot of exhaust gas." Tests have not been performed at Ames to confirm compliance with these requirements (I-A-4, I-A-9, and I-A-10). Ames does not have adequate information on (1) potential air emissions; (2) how emissions vent to the atmosphere; and (3) construction dates to determine whether they fully comply with applicable regulations and DOE design criteria.

Ames lacks a number of procedures for operating air pollution control and treatment systems. Also, Ames has not included most of its emission equipment or emission control equipment in routine facility maintenance (A-42 and A-47; I-A-16 and I-A-18).

Air emission control equipment at Ames includes a bag dust collector for graphite machining, collectors for two sandblasting machines, and a scrubber to capture metal powders not collected in MPC's gas atomizer process. Available operating and maintenance procedures do not include environmental performance parameters, for example:

- Service and maintenance for the emergency generator does not include a periodic engine tune-up that would minimize emissions (A-34 and A-36).
- There are no operating procedures for the spray booth that address operation/maintenance of the dry filter (A-42).
- There is no formal procedure specifying the frequency of service for the graphite dust collector or servicing requirements.
- Quality assurance checks are not performed to confirm that inspections or servicing has been performed adequately.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory December 2-13, 1991, or the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are inadequate training to implement IDNR regulations; incomplete procedures to effectively operate air pollution control equipment; and lack of understanding of the risk of noncompliance.

FINDING A/CF-4: Airborne Effluent Control HEPA Systems

Performance Objective

DOE 5400.5, "Radiation Protection of the Public and the Environment," Chapter II, Section 2, requires the development and implementation of an as low as reasonably achievable (ALARA) program to provide for radiation protection to control and manage exposures and releases of radioactive material to the environment with an objective of attaining dose levels from radionuclide releases as far below applicable limits as practicable.

DOE 5400.5, Chapter III, contains the Derived Concentration Guides for radionuclide air emissions to the environment.

DOE 6430.1A, "General Design Criteria," provides standards and requirements for control devices for radionuclide emissions and air pollution control.

Finding

In many cases, exhausts from radiological processes (i.e., hoods) are not equipped with high efficiency particulate air (HEPA) filters, and Ames does not provide valid integrity testing of in-place HEPA filters, as required by DOE 6430.1A.

Discussion

Ames maintains several facilities and processes where radioactive work is performed and from which air is exhausted to the environment. Several of these facilities or processes exhaust directly to the environment without filtration (i.e., hoods and processes in the Metals Development Building and a hood in the Chemistry Building). No effluent monitoring is conducted for these air emission sources to verify compliance with the Derived Concentration Guides of DOE 5400.5. This is not in conformance with ALARA principles.

There are no integrity testing requirements for in-place HEPA filters to ensure their continued required efficiency. HEPA filters are integrity tested at Rocky Flats prior to being sent to Ames. However, there are no valid in-place integrity tests performed at Ames. There are no integrity tests performed after HEPA filter installation to ensure that the filter is functioning with the required efficiency, as installed, and there are no required periodic integrity tests. The HEPA filter in the radioactive waste compactor has not been integrity tested since 1976 (I-R-1). Occasionally, integrity tests are performed with a portable air monitoring instrument (PORTACOUNT) (I-R-2). However, these integrity tests cannot be deemed quantitative and valid as the sampling technique does not provide representative samples of the exhaust (isokinetic sampling).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors contributing to this finding are a lack of policy implementation toward effluent control requirements to maintain discharges ALARA; and inadequate appraisals/audits/reviews of these requirements.

FINDING A/CF-5: Air Permit Status

Performance Objective

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards. In addition, DOE is committed to good environmental management of all of its programs." Section 5.f requires that Heads of Field Organizations "ensure that all operations under their authority comply with applicable environmental protection laws and regulations."

DOE 5400.2A, "Environmental Compliance Issue Coordination," defines Significant Environmental Compliance Issues to include "results of verification activities . . . that reveal non-compliance issues" and requires that Heads of Field Elements shall "provide EH-23 information on all environmental permits."

DOE 5482.1B, "Environmental Health and Safety Appraisal Program," Section 7.a, states that "It is Departmental policy to . . . assure compliance with applicable statutory requirements." Section 10, "Factors for Environmental Health and Safety Appraisals," includes "determination of the effectiveness of local organizations in implementing Federal, state and local requirements."

IAC 567-20.1, "Scope of Title," states that "The department has jurisdiction over the atmosphere of the state to prevent, abate and control air pollution by . . . regulating potential sources of air pollution through a system of general rules or specific permits."

IAC 567.22-1 states that "no person shall construct, install, reconstruct or alter any equipment or control equipment at an existing stationary source" without a construction permit. Equipment is defined as "equipment capable of emitting air contaminants to produce air pollution . . . including . . . manufacturing, chemical and metallurgical apparatus and process devices which may emit air contaminants." Permit exemptions of Section 22.1(2) include "fugitive dust controls . . . equipment or control equipment which eliminates all emission to the atmosphere."

Finding

Ames has not made an adequate assessment of its regulatory applicability and status with respect to Iowa air permits, as required by DOE Orders.

Discussion

The Ames Annual Environmental Report states that Ames is not required to have state air permits (A-25). Ames' conclusion that state air permits were not applicable was based on incorrect assumptions and incomplete information.

Information needed to determine air permitting applicability would involve obtaining and reviewing: (1) types of air polluting equipment and operations at Ames; (2) air emissions from this equipment and Ames as a whole (see Finding A/BMPF-1); and (3) the air quality impacts from these emissions (see Finding A/CF-1). Similar assessments will be necessary to determine whether

future projects and air emission changes require permits. Specific deficiencies in Ames' permit assessment include:

- Lack of a comprehensive list or description of air emission sources across the facility, including those in research operations and support services (I-A-15 and I-A-4).

- Ames' staff usually does not consider gases and particles released from research and maintenance equipment to be environmental air emissions possibly subject to air regulations (I-A-7, 12, 13, 15, and 22).

- Ames has not determined whether the state regulatory definition of "equipment" applies to their emission sources.

Ames does not have a procedure to perform future assessments of whether permits are needed and to ensure that new projects or modifications obtain required state air permits.

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation of DOE Orders; a lack of procedures at Ames to ensure that new sources are evaluated to determine if air permits are necessary; a lack of training for Ames personnel to implement local laws and regulations; inadequate appraisals/audits/reviews of existing projects and equipment at Ames to ensure all the necessary air permits have been obtained; and an inadequate evaluation of the risk associated with potential regulatory noncompliance.

FINDING A/CF-6: National Emission Standards for Hazardous Air Pollutants (NESHAP) Compliance

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 7.a, states that "Airborne radiation and radioactive materials discharged from DOE facilities shall comply with the requirements of 40 CFR 61."

Subpart H of 40 CFR 61, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities," contains the effective dose equivalent limits for emissions of radionuclides to the ambient air from DOE facilities and lists the emission monitoring and compliance and reporting requirements.

Section 61.92 contains the effective dose equivalent standard of 10 mrem/yr. Section 61.93 contains the requirements and methodology to be used for emissions monitoring. Section 61.93(b)(2)(iii) requires EPA approval for methods based on principles of measurement different from those allowed. Section 61.93(b)(4)(i) contains a requirement to meet the emissions monitoring requirements based on the possibility of exceeding a percentage of the Section 61.92 dose equivalent limit. Section 61.93(b)(4)(ii) contains the requirement for determination of whether a release point is subject to emission measurement based on an evaluation of the potential of a radionuclide release rate based on the discharge that would result if all pollution control equipment did not exist. Section 61.93(b)(5)(v) includes the requirement to conduct a quality assurance program that meets the performance requirements referenced in Appendix B, Method 114. Section 61.94 lists the reporting requirements, including that information which shall be included in the report.

Finding

Ames has not demonstrated compliance with the requirements of DOE 5400.1 and 40 CFR 61 Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities."

Discussion

Ames has submitted an Air Emissions Annual Report (R-3) and an Updated Air Emissions Annual Report (R-41). However, the information in the reports contain errors and omissions and the reports were not prepared using data required by 40 CFR 61 Subpart H. Some examples include, but are not limited to, the following:

- There are errors in the adjusted source terms listed in the reports. The adjusted source terms are a factor of seven lower than those which would be obtained by multiplying the source terms by the adjustment factors.
- The meteorological data used in determining the effective dose equivalents is data from Des Moines. No determination has been made as to whether the Des Moines meteorological data is or is not representative of the meteorological conditions in Ames (R-25).

- The reports do not list all the information required by Section 61.94. Examples of omissions include a complete list of all radioactive materials used at the site, a complete list of all stacks or vents where radioactive materials are released to the environment, and a description of the handling and processing that the radioactive materials undergo at the facility.

- All potential source terms are not included in the emission source term determination. The Material Preparation Laboratory in Room 199 of the Metals Development Building is an example of such an omission. This laboratory handles depleted uranium in a HEPA filtered glove box, in two benchtop processes which are exhausted without HEPA filtration, and in a hood which is not HEPA filtered. These processes are not included in the source term.

- The source term in the reports includes depleted uranium, U-235 and U-238, but does not include U-234. U-234 is a major dose contributor which would be present with the other uranium isotopes listed above.

- Ames does not monitor for air emissions as required by 40 CFR 61.93. Ames bases their source term estimation on losses due to weighing pan balance errors and adjustment factors. Ames has not applied to the EPA for approval of this alternate method used to estimate radionuclide releases.

- Ames has not documented evaluations for releases of radioactive materials, from all potential release points, without pollution control devices in place as required by Section 61.93(b)(4)(ii).

- Ames has not developed and implemented a quality assurance program that meets the performance requirements references in Appendix B, Method 114 as required by Section 61.93(b)(5)(v).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of training of the personnel responsible for preparation of the NESHAP report; a lack of policy implementation by CH concerning radiological effluents that cause public dose; and inadequate appraisals/audits/reviews of these requirements which were not previously identified.

3.5.1.3 Best Management Practice Finding

FINDING A/BMPF-1: Air Emission Inventory

Performance Objective

It is a best management practice to have an air emission inventory to assist in supporting compliance determinations, in understanding routine and emergency facility impacts, and in preparing for future regulatory change and compliance programs.

Finding

There is no Ames air emission inventory to document and quantify airborne releases for environmental planning purposes.

Discussion

An air emissions inventory is necessary to determine a facility's air quality impact and to determine regulatory requirements. Many air quality regulatory thresholds are defined in hourly and annual air emission quantities. Hourly emission information is also needed as input to air quality dispersion models to assess the air quality impacts, health impacts, and emergency hazards of air pollution sources. (see Finding A/CF-5).

Ames has not inventoried or tracked its air emissions (I-A-4 and I-A-7). Potentially, air pollutants may be emitted from volatile organic compound (VOC) storage and handling, general research projects that vent to the laboratory hoods, research equipment such as lasers and materials processing equipment, associated support equipment such as vacuum pumps, and various maintenance, and repair and machining operations (I-A-10 and I-A-16). Ames has a hazardous material chemical inventory and waste information from its various environmental and safety programs (A-62 and A-51; I-A-4 and I-A-10). However, this information has not been compiled or used in an integrated way to quantify emissions or project the highest potential short term air releases. Various organizations at Ames are developing some new procedures to gather necessary inventory information (A-7, A-41, and A-49) and if combined with research chemical mass balance calculations, Ames would have a basis for the development of a complete, integrated air emission inventory.

Available chemical information (A-61) indicates that Ames non-hazardous emissions are probably low enough to be below current federal regulatory thresholds, and thus, Federal air requirements would not apply to the facility. However, Ames has not calculated its emissions inventory needed to confirm this.

Regarding hazardous emissions, the recent Clean Air Act Amendments define a major hazardous air pollutant (HAP) source as one that emits 10 tons of emissions per year of any HAP or emits a combined total of 25 tons. Ames uses many HAP's (A-51 and A-61), and without an inventory, cannot determine whether it is a HAP major source.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory December 2-13, 1991, but was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are inadequate policy implementation and interpretation requiring emissions monitoring/tracking; a lack of training with regard to air quality programs; and a lack of adequate appraisals/audits/reviews by Ames for its air emission sources and emission inventory.

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3.5.2 Surface Water/Drinking Water

3.5.2.1 Overview

The surface water/drinking water portion of the Tiger Team Assessment 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. In addition, the assessment evaluated compliance with DOE Orders, Secretary of Energy Notices (SENs), and water pollution control practices in accordance with state requirements and industry-accepted best management practices. Table 3-5 lists applicable regulations and/or requirements used to assess surface water compliance.

The scope of the surface water/drinking water assessment included document reviews, interviews with Ames personnel, and inspection of laboratories, facilities, and material storage areas. Interviews were also conducted with staff of the City of Ames Water Pollution Control Plant (WPCP) and ISU staff, as appropriate. As part of the surface water/drinking water portion of the assessment, interviews were coordinated with other Tiger Team specialists to ensure that all potential issues were addressed.

Ames is located on the campus of ISU, and discharges approximately 90,000 gallons per day of sanitary and industrial wastewater to the ISU sanitary sewer system. ISU, in turn, discharges approximately 1.5 million gallons of wastewater per day to the City of Ames. The WPCP has a pretreatment agreement with ISU that requires quarterly sampling for flow, biochemical oxygen demand, total suspended solids, and ammonia nitrogen. A pH range of 6.0 to 10.0 is permitted.

Programs and procedures to manage chemical discharges to the sanitary sewer system have been written by various groups and research programs within Ames. A newly drafted (February 1992) Environmental Monitoring Plan establishes mechanisms to assess chemical discharges from Ames through periodic sampling of wastewater effluent. Details, such as the sampling protocol and potential sampling locations, have not been determined.

Ames purchases its drinking water from the City of Ames' municipal supply, and operates and maintains the distribution system within the DOE-owned buildings (Spedding and Wilhelm Halls, and the Metals Development Building).

Stormwater runoff from all Ames buildings situated on the main campus is routed through storm sewers and ditches. The stormwater ultimately reaches Squaw Creek, which discharges into the South Skunk River. Stormwater runoff at the Applied Science Center, where Ames occupies one building, can potentially discharge onto the Squaw Creek floodplain, and at times may reach Squaw Creek.

Ames has one underground fuel oil storage tank with a capacity of 3,000 gallons, far less than the 42,000-gallon requirement for preparation of a Spill Prevention Control and Countermeasures (SPCC) Plan. Overall, the Ames surface water/drinking water programs require improvements to meet the requirements of DOE Orders and Federal, state, and local regulations. Currently, Ames lacks comprehensive administrative controls on the

TABLE 3-5
LIST OF SURFACE WATER
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 5000.3A	Occurrence Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities	DOE
DOE 6430.1A	General Design Criteria	DOE
40 CFR 112	Spill Prevention Control and Countermeasures	EPA
40 CFR 122 & 123	National Pollutant Discharge Elimination System/State Pollutant Discharge Elimination System	EPA
40 CFR 129	Toxic Pollutant Effluent Standards	EPA
40 CFR 141 & 142	National Primary Drinking Water Regulations	EPA
Iowa Administrative Code, Div. 567 Title IV	Iowa Water Pollution Control Regulations	State of Iowa
State of Iowa	State Plumbing Code, As Amended 1976	State of Iowa

releases of hazardous chemicals into the sanitary sewer system as well as an effluent monitoring program to monitor action facility releases.

With respect to drinking water supplies, Ames does not have all the elements necessary for a formal program to install and maintain backflow prevention devices, nor has a lead monitoring program been implemented. However, guards check the presence of backflow prevention devices during daily rounds and report the status of these devices to Ames ES&H. Ames surface water/drinking water programs are currently in a state of rapid change and assessment. Recent issuance of a draft Environmental Monitoring Plan and the Chemical Hygiene Plan are indicative of an increasing awareness of deficiencies in programs with an accompanying initiation of efforts to correct them.

The surface water/drinking water portion of the environmental assessment identified two compliance findings and two best management practice findings. The compliance findings address the lack of a formal program for environmental effluent monitoring, and the lack of a formal program to ensure compliance with regard to backflow prevention devices. The two best management practice findings address the monitoring for potential uncontrolled releases to the sanitary sewer system and lead in drinking water.

3.5.2.2 Compliance Findings

FINDING SW/CF-1: Wastewater Effluent Monitoring Plan

Performance Objective

DOE 5400.1, "General Environmental Protection Programs," Chapter IV, Section 5, requires that effluent monitoring be conducted at all DOE sites to satisfy specific program objectives. These objectives include elements such as the evaluation of the effectiveness of effluent treatment and control, identification of potential environmental problems and evaluation of the need for remedial actions or mitigation measures, and the detection, characterization, and reporting of unplanned releases.

Finding

Ames does not conduct effluent monitoring of its industrial waste water released to the sanitary sewer system as required by DOE 5400.1.

Discussion

Ames does not conduct any monitoring of effluent discharges from any of the Ames buildings, prior to its entering the ISU sanitary sewer system; therefore they do not meet the objective of effluent monitoring as specified in DOE 5400.1

Sources of wastewater discharges to the sanitary sewer at Ames include laboratory sinks, floor drains, safety showers, shop sink drains, the washing machines at the Radioactive Waste Disposal Building and Spedding Hall, compressor condensate, and single pass cooling water from lasers. In many of these areas, hazardous chemicals do not have secondary containment and spill control training and equipment are lacking (see Finding TCM/CF-1). Thus, there is a heightened risk that hazardous chemicals may be discharged to the ISU sanitary sewer system. Ames does not perform monitoring of wastewater discharges prior to entry to the ISU sanitary sewer system. Instead, Ames has relied on the statements and procedures prepared by various research programs and laboratory groups to ensure compliance with DOE 5400.1.

Ames has identified the need to conduct effluent monitoring in the draft Environmental Monitoring Plan (February 1992) prepared by Ames. Details such as sampling parameters, protocols, and sampling locations have not been determined. ISU and the City of Ames do periodic monitoring of effluents from the ISU campus in support of their pre-treatment agreement. However, this monitoring does not include all potential contaminants but only covers flow, biochemical oxygen demand, total suspended solids, and ammonia nitrogen. A pH range of 6.0 to 10.0 is permitted.

The Environmental Monitoring Plan (draft plan, February 1992) is an attempt to establish mechanisms to assess the chemical discharges from Ames. Details in the plan remain to be established. All of the floor drains and sinks in the DOE buildings on the ISU campus discharge to the ISU sanitary sewer system. Examples of areas of concern include: (1) oil diffusion and mercury diffusion pumps without secondary containment located near floor drains; (2) a variety of acids, bases, and organics such as xylene, toluene, and 1,1,1-trichloroethane located adjacent to or near sinks and floor drains

without secondary containment; and (3) two 55-gallon drums of perchloroethlyene without secondary containment located immediately above a floor drain. Individual research groups/programs have established policies and procedures on the discharge of chemicals to the sanitary sewer, but there is no cohesive sitewide program that comprehensively addresses the issue.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of sitewide policy to ensure the development of this plan.

FINDING SW/CF-2: Backflow Prevention Devices

Performance Objective

DOE 6430.1A, "General Design Criteria," states that the quality of domestic water within distribution systems serving DOE facilities shall be protected from degradation by the installation of backflow prevention devices, and that domestic water supply systems shall be designed to comply with all state, regional, and local requirements. New, modified, or newly acquired systems are required to be in compliance with this order.

The State of Iowa Plumbing Code, Chapter 10, Section 10.4 (135) T.III, states that "every water outlet shall be protected from backflow."

Finding

Ames has not developed a formalized program to ensure the installation, testing, and documentation for operation of backflow prevention devices on all water outlets as required by DOE 6430.1A and the Iowa Plumbing Code.

Discussion

Backflow prevention devices are required on water outlets to prevent siphoning of contaminants into the potable water plumbing. These devices can be as simple as an air gap between the liquid overflow level and the potable water outlet. Other varieties include vacuum breakers and devices operated by a spring-loaded check valve. Impurities in the water supply cause corrosion in moving parts, thus requiring periodic testing of the devices to verify proper operation. Although guards check for the presence of backflow prevention devices during daily rounds, and report the status of these devices to ES&H, Ames has not established a formalized program to ensure that backflow prevention devices are used and maintained throughout the facility. Ames has installed backflow prevention devices on some systems, and has made available vacuum breakers to personnel who may want them installed. However, no sitewide policy on the need for backflow prevention has been established by Ames management, nor have implementing procedures been developed (I-SW-10). Additionally, Ames does not conduct periodic testing on existing backflow prevention devices to ensure proper operation (I-SW-10).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991. While both of these assessments recognized the need for formalized requirements regarding installation of backflow prevention devices, neither recognized the lack of testing of existing devices.

The apparent causal factors for this finding are a lack of policy implementation addressing DOE 6430.1A and State of Iowa Plumbing Code issues; and a lack of procedures to ensure effective implementation.

3.5.2.3 Best Management Practice Findings

FINDING SW/BMPF-1: Potential Releases to the Sanitary Sewer System

Performance Objective

To ensure that Ames is operated and managed in a manner that will protect environmental quality and minimize potential threats to the environment, it is a best management practice to prepare and implement a program addressing chemical material spills.

As a best management practice, comprehensive administrative control should be placed on the discharge of hazardous laboratory chemicals into the sanitary sewer system to ensure that potential impact to the environment is minimized.

Finding

Ames' spill management, administrative controls, and spill prevention program are not conducted in a manner that minimizes chemical releases to the sanitary sewer system.

Discussion

Ames does not have a comprehensive and integrated management program and administrative controls for toxic and chemical material releases. The spill response approaches stated in the Safety Manual, the Chemical Hazard Plan, and the Emergency Plan are not integrated into a comprehensive sitewide program that addresses toxic and chemical material spills. Ames' plans do not reference ISU plans and procedures, nor do they discuss University-wide policies (I-TCM-2 and I-TCM-19).

Ames has not developed and implemented comprehensive administrative controls on the discharge of hazardous laboratory chemicals into the ISU sanitary sewer system as suggested by best management practice.

Ames has not taken a proactive stance to reduce or eliminate the potential for improper disposal of toxic or hazardous materials to the sanitary sewer system. The drains in laboratories throughout Ames are connected directly to the sanitary sewer. Storage of hazardous chemicals and materials, combined with a lack of spill control equipment and procedures, creates the potential for discharges of hazardous chemicals to the sanitary sewer during uncontrolled releases.

Examples of observed deficiencies and potential release sites include the following:

- The Chemical Storeroom in Spedding Hall does not have a spill response kit, is operated without working knowledge of a formal spill response, and bulk chemical storage has inadequate secondary containment (I-TCM-17). Floor drains were noted in the main storage area of the storeroom.

- Used or "dirty" mercury retained for offsite recycling is stored without adequate secondary containment or appropriate spill response kits in the Chemical Storeroom, the Metals Development

Building vault, and in various laboratories. Although various written spill procedures for cleanup of mercury exist, the procedures are not consistent. Additionally, the Chemical Hygiene Plan does not address mercury spill cleanup procedures (I-TCM-17, I-TCM-20, and I-TCM-59).

- Individual programs have spill response procedures that have not been evaluated by ES&H specialists or integrated into Ames procedures (I-TCM-9).

- Responses provided by Ames staff to the Environmental Subteam indicated inconsistencies in understanding spill response requirements (I-TCM-16, 17, 18, and 20).

- A number of both oil diffusion and mercury diffusion pumps were observed near floor drains in both Spedding and Wilhelm Hall. These pumps did not have secondary containment.

- A vacuum diffusion apparatus containing an estimated 40 pounds of mercury was observed in Spedding Hall within 10 feet of a floor drain. The apparatus had a built-in trough which could be used as secondary containment (I-SW-16).

- Large glass containers of alcohol caustic solutions without secondary containment were observed immediately adjacent to sinks in two laboratories, one of which also had a floor drain nearby (I-SW-11). The Environmental Subteam was informed that secondary containment is forthcoming, but has not yet been received.

- Aqua regia (a mixture of nitric and hydrochloric acids) was observed being stored without secondary containment near sinks in two hoods (I-SW-14).

- Four-liter glass bottles of solvents were stored in cabinets under hoods and sinks in a number of laboratories that possessed open floor drains nearby (I-SW-18 and I-SW-20).

- In a recent incident in Wilhelm Hall, a container of acid exploded, followed by an acidic release to the sanitary system (SW-42).

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are that site personnel responsible for laboratory areas have not had an understanding of the potential risk for uncontrolled releases to the sanitary sewer; inconsistent policy implementation; and incomplete training of Ames staff.

FINDING SW/BMPF-2: Lead in Drinking Water

Performance Objective

It is a best management practice to monitor potable water supplies for lead at facilities whose water distribution systems were constructed using lead based products.

Finding

Ames does not have a program to periodically monitor for lead in its potable water supply systems.

Discussion

Until 1987 or 1988, solder containing 50 percent lead was used to join copper pipe and tubing used in drinking water systems. During building construction, distribution piping from water mains was connected to buildings using a technique that involved pouring melted lead into each joint.

The ISU ES&H Department has developed a plan which will begin in July 1992, to routinely sample buildings on the ISU campus for lead. However, because ISU was instructed by EPA not to sample for lead in the drinking water of buildings constructed prior to 1982 (I-SW-32), the DOE-owned buildings will not be included in the sampling plan. This approach does not address the potential for leaching of lead from joints that possess 50/50 lead solder used between 1982 and 1988 (when use of 50/50 solder was stopped), or from pre-1982 construction projects which used lead-based components. The use of 50/50 lead solder in drinking water supply lines was discontinued in 1988 (I-SW-10). Ames sampled for lead in drinking water in 1988 (all values were reported as less than 5 parts per billion), but has no current plans for additional testing (I-SW-10). A written policy on use of either 95/5 or lead-free solder was issued in January 1992.

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of a <u>policy</u> regarding sampling for lead.

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3.5.3 Groundwater/Soils, Sediments, and Biota

3.5.3.1 Overview

The purpose of the groundwater/soils, sediments, and biota portion of the environmental assessment of Ames was to: (1) evaluate both the programmatic and technical status of groundwater protection and monitoring as it relates to regulations, industry guidance, and best management practices as presented in Table 3-6; (2) evaluate the environmental monitoring programs of these media; (3) evaluate the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; and (4) evaluate 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, the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act (CERCLA/SARA), and State of Iowa Regulations.

The assessment included interviews with DOE and Ames employees; inspection of selected Ames facilities and locations; review of documents, procedures, and records associated with groundwater protection, management, and monitoring; and review of soil and groundwater sampling and handling techniques.

It is the responsibility of DOE facilities to ensure that their operations do not adversely affect the quality of groundwater, soils, sediments and biota. Surveillance of local groundwater, soils sediments and biota is necessary to determine if the facility is having an adverse effect on the local environment. The Ames ES&H Group is responsible for performing those surveillance activities.

A total of 15 potential inactive waste sites have been identified at Ames. Isolated sampling and remediation activities have been performed in association with many of these specific source areas. In addition, soil exploration activities were performed when the Ames Lab Research Reactor (ALRR) was closed to determine if elevated levels of residual radioactive contamination were present around the facility.

Five groundwater monitoring wells are associated with Ames. They were installed in association with two of the above mentioned inactive waste sites. Three groundwater monitoring wells were installed at the Chemical Disposal Site (CDS) located at the Applied Science Center (ASC), and two were installed behind Wilhelm Hall at the former site of a leaking underground storage tank. Soil samples were collected during well installation. Information on soil type, and qualitative measurements on contaminant levels were gathered.

Though soil and groundwater sampling activities have been performed, the scope of the monitoring program is not sufficient to characterize the site hydrogeology or the overall

TABLE 3-6
LIST OF GROUNDWATER/SOIL, SEDIMENTS, AND BIOTA REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
Public Law 91-190	The National Environmental Policy Act of 1969	EPA
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE 5400.5	Radiation Protection of the Public and the Environment	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE/EH-0173T	Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance	DOE
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
40 CFR 404	The Clean Water Act (Discharge of dredge and fill into waters of the U.S.)	EPA
43 CFR 11	Natural Resource Damage Assessments	EPA
OSWER Directive 9283.1-2	Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites	EPA
OSWER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document Guidance for Conducting Remedial Investigations	EPA
OSWER Directive 9950.3-01	Investigations and Feasibility Studies Under CERCLA	EPA

TABLE 3-6
LIST OF GROUNDWATER/SOIL, SEDIMENTS, AND BIOTA REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
Iowa Administrative Code (IAC) Chapter 131	Notification of Hazardous Conditions	Iowa Dept. of Natural Resources (IDNR)
IAC Chapter 133	Rules for Determining Cleanup Actions and Responsible Parties	IDNR

potential impact the Ames facility may have had on the local groundwater, soil, sediment and biota.

Ames is in the process of developing a program to manage their inactive waste sites. An adjunct of this process will be the development of a groundwater protection management program. The CDS is scheduled to be the subject of a remedial investigation/feasibility study (RI/FS) assessment during 1992. The RI/FS assessment process can facilitate development of an appropriate work plan, sample plan preparation procedures and sampling and sample handling procedures. In addition, as the CDS assessment progresses, the procedures developed and the information generated can be used in conjunction with existing data available to Ames to develop their overall Groundwater Protection Management Program Plan, and Groundwater Monitoring Plan as required by DOE 5400.1.

In general, the groundwater/soils, sediments and biota programs are in the developmental stages and need significant improvements to meet the requirements of DOE and state and Federal regulations. Ames does not possess staff with the technical expertise needed to develop and implement groundwater protection programs and practices. Soils, sediments, and groundwater have been characterized in a preliminary manner, and biota has not been sampled. A preliminary Groundwater Protection Management Protection Program Plan has been prepared, but requires improvement. The site hydrogeology has not been completely characterized.

The groundwater/soils, sediments, and biota portion of the Ames assessment identified two compliance findings. The findings pertain to groundwater sampling procedures; and groundwater protection management program planning. Concerns regarding radiological surveillance of biota is addressed in Finding RAD/CF-1.

3.5.3.2 Compliance Findings

FINDING GW/CF-1: Soil and Groundwater Sampling Procedures

Performance Objective

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of applicable environmental statutes, regulations and standards."

DOE 5400.1, Chapter IV, Section 9, requires that groundwater that is, or could be, affected by DOE operations "shall be monitored to determine the effects of operations on groundwater quality and quantity and to demonstrate compliance with DOE requirements and applicable Federal, state and local laws and regulations."

DOE 5400.4, "Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Requirements," Sections 7.a and 7.c requires that DOE respond to hazardous substance releases in accordance with CERCLA and the National Contingency Plan (NCP) regardless of whether the site is included on the National Priorities List (NPL), and that in instances where corrective actions are carried out under other authorities, DOE needs to ensure that these corrective actions are not inconsistent with the NCP.

DOE 5400.4, Section 8.e, states that DOE facilities shall "gather information with respect to releases and potentially imminent releases of hazardous substances and maintain a field organization-wide record of all actions taken under this Order, CERCLA, as amended, the NCP, and applicable DOE policies, requirements, and procedures related to such releases."

Contamination assessment guidelines found in CERCLA and the NCP state that groundwater should be adequately characterized to understand flow path, contaminant sources, and other hydrogeologic features.

Finding

Ames has not developed and implemented effective procedures for soil and groundwater sampling and sampling equipment decontamination as required to meet the intent of DOE 5400.4, CERCLA, and the NCP.

Discussion

Ames does not have standard groundwater sampling procedures for sitewide groundwater monitoring activities. Procedures for groundwater sampling at the Chemical Disposal Site (IWS-15) and the underground storage tank behind Wilhelm Hall (IWS-16), and soil sampling for the soil survey at the Chemical Disposal Site (IWS-17) were reviewed as part of this assessment. Examples of deficiencies identified in the sampling procedures include, but are not limited to the following:

- Analytical methods to be performed on the samples are not referenced.

- Sample preservation techniques are not consistently discussed.

- Chain-of-custody procedures are not consistently included.

- Procedures for sample collection are not consistently addressed, and do not include the same level of detail.

- Procedures for groundwater sampling do not include total well depth measurement to evaluate well integrity.

- The time lag between well purging and well sampling listed in the Procedure for Monitoring Underground Storage Tank Test Wells exceeds standard EPA guidance contained in the Technical Enforcement Guidance Document. This document specifies that samples for volatile organic analysis be collected within 24 hours. Groundwater samples are to be collected from a purge well once sufficient volume is present to meet sample requirements to ensure the sample is representative of aquifer conditions.

- Decontamination procedures listed in the Groundwater Sampling Protocol - Chemical Disposal Site do not ensure that the potential for cross-contamination is eliminated.

- Procedures for decontamination of field screening equipment, such as pH meters and conductivity meters, were not described.

The Environmental Subteam observed the groundwater sampling event conducted by Ames on February 15, 1992. During this sampling activity, the sampling team did not follow Ames sampling procedures (see Finding QA/CF-10). Examples of deficiencies in the implementation of Groundwater Sampling Protocol - Chemical Disposal Site include, but are not limited to:

- Protection of worker health and safety was not addressed. The worker safety equipment which was listed in the protocol was not used.

- Chain-of-custody procedures were not followed. Sample bottle security seals, as listed in the protocol, were not used.

- Decontamination procedures described in the sampling plan were not implemented. In addition, the decontamination activities that were performed in the field were not sufficient to ensure that sampling equipment was free from contamination.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of personnel with relevant work experience; a lack of procedures to assist the site in effectively sampling groundwater; and a lack of training of Ames sampling personnel in monitoring procedures.

FINDING GW/CF-2: Groundwater Protection Management Planning

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter III, Section 4.a, "Special Program Requirements" requires that a Groundwater Protection Management Program Plan (GPMPP) be completed by May 1990. The GPMPP is to include the following: documentation of the groundwater regime with respect to quantity and quality; design and implementation of a groundwater monitoring program to support resource management and comply with applicable environmental laws and regulations; a management program for groundwater protection and remediation; a summary and identification of areas that may be contaminated with hazardous substances; strategies for controlling sources of these contaminants; a remedial action program that is part of the site Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program required by DOE 5400.4; and decontamination and decommissioning programs and other remedial programs contained in DOE directives. The GPMPP is to be reviewed annually and updated every 3 years.

DOE 5400.1, Chapter IV, Section 9, defines the requirements for a Groundwater Monitoring Plan (GMP). "The plan shall identify all DOE requirements and regulations applicable to groundwater protection and include monitoring strategy. The elements of the groundwater monitoring program shall be specified (sampling plan, sampling, analysis, and data management), as shall the rationale or purpose for selecting these elements."

DOE 5400.4, "Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Requirements," Sections 7.a, 7.c, and 8.e require that DOE respond to hazardous substance releases in accordance with CERCLA, and the National Contingency Plan (NCP) regardless of whether the site is included on the National Priorities List, and gather information with respect to releases and potentially imminent releases of hazardous substances, and maintain a field organization-wide record of all actions taken.

Finding

Ames has not characterized local hydrogeologic conditions, and developed and implemented a Groundwater Protection Management Program, as required by DOE 5400.1 and 5400.4.

Discussion

In December of 1991, Ames prepared and submitted a document titled "Groundwater Protection Management Plan" (GPMP) to CH for review to satisfy the requirements of 5400.1 (I-IWS-55). The GPMP prepared by Ames contained general information on regional geology that has been gathered from the Iowa Geological Survey and the Ground Water Resources report for Story County. Information included from the installation of groundwater monitoring at the Chemical Disposal Site and Wilhelm Hall emergency generator underground storage tank was limited.

The Ames GPMP does not describe a process to manage groundwater protection, define hydrogeologic conditions or monitor groundwater quality. It is understood that Ames is a relatively small facility with limited current potential to significantly degrade the quality of the local groundwater.

However, Ames has obligations to comply with DOE requirements by developing a hydrogeological profile of the site commensurate with the size and potential threat the site poses to the environment.

Examples of deficiencies identified in site characterization activities and the Ames GPMP include, but are not limited to, the following:

- The identification of areas that may be contaminated with hazardous substances and a summary of the potential threats these areas pose to the environment are not complete and do not meet the requirements of DOE 5400.4. A total of 16 potential inactive waste sites associated with Ames have been identified. Thirteen of those sites were determined to present a potential threat to the environment (IWS-6, IWS-7, and IWS-9). The GPMP only identifies two of those sites, the Chemical Disposal Site (CDS) and the Wilhelm Hall fuel release. These two sites are suspected of presenting the most significant threat to groundwater.

- The description of the two existing monitoring programs presented in the Ames GPMP is not accurate.

  - The Ames GPMP states that the Wilhelm Hall wells are sampled and analyzed quarterly for organics. The samples are not analyzed, but are physically inspected for overt signs of contamination.

  - The Ames GPMP states that quarterly groundwater samples are collected from wells at the CDS using Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring guidance. Procedures reviewed and observed by the Tiger Team during the Assessment were not consistent with the cited RCRA guidance (see Finding GW/CF-1).

- The Ames GPMP was not prepared until 18 months after the compliance date specified in DOE 5400.1.

- The Ames GPMP does not identify and discuss the nine water supply wells located on the ISU campus (I-IWS-47, I-IWS-57).

Ames has not attempted to characterize the existing hydrogeologic conditions needed to develop a conceptual model of the site meet the requirements of DOE 5400.4. Ames has conducted isolated characterization activities at small release sites; however, a number of these were found to be deficient. Examples of deficiencies in their characterization activities include, but are not limited to the following:

- Environmental screening techniques, procedures, results and follow-up removal actions are not properly documented.

- The number, location and depth of the groundwater wells installed at the CDS and fuel release site at Wilhelm Hall, and the "monitoring" program that has been implemented are not sufficient to characterize and determine the presence, level and extent of contamination.

- The assessment (sampling, analysis, and documentation) activities that have occurred were not performed in accordance with EPA protocols.

- A background well was not installed upgradient of either location to collect information on background water quality. Though the purpose of one of the three wells installed at the CDS was to provide background information, it is installed downgradient of the ISU animal burial pit, and therefore cannot provide groundwater samples representing background conditions (I-IWS-25).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation to ensure that the requirements of DOE 5400.1, 5400.4, and CERCLA are met; a lack of training on the requirements of DOE Orders and Federal regulations; and lack of personnel with the necessary education, sufficient knowledge, and work experience related to issues stated above.

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3.5.4 Waste Management

3.5.4.1 Overview

The purpose of the waste management portion of the environmental assessment was to evaluate the current status of hazardous, radioactive, mixed, and solid waste management practices at Ames with respect to compliance with Federal and state regulations, DOE Orders, Ames procedures, and best management practices. The regulations, requirements, and guidelines used in this assessment are presented in Table 3-7.

The scope of this assessment included discussions and interviews with Environment, Safety and Health (ES&H) Group staff in the Operations Division of Ames, the Environmental Health and Safety Department of ISU, as well as interviews with non-ES&H staff involved in waste generation and management; a review of waste management documents, including policies, procedures, plans, logbooks, contracts, and hazardous waste manifests; observations of waste generation and management practices; and inspections of waste management facilities.

The waste management overview is intended to frame the scope of waste management activities at Ames including waste management responsibility, waste generation, waste collection and disposal, and a summary of findings.

Waste Management Responsibilities

Responsibility for hazardous, mixed, radioactive, and special (sharps) waste management at Ames rests with ES&H. Roles and responsibilities for waste management in ES&H have not been formally defined, but an ad hoc division of responsibility has developed between the two professionals within ES&H that perform the day-to-day functions pertaining to waste management. The two people responsible for waste management operations will retire within the next year. There is also one person within ES&H responsible for training of hazardous waste personnel. This person has only recently assumed this position. Training programs within ES&H are not yet fully developed, tracked, or implemented.

The two individuals in ES&H with waste management responsibility divide the work: one person is primarily concerned with hazardous wastes, waste minimization, and waste characterization; the other person manages radioactive waste, and packaging and transport of hazardous and radioactive wastes. It should be noted that these individuals also are responsible for duties other than waste management. It is the opinion of the Tiger Team that there are insufficient personnel resources dedicated to waste management at Ames, as evidenced by the lack of policies, procedures, and effective management.

Waste Generation

The Science and Technology Division at Ames consists of 12 research programs that generate hazardous, mixed, low-level radioactive, and special wastes (such as used syringes). During this Tiger Team Assessment, the predominant hazardous wastes generated in the laboratory were halogenated solvents (EPA Classification F001 and F002), non-halogenated solvents (F003 and F005), ignitable liquids (D001), acids and corrosives (D002), and characteristic

TABLE 3-7
LIST OF WASTE MANAGEMENT
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
CERCLA	Section 7 - Liability	EPA
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Programs	DOE
DOE 5820.2A	Radioactive Waste Management	DOE
40 CFR 260	Hazardous Waste Management System: General	EPA
40 CFR 261	Identification and Listing of Hazardous Waste	EPA
40 CFR 262	Standards Applicable to Generators of Hazardous Waste	EPA
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	EPA
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	EPA
40 CFR 268	Land Disposal Restrictions	EPA
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program	EPA
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)	EPA
54 Federal Register 25056, June 12, 1989	Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program	EPA
Iowa Administrative Code, Division 567, Title XI, Chapter 143	Iowa Used Oil Recycling Regulations	Iowa Environmental Protection Commission

TABLE 3-7
LIST OF WASTE MANAGEMENT
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
Iowa Administrative Code, Division 567, Title IX, Chapter 119	Waste Oil Regulations	Iowa Environmental Protection Commission
Iowa Administrative Code Annotated, Chapter 455B	Iowa Infectious Waste Management Act	Iowa Department of Natural Resources
Iowa Administrative Code, Division 567, Title X, Chapter 135	Iowa Underground Storage Tank Regulations	Iowa Department of Natural Resources

liquids and solids (D004 to D011). Most of the programs generate used oils from vacuum pump maintenance. The research programs have also generated some acute hazardous waste (arsenic compounds). The other source of hazardous waste at Ames is the Operations Division. The maintenance garage and paint shop generate quantities of spent solvents and degreasers, waste paint, and other miscellaneous hazardous wastes (e.g., concentrated vehicle cleaners, unusable adhesives).

The Metallurgy and Ceramics Program and the Safeguards and Securities Program both generate small amounts of low-level radioactive and mixed wastes (about 1 kilogram per month); mostly organic solvents and some lubricants. Ames has an existing inventory of mixed waste consisting of spent solvents and approximately one and one half 55-gallon drums of radioactively contaminated lead piping.

Additional low-level radioactive waste generated at Ames is confined primarily to decontamination and decommissioning projects. Recently, a renovation of the ventilation system in Wilhelm Hall resulted in the generation of radioactively contaminated duct work. The other main source of radioactive waste at Ames is the metals preparation activities associated with the Metallurgy and Ceramics Program. Ames is storing radioactive soil (about 15 55-gallon drums) from a previous remediation project, miscellaneous radioactive scrap materials, and some radioactive asbestos waste.

Ames also generates non-hazardous wastes. Used oil is collected in the maintenance garage and Room 115 in Spedding Hall and subsequently sold to a commercial recycling facility. The Science and Technology Division at Ames generates sharps (used syringes used for non-biological research), and the Occupational Medicine Group in the Operations Division generates small amounts of infectious waste. Non-hazardous rubbish is collected in waste barrels and dumpsters. Ames is operating an office paper recycling program.

Waste Collection And Disposal

Ames was once considered a conditionally exempt small quantity generator of hazardous and mixed wastes, which resulted in reduced regulatory requirements for waste management. More recently, hazardous and mixed waste generation at Ames (including a recent laboratory cleanup conducted prior to the Tiger Team Assessment) has increased to levels that resulted in Ames being classified a "small quantity generator" (between 100 and 1,000 kilograms per month) and, at times, a "generator" (over 1,000 kilograms in a month).

Each research program in the Science and Technology Division has developed a hazardous waste management program that includes training and guidance on the management of individual satellite accumulation areas, where waste is temporarily accumulated at the point of generation. Under the present waste management system, hazardous waste containers are brought (when full or within 30 days of the container start date) to an ES&H temporary waste storage area located in Room B55 in Spedding Hall. From there, ES&H classifies the waste and performs radiological surveys. In the past, wastes would accumulate in Room B55 until a commercial hauler was contracted to remove the wastes. Currently, Ames is implementing a system of regular hazardous waste pickups by ISU.

Mixed wastes are accumulated in Room B55, the vault in the Metals Development Building, and the Radioactive Waste Disposal Building, which is located off-site at the ISU Applied Science Center (ASC). Historically, transfer of mixed waste between the ASC and Room B55 has occurred without regard to proper packaging and manifesting. Currently, there are extremely limited disposal options for mixed waste, necessitating their continued storage.

Hazardous waste from the Operations Division is periodically removed by ES&H and brought to Room B55 in Spedding Hall for temporary storage.

There are no permitted treatment, storage, and disposal (TSD) facilities at Ames. All treatment and disposal of hazardous waste generated by Ames is contracted to ENSR, Aptus and, most recently, ISU. These contractors label, package, and transport the material offsite.

Radioactive waste generated at Ames is surveyed for radioactivity and stored at the Radioactive Waste Disposal Building. Radioactive waste generated at Ames has not been disposed of since the late 1980s. Ames previously had disposed of low-level radioactive waste at Hanford. However, Ames was unable to meet new waste acceptance criteria imposed by Westinghouse Hanford and the State of Washington.

Infectious waste generated at the Occupational Health Center is "red-bagged" and autoclaved by ISU. Non-infectious sharps generated in the research laboratories are collected in modified 1-gallon paint cans and transported to ES&H. Both the autoclaved infectious waste and the non-infectious sharps are crushed and disposed of in the Ames City Landfill.

Non-hazardous waste is collected in dumpsters, which are emptied by ISU and hauled to the City of Ames waste-to-energy facility.

Summary Of Findings

The waste management findings indicate an overall lack of definition for roles and responsibilities within ES&H, a lack of formal policies and procedures to implement effective waste management, and a lack of qualified personnel and resources charged with ensuring that waste management conforms to a complex set of regulatory drivers.

There are 10 waste management compliance findings and 1 best management practice finding. The following issues are addressed in compliance findings: unpermitted hazardous and mixed waste storage, EPA identification numbers, waste characterization, recordkeeping and reporting, personnel training, satellite accumulation areas, temporary hazardous and mixed waste storage areas, hazardous waste packaging and transport, waste minimization, and radioactive waste disposal management system. One best management practice finding was identified during the assessment regarding a lack of adequate oversight of contracted hazardous treatment, storage, and disposal facilities.

3.5.4.2 Compliance Findings

FINDING WM/CF-1: Unpermitted Hazardous and Mixed Waste Storage

Performance Objective

40 CFR 262.34(a) allows generators to accumulate hazardous waste onsite for 90 days or less without a permit.

40 CFR 262.34(b) states that "A generator who accumulates hazardous waste for more than 90 days is an operator of a storage facility and is subject to the requirements of 40 CFR 264 and 265 and the permit requirements of 40 CFR 270 unless he has been granted an extension to the 90-day period."

40 CFR 262.34(c)(1) allows the accumulation of ". . . as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste . . . at or near any point of generation where wastes initially accumulate, which is under the control of the operator of the process generating the waste, without a permit or interim status . . . provided he: (i) Complies with 40 CFR 265.171, 265.172, and 265.173(a)."

40 CFR 262.34(d) contains hazardous waste accumulation requirements for generators of between 100 and 1,000 kilograms of hazardous waste in a month. Hazardous waste may be accumulated for up to 180 days without a permit or without interim status provided the quantity of hazardous waste onsite does not exceed 6,000 kilograms.

40 CFR 268.50 prohibits the storage of restricted hazardous and mixed wastes for any purpose other than to accumulate such quantities necessary to facilitate proper recovery, treatment, or disposal. Generators who must store hazardous or mixed waste for longer than 90 days because of the regulations under 40 CFR 268 become an owner/operator of a storage facility and must obtain a Resource Conservation and Recovery Act (RCRA) permit for storage.

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," states that "It is the policy of DOE to: Manage all Departmental hazardous and radioactive mixed waste according to the requirements of the Resource Conservation and Recovery Act."

Finding

Ames is storing hazardous and mixed wastes beyond statutory accumulation times without a permit or interim status as required by 40 CFR 262.34(a) and 40 CFR 262.34(d). Ames is also storing restricted mixed waste for purposes other than the accumulation of such quantities to facilitate proper recovery, treatment, or disposal as allowed by 40 CFR 268.50.

Discussion

This finding addresses issues related to both unpermitted storage of hazardous and mixed waste as well as storage of restricted mixed waste.

Unpermitted Storage

Prior to 1991, Ames was considered a small quantity generator (I-WM-3); therefore, Ames was governed by the small quantity generator accumulation requirements. In 1991, Ames exceeded the small quantity generator requirements and became a generator subject to the requirements of 40 CFR 262.34(a). During the Tiger Team Assessment, five distinct hazardous waste accumulation areas were identified:

- Radioactive Waste Disposal Building at the Applied Science Center,
- Room B55 (and attached rooms) in Spedding Hall,
- the vault located at the Metals Development Center,
- the maintenance garage, and
- the paint shop.

Each of these locations except the vault contain greater than 55 gallons of hazardous and/or mixed waste; therefore exceeding the threshold of a satellite accumulation area (see Finding WM/CF-6). The vault is considered a mixed waste accumulation area and not a satellite accumulation area because it is not near the point of initial generation (40 CFR 262.34(c)).

Each of these locations have accumulated wastes beyond the 90 or 180-day storage limits for generators and small quantity generators, respectively (I-WM-1, 2, 3, 16, 17, 18, and 27) and therefore are subject to the requirements of 40 CFR 264, 265, and 270. Ames does not have a permit for continued storage of hazardous and mixed waste stored in these five areas. It is likely that the vault, Room B55 Spedding Hall, and the Radioactive Waste Disposal Building will continue to store hazardous and mixed wastes beyond the maximum allowable accumulation periods, since these locations are used to store mixed waste for which treatment and disposal options are limited.

Restricted Mixed Waste

Ames is a generator of small quantities of mixed wastes which are currently restricted from land disposal pursuant to 40 CFR 268. Pursuant to 40 CFR 268.50, restricted wastes are prohibited from storage except for the purpose of accumulating sufficient quantities to facilitate proper recovery, treatment or disposal. Ames currently has in storage small quantities of mixed waste solvents (F-listed) at the Radioactive Waste Disposal Building (I-WM-27) and several gallons of such material in Room B-55 of Spedding Hall (I-WM-3). These wastes are not being stored for the purposes of accumulating sufficient quantities necessary to facilitate proper recovery, treatment or disposal. However, there is a severe nationwide shortage of treatment and disposal capacity for mixed wastes; therefore, continued storage is anticipated. Pursuant to 40 CFR 268.50: "(A generator who is in existence on the effective date of a regulation under this part and who must store hazardous wastes for longer than 90 days due to the regulations under this Part becomes an owner/operator of a storage facility and must obtain a RCRA permit. Such a facility may qualify for interim status upon compliance with the regulations governing interim status under 40 CFR 270.70.)" DOE has also imposed a

conditional moratorium on the shipment of hazardous wastes potentially contaminated with radioactivity, which further complicates the issue of restricted mixed waste treatment and disposal.

To address the issue of generation and storage of mixed waste on a national level, DOE Headquarters, in December 1989, requested EPA to enter into Federal Facility Compliance Agreements with all DOE facilities that faced existing or future land disposal restricted (LDR) compliance uncertainty. At several DOE facilities, DOE and EPA Regional Offices have negotiated site-specific compliance agreements. DOE Headquarters and EPA Headquarters are continuing to address this issue at a national level.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment.

The apparent causal factors for this finding are personnel without the knowledge and experience to effectively manage the waste management program at Ames; a lack of available facilities to treat and dispose of LDR wastes which pose barriers and controls towards complying with LDR regulations; and the change of Ames EPA generator status from a conditionally exempt small quantity generator to a small quantity generator, which invoked the requirements of 40 CFR 268.

FINDING WM/CF-2: EPA Identification Numbers

Performance Objective

40 CFR 260.10 defines:

- a "Generator" as ". . . any person, by site, whose act or process produces hazardous waste . . ."; and,
- "On-site" as ". . . the same or geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing as opposed to going along, the right-of-way."

40 CFR 262.12(a) states that "A generator must not treat, store, dispose of, transport, or offer for transportation, hazardous waste without having received an EPA identification number from the Administrator."

40 CFR 262 Subparts B and C specify requirements for manifesting and packaging and transport of hazardous wastes.

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires that it is the policy of DOE to "Manage all Departmental hazardous and radioactive mixed wastes according to the requirements of Subtitle C of the Resource Conservation and Recovery Act."

Finding

Hazardous and mixed waste generation and storage at Ames operations conducted at the ISU Applied Science Center is occurring without a valid EPA identification number as required by 40 CFR 262.

Discussion

The ISU Applied Science Center (ASC) is located approximately 2 miles west of the main ISU campus. Transportation between the ASC and the ISU main campus must occur over public roads (Ontario Avenue and 13th Street). Although most of Ames' operations occur in facilities at the ISU main campus, the Radioactive Waste Disposal Building and research laboratories associated with the Nuclear Safeguards and Security Program and the Environmental Restoration/Waste Management Program are located at the ASC. In addition, uncharacterized waste was discovered during the Tiger Team Assessment in the High Pressure Testing Facility (I-WM-1) and the Chemical Disposal Site (I-IWS-27), both of which are located at the ASC and operated by Ames.

Ames has obtained an EPA identification number (IA6890008950). This number is used on manifests for hazardous waste shipments originating from Spedding Hall on the ISU main campus. A separate EPA identification number for hazardous waste management at the ASC is required because it is not contiguous to the main campus.

This finding partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is personnel. Ames personnel do not have the necessary understanding of Resource Conservation and Recovery Act (RCRA) regulations to effectively carry out waste management responsibilities.

FINDING WM/CF-3: Waste Characterization

Performance Objective

40 CFR 262.11 states that any person who generates a solid waste must determine whether that waste is a hazardous waste. If the waste is determined to be hazardous, the generator must refer to 40 CFR 264, 265, and 268 for possible exclusions or restrictions on this waste.

40 CFR 261.5 contains specific regulations for generators of less than 100 kilograms of hazardous and mixed waste in a calendar month (conditionally exempt small quantity generator).

40 CFR 262.34 contains specific regulations for generators of between 100 and 1,000 kilograms of hazardous and mixed waste in a calendar month (small quantity generator) and generators of greater than 1,000 kilograms of waste in a calendar month (generator).

Finding

Ames does not have policies or procedures in place to monitor hazardous and mixed waste generator status to ensure compliance with 40 CFR 261.5 or 262.34. There are no waste characterization programs or procedures at Ames to satisfy the requirements of 40 CFR 262.11.

Discussion

Ames does not continually track the amount of waste generated on a monthly basis (I-WM-28). This tracking is required to determine Ames' generator status, which places restrictions on the amount of time that waste may be accumulated, and affects the design, operations, and emergency planning requirements for temporary hazardous and mixed waste storage areas (see Finding WM/CF-7).

Ames generates a variety of mixed, hazardous, and non-hazardous chemical wastes. Hazardous and mixed wastes are collected in containers at satellite accumulation areas in the program laboratories and subsequently transported (by the generator) to Room B55 in Spedding Hall. At Spedding Hall, ES&H accepts the container from the generator, who is required to complete a Safety, Health and Plant Protection (SH&PP) Waste and Surplus Chemicals (WSC) form (WM-45). There are four other temporary hazardous and mixed waste storage areas at Ames (see Finding WM/CF-1); however, none of the wastes residing in these areas is logged on WSC forms or otherwise included in the waste generation records.

The WSC forms are compiled in a loose-leaf binder by ES&H. The WSC forms represent the extent of hazardous and mixed waste recordkeeping at Ames (I-WM-28). The WSC forms are not always completed, resulting in considerable uncertainty over the characteristics of some wastes as well as the monthly generation rates required to determine Resource Conservation and Recovery Act (RCRA) generator status. During the Tiger Team Assessment, the following deficiencies were observed in completion of the WSC forms:

- The form contains a line to indicate if the chemicals are waste or surplus. Sometimes this line was not completed or both surplus

and waste were included on a single form. This practice creates the potential for surplus chemicals to be counted as waste, and vice versa.

- The quantity of chemicals was not always recorded and the number of containers was usually not indicated. Thus, the amount of hazardous and mixed waste cannot be accurately determined from Ames' records.

- The WSC forms were not always used - sometimes yellow-lined paper was provided instead. This practice resulted in required information being omitted such as waste origin, fill dates, and number of containers.

- The research program where the waste was generated was not always indicated on the form, making it difficult to identify the particular waste generator.

- The identity of the waste was not recorded in some instances; in other cases cryptic names, or even complex chemical formulas were used to identify the material. There were other instances where only general descriptions such as "used solvents" were provided. Such descriptions do not permit accurate characterization of the wastes based on process knowledge.

There are no formal procedures at Ames to segregate and characterize known chemicals as either waste or surplus (I-WM-19), which could result in the classification of some chemicals as surplus even though they have no useful purpose. Presently, this segregation is performed using professional judgement. In addition, there is no formal mechanism for redesignating returned surplus material as waste (I-WM-28). Thus, surplus chemicals returned as waste would not be accounted for by Ames for the purpose of determining RCRA generator status.

Ames does not have formalized procedures to characterize unknown wastes (I-WM-19). These wastes are currently sent to in-house laboratories for analysis; however, there are no guidelines for determining laboratory analysis parameters, duplicate sampling, and sample representativeness (I-WM-3). During the Tiger Team Assessment, several containers of uncharacterized waste were observed throughout the site. In addition, potentially hazardous waste generated by the clean coal project in the Coal Preparation Building was being dumped on the ISU coal pile without adequate characterization (I-SW-27).

Due to shortcomings in waste characterization procedures, some non-hazardous or low-level radioactive wastes may be managed as hazardous or mixed wastes. For example, radioactive wastes are currently being managed as mixed wastes because they were placed in used paint drums obtained from the Iowa Department of Transportation. These drums were identified by Westinghouse Hanford as potential mixed waste. They recommended analysis using the toxicity characteristic leaching procedure. Ames has not attempted to characterize this material (I-WM-27). It is also possible that hazardous wastes are being discarded into the non-hazardous waste stream. During the Tiger Team Assessment, only 1 of the 12 laboratory programs inspected collected towels and other solids that were soaked with hazardous waste (usually spent solvents).

Waste generators at Ames also contribute to waste characterization problems. Waste generators are required to segregate wastes into appropriate containers at satellite accumulation areas and log waste information on the container inventory (see Finding WM/CF-6). During the Tiger Team Assessment, non-hazardous waste was sometimes placed in the same container as hazardous waste (I-WM-6) and one waste container was unlabeled (I-WM-6).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are lack of formal procedures to characterize waste and monitor generator status; inadequate quality assurance/quality control to ensure that the WSC forms are completed properly; and inadequate personnel with knowledge and experience to manage the hazardous waste at Ames.

FINDING WM/CF-4: Recordkeeping and Reporting

Performance Objective

40 CFR 262.40 requires that hazardous and mixed waste generators retain signed manifests (by the designated facility that received the waste), biennial and exception reports, and waste characterization records for at least three years. 40 CFR 262.44 relieves generators of less than 1,000 kilograms of hazardous and mixed wastes in a given month from the requirement of submitting biennial reports.

Finding

Ames does not maintain hazardous and mixed waste records as required by 40 CFR 262.40. Ames is not fully aware of Resource Conservation and Recovery Act (RCRA) reporting requirements and can not demonstrate compliance with 40 CFR 262.40 and 40 CFR 262.44.

Discussion

Research laboratories at Ames that generate hazardous and mixed waste are required to deliver waste containers to Room B55 in Spedding Hall (I-WM-1, I-WM-2, and I-WM-3). Generators are required to label all containers with name, room number, and contents. In addition, waste generators must complete a Safety, Health and Plant Protection (SH&PP) Waste and Surplus Chemicals (WSC) form (WM-45) that describes the quantity and identity of chemicals submitted and whether they are surplus chemicals or waste. A review of recently-completed SH&PP WSC forms conducted during this Tiger Team Assessment revealed a number of deficiencies in the completion of these forms (see Finding WM/CF-3). In addition, not all hazardous waste generators at Ames have been required to complete these forms (I-WM-17 and I-WM-19). The WSC forms and copies of manifests from previous off-site waste shipments are the only records of waste generation and characterization maintained at Ames. The WSC forms do not include all hazardous wastes generated at Ames (see Finding WM/CF-3); no traceable records exist for these wastes.

Ames personnel with waste management responsibility are not fully aware of requirements for exception and biennial reporting, and there are no systems in place to ensure that manifests are returned within the appropriate timeframe (I-WM-26 and I-WM-27) from offsite hazardous waste treatment, storage, and disposal facilities contracted by Ames. Since Ames exceeded small quantity generator requirements in 1991, a biennial report is required to be submitted to EPA by March 1, 1992 (40 CFR 262.41). As of February 25, 1992, Ames had not initiated preparation of this report (I-WM-28).

Additional examples of inadequate recordkeeping can be found in Finding WM/CF-7 (inspection logs).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are lack of procedures for tracking waste characterization; and training of responsible individuals in RCRA recordkeeping and reporting requirements.

FINDING WM/CF-5: Personnel Training

Performance Objective

40 CFR 262.34(a)(4) allows a generator (of greater than 1,000 kilograms of hazardous and mixed waste in a calendar month) to accumulate hazardous waste on-site provided that the generator complies with the requirements of 40 CFR 265.16.

40 CFR 265.16 establishes standards for personnel training for workers at interim status treatment, storage, and disposal (TSD) facilities. Personnel at TSD facilities are required to successfully complete a training program ". . . that teaches them to perform their duties in a way that ensures the facility's compliance. . . ." Employees must not work in unsupervised positions until they have completed these training requirements. In addition, facility owners and operators are required to maintain job titles for each position at the facility related to hazardous waste management, the name of the employee filling each job, a written job description for each position, and a written description of training required for each position.

As a best management practice, hazardous waste generators should be trained to properly manage hazardous wastes at the point of generation.

Finding

Ames personnel with waste management responsibility have not received required training, and Ames does not comply with job description requirements contained in 40 CFR 265.16. Waste generators at Ames are not adequately trained to ensure proper management of hazardous waste at the point of generation.

Discussion

This finding focuses on three aspects of waste management training: Resource Conservation and Recovery Act (RCRA) training required for hazardous and mixed waste storage facilities; job descriptions required by RCRA to define roles, responsibilities, and personnel qualifications; and waste generator training necessary to ensure proper management of waste at the initial point of generation. Each of these aspects is discussed below.

<u>RCRA Training</u>

Ames is subject to the RCRA training requirements because it is a small quantity generator that has stored hazardous wastes beyond 180 days (40 CFR 262.34(f)) and/or was classified as a generator of greater than 1,000 kilograms of hazardous waste in a calendar month. The RCRA training regulations require that facility personnel successfully complete a program of classroom training that includes:

- procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment;
- communications or alarm systems;
- responses to fires or explosions; and

- shutdown of operations.

Training is required to be completed within 6 months after the effective date of these regulations and must be updated annually.

During this Tiger Team Assessment, it was determined that five locations at Ames met the criteria of a temporary waste storage area; therefore, they would be subject to the training requirements of 40 CFR 265.16. These locations include Room B55 in Spedding Hall, the Radioactive Waste Disposal Building, the vault in the Metals Development Building, the paint shop, and the maintenance garage (see Finding WM/CF-1).

There are no personnel at Ames that are trained in accordance with RCRA regulations (I-WM-3 and I-WM-18). Several Ames employees are scheduled to attend a RCRA training program in March 1992 (I-WM-18; WM-23).

Job Descriptions

The RCRA regulations for hazardous and mixed waste storage facilities also require that job titles and descriptions be developed. These job descriptions should include education and skill requirements as well as the duties assigned to each position. Ames has not prepared the appropriate documentation to comply with the RCRA requirements for job descriptions (I-WM-18 and I-WM-20).

Waste Generator Training

There is no written policy at Ames requiring waste generators to be trained (I-WM-20). It is believed that the training requirement was imposed as a result of a recommendation made by an earlier environmental audit conducted by DOE (I-WM-20). Each research program at Ames requires that personnel receive hazardous waste generator training. This training typically consists of reading the Hazardous Waste Disposal Practices Manual and signing a form to indicate such. Some programs initially supervise new personnel to ensure proper waste management. Based on observations of waste management deficiencies in the research programs made during the Tiger Team Assessment, not all waste generators who have received training adhere to established procedures (see Finding WM/CF-6).

The other issue at Ames regarding waste generator training is the scope of the program. Currently, only personnel within the research programs at Ames are required to be trained (I-WM-18 and I-WM-20). Other Ames personnel generate hazardous waste (e.g., paint shop, maintenance garage); however, they are not required to receive waste generator training (I-WM-18 and I-WM-20).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is policy. There are no policies at Ames related to training and personnel records required by RCRA and there is no policy that requires training for all personnel at Ames that generate hazardous and mixed wastes.

FINDING WM/CF-6: Satellite Accumulation Areas

Performance Objective

40 CFR 262.34(c)(1) allows the accumulation of ". . . as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste . . . at or near any point of generation where wastes initially accumulate, which is under the control of the operator of the process generating the waste, without a permit or interim status . . . provided he: (i) Complies with 40 CFR 265.171, 265.172, and 265.173(a)."

40 CFR 262.34(c)(1) includes several container and labeling requirements for satellite accumulation areas:

- All containers should be labeled with the contents or the words "Hazardous Waste."
- Containers must be in good condition and compatible with the hazardous waste to be stored.
- Containers must always be closed during storage except when adding or removing waste.

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," states that "It is the policy of DOE to: a. Manage all Departmental hazardous and radioactive mixed wastes according to the requirements of Subtitle C of the Resource Conservation and Recovery Act . . . ."

Each operating research program/group at Ames has developed a manual for the management of hazardous waste. These manuals contain procedures for managing satellite hazardous waste storage containers. The waste management procedures for each laboratory research program/group contain the requirements for satellite accumulation areas as contained in 40 CFR 262.34(c)(1) plus several other requirements specific to Ames, including management of used syringes and other "sharps." These additional requirements include:

- labeling hazardous waste containers with the project leader/principal investigator, room number, date of each addition to the container, chemical identity, and weight or volume of each addition to the container;
- segregating halogenated organics, non-halogenated organics, oils, acids, carcinogens, and inorganic solids; and,
- transporting hazardous waste containers to ES&H 30 days after the first entry on the label.

As a best management practice, satellite accumulation areas should be managed uniformly to promote consistency in operation, inspection, and design. Centralized management of satellite accumulation areas also facilitates training, oversight, comprehensiveness, and implementation of changes in programs or procedures.

Finding

Operation of satellite accumulation areas within Ames is not coordinated and is not in accordance with Ames procedures and 40 CFR 262.34(c)(1).

Discussion

Hazardous, mixed, and special waste (used syringes) is generated in most research laboratories at Ames. Most of these hazardous wastes are spent solvents, organics, acids, and metal ion solutions. Some solid hazardous wastes are generated as well as small amounts of mixed and acutely hazardous wastes (I-WM-3 and I-WM-19; WM-45). Ames' support facilities (maintenance garage and paint shop) also generate hazardous wastes that are accumulated in satellite areas prior to transfer to Room B55 at Spedding Hall.

Each research program/group has an employee manual describing waste generator responsibilities and procedures (WM-30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 43, and 47). Each laboratory program/group has designated a safety coordinator who is responsible for training, supervision of waste generation, inspection of satellite areas, and implementation of any waste management initiatives from ES&H. All researchers performing work in the research laboratories are required to read and sign a statement that the waste disposal practices manual is understood (WM-41). There are no manuals or procedures for satellite accumulation areas in the support facilities at Ames (I-WM-17).

There is no coordination of satellite accumulation areas at Ames, resulting in inconsistent management and operating practices. During the Tiger Team Assessment, several differences between the management of satellite accumulation areas between and within each group were apparent. Consistent management of satellite accumulation areas is important to the success of an overall integrated waste management system because it is at the point of generation where most of the significant (and irreversible) decisions on waste characterization and minimization occur. Inconsistencies among management programs for satellite accumulation areas at Ames include:

- The maintenance, by certain research program/groups of hazardous waste inventories to enable specific estimates of hazardous waste generation as well as provide numeric data to measure waste minimization effectiveness.
- The conduct of periodic (and documented) inspections of satellite accumulation areas by certain research programs/groups.
- The use of different labels for waste containers and different labeling techniques by each program.
- The use of secondary containment by some groups to prevent mixing of incompatible wastes and accidental discharge to the wastewater disposal system.
- The collection of towels and other solid materials soaked with hazardous waste.

Another indication of a lack of coordination between ES&H and the program laboratories with regard to hazardous waste management concerns pre-printed

container labels for hazardous waste. These labels, issued by ES&H, do not provide appropriate space (or columns) to record the information required by the program/group waste management procedures.

In addition to the lack of coordination and inconsistency in the management of satellite accumulation areas, existing procedures and regulations are not always followed. Inspections of satellite accumulation areas conducted during this Tiger Team Assessment identified:

- Unlabeled hazardous waste containers (I-WM-4, 6, 9, and 12).
- Hazardous waste container fill dates not recorded (I-WM-6 and I-WM-17).
- Used pump oil mixed with organic hazardous waste (I-WM-6).
- Illegible and inadequate labeling of hazardous waste containers (I-WM-7 and I-WM-9).
- Disposal container overfilled with used syringes (I-WM-6).
- Unauthorized hazardous waste treatment (I-WM-10).
- Covers not on hazardous waste containers (I-WM-12 and I-WM-13).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment.

The potential causal factors for this finding are policy, procedures, and supervision. There is no policy at Ames pertaining to management (coordination) of satellite accumulation areas. Not all Ames satellite accumulation areas have procedures. Satellite accumulation areas in the research laboratories are not adequately supervised either by line managers as evidenced by the non-compliances noted during the Tiger Team Assessment.

FINDING WM/CF-7: Temporary Hazardous and Mixed Waste Storage Areas

Performance Objective

40 CFR 262.34(a) specifies requirements for temporary waste storage areas where wastes may be accumulated for up to 90 days. These requirements apply to generators of over 1,000 kilograms of hazardous waste in a month and include: container management (compatible material, labeling, dating, integrity), weekly inspections, separation of incompatible wastes, preparedness and prevention (40 CFR 265 Subpart C), contingency planning and emergency procedures (40 CFR 265 Subpart D), and training.

40 CFR 262.34(d) contains requirements for temporary hazardous and mixed waste storage areas applicable to small quantity generators (greater than 100 kilograms and less than 1,000 kilograms per month). These requirements include: container management (compatible material, labeling, dating, integrity), preparedness and prevention (40 CFR 265 Subpart C), and emergency procedures (40 CFR 262.34(d)(5)).

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," states that "It is the policy of DOE to: Manage all Departmental hazardous and radioactive mixed wastes according to the requirements of Subtitle C of the Resource Conservation and Recovery Act . . . ."

Finding

Operation of temporary hazardous and mixed waste storage areas is not in accordance with 40 CFR 262.34(a) and 40 CFR 262.34(d).

Discussion

Ames is usually classified as a small quantity generator of hazardous and mixed waste. However, there was a month where they were considered a generator (greater than 1,000 kilograms per month) (I-WM-3). Thus, temporary hazardous and mixed waste storage areas at Ames have been required to comply with regulations for generators of hazardous and mixed waste (40 CFR 262.34(a)) as well as those for small quantity generators (40 CFR 262.34(d)). The requirements for small quantity generators are less stringent.

During the Tiger Team Assessment, five locations at Ames were identified as meeting the definition of a temporary waste storage area and therefore subject to the above-mentioned regulations: the Radioactive Waste Disposal Building, Room B55 in Spedding Hall, the vault in the Metals Development Building, the paint shop, and the maintenance garage (see Finding WM/CF-1). None of these areas fully complied with either 40 CFR 262.34(a) or 40 CFR 262.34(d).

The following specific deficiencies were observed during the Tiger Team Assessment:

- Not all containers are labeled as "Hazardous Waste" (40 CFR 262.34(a)(3)) (I-WM-1, 2, 3, 16, 17, and 29).
- Not all containers are labeled with the start date of accumulation (40 CFR 262.34(a)(2)) (I-WM-1, 2, 3, 16, 17, and 29).

- Not all waste accumulation areas are equipped with spill control equipment (40 CFR 265.32(c)) (I-WM-16, I-WM-17, and I-WM-29).

- No areas are inspected on a weekly basis (40 CFR 265.174) (I-WM-3).

- None of the areas has a Contingency Plan (40 CFR 265 Subpart D) (I-WM-3). This is a requirement only for hazardous and mixed waste generators of greater than 1,000 kilograms per month.

- The temporary waste storage area at the Metals Development Building is not equipped with a telephone or other internal communication or alarm system (40 CFR 265.32(b)) (I-WM-27). This is a requirement only for hazardous and mixed waste generators of greater than 1,000 kilograms per month.

- Required information is not posted next to the telephones (I-WM-27). 40 CFR 262.34(d)(5)(ii) requires that the name of emergency coordinator, location of fire extinguishers and spill control equipment, fire alarm, and the telephone number of the fire department be posted next to the telephone.

- Not all hazardous waste containers are covered (I-WM-2 and I-WM-27).

Training is another requirement for personnel operating temporary waste storage areas for hazardous and mixed waste generators (40 CFR 262.34(a)(4)). Personnel at Ames are not trained to meet this requirement (see Finding WM/CF-5).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are personnel, procedures, and change. Ames personnel do not have the necessary knowledge of Resource Conservation and Recovery Act storage requirements. Ames does not have procedures governing the design and management of temporary hazardous and mixed waste storage areas. The change in generator status at Ames also contributed to deficiencies in temporary hazardous and mixed waste storage areas (the requirement of a Contingency Plan, for example).

FINDING WM/CF-8: Hazardous and Mixed Waste Packaging and Transport

Performance Objective

40 CFR 262 Subpart B requires that "A generator who transports, or offers for transportation, hazardous waste for offsite treatment, storage, or disposal must prepare a Manifest . . . ."

40 CFR 262 Subpart C establishes requirements for packaging, labeling, marking and placarding hazardous waste shipments.

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," states that "It is the policy of DOE to: manage all Departmental hazardous and radioactive mixed wastes according to the requirements of Subtitle C of the Resource Conservation and Recovery Act . . . ."

Ames has established a "Safety, Health and Plant Protection Standard Shipping Policy" that specifies procedures for the shipment of radioactive and hazardous materials.

Finding

Ames procedure for packaging and transport of hazardous and mixed waste, and the Ames policy for shipping hazardous materials, including hazardous waste, does not comply with 40 CFR 262.

Discussion

The Ames policy for shipping hazardous materials offsite does not refer to any Resource Conservation and Recovery Act (RCRA) requirements for manifesting, labeling, packing, or placarding (WM-5). This policy is inadequate for the purpose of shipping hazardous wastes or ensuring that packaging and shipping procedures undertaken by contractors are in compliance with 40 CFR 262.

Ames usually retains outside contractors to package and transport hazardous wastes offsite (I-WM-3 and I-WM-27). These contractors: label Ames' hazardous waste; complete required manifests and land disposal restriction notifications; package and pack the containers; and load the waste onto vehicles for transport offsite. Ames personnel sign the manifests and land disposal restriction notifications. Ames does not have any procedures for overseeing these operations, or ensuring that the hazardous waste is packaged and transported in accordance with 40 CFR 262 Subpart C. Under these regulations, it is the responsibility of the generator to ensure that waste is labeled, marked and packaged according to Department of Transportation regulations (49 CFR 173, 178, and 179). In addition, it is the responsibility of the generator to ensure that the initial transporter's vehicle of hazardous waste is placarded. There is only one person at Ames with sufficient expertise to ensure that packaging and transport is in accordance with these requirements. This person is not always present during commercial hazardous waste shipments (I-WM-27).

Another deficiency in packaging and transport of hazardous waste is with the signatory on hazardous waste manifests. The manifests require a "generators certification" that the contents of the shipment are fully and accurately

described by proper shipping name and are classified, packed, marked, and labeled according to regulation. These manifests have been signed by persons not familiar with these requirements (WM-50).

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of procedures for ensuring that hazardous waste shipments are packaged and transported in accordance with 40 CFR 262; and inadequate resources to properly monitor packaging and shipping performed by the contractors.

FINDING WM/CF-9: Waste Minimization

Performance Objective

40 CFR 262 requires generators of hazardous wastes to certify that they have waste minimization programs in place to reduce the volume and toxicity of the wastes generated to the greatest degree that is economically practical.

52 CFR 25056, June 12, 1989, provides EPA guidance to hazardous waste generators on the elements needed for an effective waste minimization program.

DOE 5820.2A, "Radioactive Waste Management," requires that facilities report annually to appropriate DOE Headquarters groups on waste reduction activities as an appendix to the waste management plan.

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires facilities to implement programs for the minimization of hazardous and mixed wastes.

DOE 5400.1, "General Environmental Protection Program," Chapter III, Section 4.b, requires that a waste minimization plan and program be in place by May 9, 1990. As part of that program, a plan is to be developed that would include goals for minimizing wastes with annual reductions, a comparison of reductions achieved with the reductions of the previous year, and the methods that accomplish waste minimization.

The implementation guidance for DOE 5400.1, "Waste Minimization Plan, and Waste Reduction Reporting of DOE Hazardous, Radioactive, and Radioactive Mixed Wastes," March 1990, provides information on the development of waste minimization plans.

Finding

Ames does not have an approved waste minimization plan as required by DOE 5400.1, and the draft waste minimization program does not fully meet the requirements of DOE Orders and 40 CFR 262.

Discussion

Ames has prepared, submitted, and implemented a draft waste minimization plan to satisfy the requirements of DOE 5400.1 (WM-17). However, the plan was deemed insufficient by CH to meet the requirements of the DOE Order and has not been finalized (I-WM-26). The draft plan establishes a waste minimization policy at Ames that emphasizes source reduction, recycling, and recovery. The plan states that Ames will evaluate policies, technologies, procedures, and personnel training programs on a bi-annual basis to assure that waste minimization goals and objectives are being attained. The plan also establishes annual source reduction goals of 2 to 5 percent (WM-17).

Although the Ames waste minimization plan has not been finalized, examples of waste minimization practices currently being implemented at Ames include: (1) replacement of hazardous solvents with non-hazardous solvents during metal preparation operations (I-WM-24); (2) segregation of waste solvents for possible future recovery (I-WM-4); (3) precipitation of aqueous silver wastes to silver chloride for possible future recovery (I-WM-10); and (4) replacement

of a hazardous cleaning bath with non-hazardous methods at the air conditioning shop.

Despite the waste minimization practices described above, the draft Ames Waste Minimization Plan and program is deficient. Examples of deficiencies are described below:

- Although numeric goals for waste minimization were established, Ames does not presently measure waste generation; therefore, Ames does not have a mechanism to track changes in waste quantity, volume, and toxicity as required by DOE 5400.1.

- Similarly, although each laboratory program has an Employee Hazardous Waste Disposal Practices Manual that suggests some methods of waste minimization, there are no formal procedures to implement any of these methods.

- Review of Ames chemical purchases by ES&H is not effective in promoting waste reduction. This review is conducted by an ES&H secretary and has not resulted in any chemical purchase modifications since the program was initiated. Furthermore, ES&H cannot make binding decisions on chemical purchases, which resulted in purchase of a vehicle cleaning chemical by Ames despite a recommendation from ES&H that the purchase be deferred until existing stock was depleted (I-WM-19).

- Not all waste minimization initiatives undertaken by individual laboratory programs have been evaluated by ES&H (I-WM-28).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December, 1991.

The potential causal factors for this finding are policy implementation and procedures. Ames has not implemented DOE requirements on waste minimization. Procedures for waste minimization are not complete and not completely effective.

FINDING WM/CF-10: Radioactive Waste Disposal Management System

Performance Objective

DOE 5820.2A, "Radioactive Waste Management," establishes policies, guidelines, and minimum requirements by which DOE manages its radioactive and mixed waste and contaminated facilities. The Order requires that DOE facilities develop and implement an effective radioactive waste disposal management system.

Finding

Ames has not implemented a comprehensive radioactive waste disposal management system as required by DOE 5820.2A.

Discussion

Ames has not implemented the requirements of DOE 5820.2A into its radioactive waste disposal practices. Failure to meet the requirements of DOE 5820.2A and the Westinghouse Hanford Waste Acceptance Criteria has resulted in Ames not being able to package or send radioactive waste to Hanford for disposal. This has created a situation where radioactive waste must be stored at different locations within Ames. This is because the Radioactive Waste Disposal Building does not maintain the capacity to store all radioactive waste awaiting disposal.

Examples of lack of implementation include, but are not limited to, the following:

Implementation Plan Requirements

- An implementation plan describing a compliance schedule for this Order was due to the Assistant Secretary for Environment, Safety and Health (EH-1) by March 26, 1989. Ames has not submitted an implementation plan to EH-1 as of February 1992 (I-R-2).

Management of Low-Level Waste (Chapter III)

- Ames has not established a documented, auditable waste generation reduction program as required by Section 3.c.(2) (I-R-2).
- Ames has not established a documented waste segregation program as required by Section 3.c.(3) (I-R-2).
- Ames has not established a documented waste minimization program as required by Section 3.c.(4) (I-R-2).
- Ames does not adequately characterize its low-level waste in accordance with Section 3.d. Inadequate waste characterization is an issue associated with the disqualification from being able to ship waste to Hanford for disposal (R-14; I-R-2).
- Ames has not developed and documented waste acceptance criteria as required by Section 3.e (I-R-2).

Decommissioning of Radioactively Contaminated Facilities (Chapter V)

- Ames has not prepared a complete list of contaminated facilities to provide for the surveillance, maintenance, and decommissioning of contaminated facilities as required (I-R-2, I-R-6, and I-R-7).

Waste Management Plan Outline (Chapter VI)

- Ames has not developed a Waste Management Plan, for radioactive materials, as required by Section 3.c. Attachment II of DOE 5820.2A defines waste management as, "The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste as well as associated surveillance and maintenance activities." Annual updates of the Waste Management Plans (DOE 5820.2A, Chapter VI) are required to be submitted to, as a minimum, Director of Defense Waste and Transportation Management (DP-12) and EH-1 each December.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation concerning the requirements of DOE 5820.2A; inadequate training to meet the requirements of this Order; and inadequate appraisals/audits/reviews of these issues which have not previously been identified.

3.5.4.3 Best Management Practice Finding

FINDING WM/BMPF-1: Oversight of Offsite Hazardous Waste Treatment, Storage, and Disposal Facilities

Performance Objective

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 107, establishes that generators of hazardous substances may be considered to be strictly liable for any releases of those hazardous substances from a treatment, storage, or disposal facility.

To ensure that hazardous wastes shipped offsite are handled by reputable facilities in a manner that minimizes potential future liability to Ames and to DOE, it is a best management practice to formally evaluate the performance and management of commercial treatment, storage, and disposal facilities. These evaluations should include checking the compliance status of the facility with appropriate regulatory agencies, as well as onsite audits of the facility.

Finding

Ames does not always conduct formal evaluations of facilities that treat and/or dispose of hazardous waste generated at Ames as required by best management practices.

Discussion

Ames has used several commercial facilities to treat and dispose of hazardous waste. These facilities are contracted on an as-needed basis by ES&H through the Administrative Services Division. The procurement process does not involve an assessment of the permit status, compliance history, and other relevant environmental issues associated with the vendor (I-WM-20). Such an evaluation would include, but not be limited to:

- Reviewing permit applications, permits, inspection records, and other pertinent documentation.
- Contacting appropriate regulatory agencies to ascertain compliance history and current status.
- Reviewing the adequacy of hazardous waste treatment processes.
- Inspecting or auditing operations.
- Evaluating hazardous waste vendors used to treat or dispose of hazardous waste that cannot be processed at the Chemical Waste Handling Facility.
- Evaluating if procedures such as the Waste Analysis Plan (WM-44) are appropriate.

Most recently, Ames has contracted ISU to transport, treat, and dispose of hazardous waste. Prior to entering into this agreement, Ames did not conduct a comprehensive evaluation of the ISU waste management system (I-WM-23). Although Ames and CH met with ISU prior to entering into the hazardous waste

contract, this meeting and any review findings were not documented (I-WM-31). The Chemical Waste Handling Facility and the waste management system at ISU was reviewed by the Tiger Team. This evaluation revealed that ISU is operating the Chemical Waste Handling Facility under Interim Status; a Part B permit application was submitted in the mid-1980s (I-WM-23). The facility has been cited in the past for minor deficiencies (container integrity) only and appeared to be operated in compliance with Resource Conservation and Recovery Act regulations pertaining to interim status facilities, although an in-depth inspection of the level typical of a Tiger Team Assessment was not performed. Two issues of potential importance to Ames were identified:

- ISU has no mechanism to track the ultimate disposition of individual wastes generated by Ames. Once ISU has assigned a treatment or disposal code to a waste container, the ultimate disposition of this material is not tracked.

- ISU does not perform rigorous evaluations of commercial facilities that it contracts to treat and dispose of wastes.

This finding was fully identified in the CH-ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are of policy and risk. Ames does not have policies to evaluate facilities used by Ames to store, treat, and dispose of its hazardous waste. Ames also has an inadequate appreciation of the risk to Ames if hazardous wastes are not properly managed by commercial facilities.

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3.5.5 Toxic and Chemical Materials

3.5.5.1 Overview

The toxic and chemical materials portion of the Tiger Team Assessment evaluated Ames' compliance with regard to the Toxic Substances Control Act (TSCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); the Hazardous Materials Transportation Act (HMTA); DOE Orders; Iowa regulations; Ames policies and administrative memoranda; and best management practices. The use, storage, and disposal of polychlorinated biphenyls (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. The regulations, requirements, and guidelines used in this assessment are presented in Table 3-8.

This assessment was accomplished through discussions and interviews with Ames personnel, and review of written policies, procedures, inspection records, inventories, and audit reports of toxic and chemical materials procurement, storage, and use.

Responsibility for the TCM management at Ames is shared between many different organizations. Each laboratory operational unit retains the primary responsibility for properly managing toxic and chemical materials under its control. The Environment, Safety and Health (ES&H) Group provides technical assistance and informational support to Ames's operational units. Additional functions of ES&H include: the issuance of guidance and oversight of operations in the areas of regulatory analysis, sampling, recordkeeping, hazardous materials training, industrial hygiene, hazard identification, monitoring, and environmental compliance.

Management of oil-filled PCB or PCB contaminated equipment currently in use or in storage is conducted by several Ames functional areas. Responsibilities are informally assigned along the lines of ownership and the location and characteristics of the equipment. For example, the Metallurgy and Ceramics Group manages PCB equipment located in the group's laboratory space in the Metals Development Building. ES&H staff provide guidance during the removal of capacitors from service for disposal.

Pesticide and herbicide use at Ames has been assigned to pest control contractors under the oversight of the Facilities Services Department. The contractors are licensed by the State of Iowa. Ames does not provide onsite storage or facility support to the pesticide contractors.

Ames Purchasing Department has the responsibility for the procurement, receiving, and storage of chemicals prior to distribution, including hazardous materials and compressed gases. Chemicals and the required Materials Safety Data Sheets (MSDS) are ordered through a Purchase Requisition, and are received at the Ames Warehouse. The requestor is contacted to arrange for delivery by the Warehouse staff. Routine bulk storage of hazardous materials and compressed gases is in designated areas within the Warehouse and the Chemical Storeroom in 160 Spedding Hall. Ames staff, visiting researchers, Iowa State University (ISU) faculty and graduate students may purchase or

TABLE 3-8
LIST OF TOXIC AND CHEMICAL MATERIALS
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste	DOE
DOE 5480.19	Conduct of Operations	DOE
29 CFR 1910	Hazardous Materials Storage	OSHA
40 CFR 112	Oil Pollution Prevention (CWA)	EPA
40 CFR 165	(FIFRA) Pesticide Storage/Disposal Regulations	EPA
40 CFR 171	Certification of Pesticide Application	EPA
40 CFR 761	(TSCA) Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions	EPA
49 CFR 171, 173, 177, 178, and 397	Transportation of Hazardous Materials, Packaging, Marking, Spill Reporting, etc.	DOT
Chapter 206, Code of Iowa	Licensing of Pesticide Applications	Iowa Dept. of Agriculture and Land Stewardship
	Ames Laboratory General Environmental, Safety and Health Policy	Ames

obtain chemicals and compressed gases outside the established Ames Purchase Requisition process.

Due to its mission as a research institution, Ames staff, visiting researchers, and contractor users throughout the site store chemicals, including hazardous chemicals and compressed gases, in areas used for ongoing research and maintenance activities. The volume of chemicals in storage for use varies from extremely small research quantities to bulk storage of 55-gallon barrels.

Warehouse staff manage stored, pooled, excessed, and scrap equipment from Ames operations. Equipment stored for individual Ames users or a sitewide pool prior to designations as excess or scrap are placed in the Warehouse. Once designated as scrap, equipment is held within the secured, key access trailers adjacent to the Warehouse. Such equipment may contain hazardous materials during the storage, excess, or scrap phases at Ames.

In summary, Ames' TCM management programs require improvement to meet the requirements of DOE Orders and Federal, state, and local regulations. Procedures and programs to properly handle, store, and manage toxic and chemical materials are not comprehensive. This lack of comprehensive management has resulted in fragmented line responsibilities, inconsistent recordkeeping and documentation, and incomplete training or formal instruction for researchers, ISU professors or graduate students.

The toxic and chemical materials assessment identified four compliance findings. The compliance findings address deficiencies in the comprehensive management of toxic and chemical materials, the management of peroxide forming chemicals, PCB management, and the Pollution Prevention Awareness Plan.

3.5.5.2 Compliance Findings

FINDING TCM/CF-1: Toxic and Chemical Materials Management Program

Performance Objective

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct its operations in an environmentally sound manner that limits risks to the environment." Heads of Field Organizations shall "develop and implement programs that direct contractors to execute environmental protection compliance programs and policies, and provide for oversight, confirmation, and independent verification of those contractor programs."

DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities," requires that "the conduct of operations at DOE facilities be managed with a consistent and auditable set of requirements, standards, and responsibilities and that . . . Operators at DOE facilities have procedures in place to control the conduct of their operations."

DOE 5480.19, Attachment I, Chapter VIII, states that "Operators should be knowledgeable about aspects of facility processes and safety that affect operation and should be able to analyze off-normal situations and take appropriate action to correct the cause(s) of problems." Examples of the types of concepts and processes with which operations personnel should be familiar include: "The purpose and hazards associated with facility storage and use of such chemicals as boron, acids, caustics, chromates, hydrazine, ammonia, solvents containing chlorinated hydrocarbons, and chemicals containing organics . . . Properties and hazards of such gases as hydrogen, nitrogen, carbon dioxide, chlorine, and halon. . . . The chemical constraints, process equipment, and controls associated with the . . . toxic waste systems."

Finding

Ames does not have an effective, and comprehensive sitewide program that manages toxic and chemical materials (TCM) to ensure compliance with DOE 5400.1 and 5480.19.

Discussion

The management of TCM is required to be comprehensive with respect to sitewide operations, and effective in terms of minimizing potential impacts and assessing off-normal situations resulting from their storage and use. Comprehensive management of TCM must incorporate and integrate aspects of project planning, procurement, receipt, labeling, tracking, storage, and use. Management systems for TCM also require the development and application of systems for hazard identification and oversight by the contractors and DOE to ensure compliance and minimize potential releases to the environment.

Ames lacks the elements of a comprehensive system to manage TCM. Ames management of TCM is initiated during project planning, such as proposal review or requests for work orders to modify existing research activities. Ames ES&H review and signature approval is required prior to the initiation or modification of a project. The review is conducted as part of a mandatory

safety assessment of each modification or proposal, as required by the Ames Safety Manual (TCM-60). ES&H, however, has not defined the conditions by which a stop work order, process modification, or substitution for TCM hazards will be applied during the safety assessment process (I-TCM-2 and I-TCM-14).

Furthermore, procurement of TCM at Ames follows several formal and informal pathways. Ames has a formal procurement system with automatic ES&H review and ordering of a Material Safety Data Sheet (MSDS) from the vendor, if not already on file, for all purchase requisitions (I-TCM-1). Alternative procurement processes create the potential for information gaps in the existing sitewide inventories (I-TCM-2, I-TCM-3, and I-TCM-5). Informal methods to acquire non-inventoried TCM include receipt by individual researchers through the mail, or by use of ISU inventories in areas shared between Ames and ISU. Non-inventoried TCM are not included in Ames procurement inventories (I-TCM-2, I-TCM-5, and I-TCM-18).

Hazardous material labeling of TCM at Ames is the responsibility of the user or his/her supervisor (TCM-60). The ES&H staff is required to provide proper signs upon request and to audit labeling practices to ensure correct use (TCM-59). However, Ames staff does not receive formal training or written instructions on labeling hazardous materials nor does ES&H routinely audit Ames staff labeling practices (I-TCM-4).

Tracking of TCM at Ames is accomplished through a variety of inventory systems that are updated annually (TCM-1, TCM-2, and TCM-23). The systems are not integrated into a centralized data base to delineate the location, owner, volume, or status of TCM use at Ames (I-TCM-9, I-TCM-14, and I-TCM-19). Examples of deficiencies include, but are not limited to, the following:

- Comprehensive, sitewide collection of hazard identification data posted on each laboratory door is not maintained (I-TCM-9, I-TCM-14, and I-TCM-19).

- TCM storage in Room B-55 Spedding Hall (a waste staging area) is not tracked through a documented inventory system, which creates the potential for improper responses in the event of an off-normal or emergency event (I-TCM-14).

- Water reactive chemicals, such as calcium and magnesium, were stored in the Room 147 Metals Development Staging Area without a hazard posting or warning sign in the area (I-TCM-16).

- Stored metal powders in 348 Spedding Hall were labeled as a fire risk, but no comparable hazard designation was posted at the room's entrance (I-TCM-21).

Storage of TCM at Ames occurs throughout the site including the Warehouse, the Chemical Storeroom, centralized storage areas for specific programs, individual laboratories, and Facilities Services' Shops (I-TCM-14, 15, 16, 17, 18, 20, and 21). A comprehensive sitewide program has not been established and implemented for items such as hazard identification, storage of incompatible materials, provision of secondary containment, or assessment of potential mechanisms for hazardous materials release (refer to SW/BMPF-1). Additionally, ES&H oversight and auditing programs to ensure compliance with storage requirements are not fully developed.

Various forms of improper storage were observed at Ames. Examples of improper storage include, but are not limited to, the following:

- Incompatible chemicals were observed in the bulk storage area of the Warehouse and Chemical Storeroom without diking or secondary containment (I-TCM-5 and I-TCM-17). The issue of incompatible storage has been noted by ES&H (I-TCM-5 and I-TCM-12). As a result, Ames initiated a work order in November 1991, to construct diking and containment in the Warehouse (TCM-55). However, this construction has not been approved and incompatible chemicals remain stored in this area and in the Storeroom (TCM-55).

- Oil containers stored in the Flammable Storage Cabinet in the Metals Development Machine Shop contained evidence of leaking containers and a noticeable oil sheen (I-TCM-15).

- A 55-gallon barrel of perchloroethylene, owned by a subcontractor (ENSR) in 144 Metals Development Building, is stored without secondary containment (I-TCM-16).

- Storage of reactive metals, such as lithium (Metals Development Repository, 2156 Gilman Hall) and sodium (705 Gilman Hall, 27 Spedding Hall), was observed without proper labeling, inventory records, or hazard identification posting (I-TCM-16, I-TCM-18, and I-TCM-21).

- Mercury is stored without secondary containment in a laboratory hood in 344 Spedding Hall (I-TCM-21).

- Paints, lacquers, and lacquer thinners are stored in a variety of used material containers in the Paint Shop without any evaluation of potential incompatibility risks. Labeling of these re-used containers is inconsistent and increases the potential for mis-use or improper disposal (I-TCM-11).

The storage of scrap and excess equipment is also a component for a comprehensive TCM management program. Ames ES&H Group does not routinely inspect equipment held in storage, or designated as scrap or excess, for the presence of hazardous materials, such as polychlorinated biphenyls (PCBs), asbestos, or chlorofluorocarbons (I-TCM-5, I-TCM-6, and I-TCM-14). Evidence of recent oil leaks from stored equipment indicated that equipment is not consistently drained of oil, or inspected prior to storage (I-TCM-5). PCB capacitors have been found on occasion in equipment during preparation for scrapping (I-TCM-5 and I-TCM-14).

Coordination and oversight of operations by Ames ES&H are necessary to ensure effective TCM management. The examples of inadequate coordination and oversight include, but are not limited to, the following:

- Ames defines sitewide TCM use and management responsibilities in the Chemical Hygiene Plan, the Ames Safety Manual, and the Emergency Plan (TCM-24, TCM-59, and TCM-60). However, elements common to the three sitewide documents are not consistent, and each contains limited references to the requirements defined in the other documents (TCM-60).

- Group leaders have developed procedures to manage the use of TCM (I-TCM-2, 5, 10, 12, 15, and 16). However, these procedures are not routinely reviewed or evaluated by ES&H, and are not integrated into a sitewide approach to manage TCM (I-TCM-4 and I-TCM-6).

- CH does not provide adequate oversight of Ames management of TCM. Formal oversight consists of a biannual site assessment (I-TCM-23).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are inadequate policy implementation of existing Ames procedures to direct management of TCM from the initial project planning phases through its final use; multiple, inadequate TCM management procedures; insufficient training of Ames staff in TCM management; and inadequate appraisals/audits/reviews by Ames and CH to identify and address the range of deficiencies related to TCM management at Ames.

FINDING TCM/CF-2: Management of Peroxide-Forming Chemicals

Performance Objective

DOE 5400.1 "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of the applicable environmental statutes, regulations, and standards." In addition, DOE is committed to good management of all its programs and facilities to correct existing environmental problems, to minimize risks to the environment or public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public.

Ames' General Environment, Safety and Health Policy (the Ames Safety Manual) defines the requirements for the management of peroxide-forming chemicals. These requirements include, "labels indicating storage expiration date and space for entering the date the container is opened must be affixed." Additional management requirements include, "unopened dated containers received from the storeroom shall be disposed of as chemical waste 12 months after the manufacturer's date of packaging or at the expiration date given by the manufacturer. Undated containers purchased directly from an outside source should be disposed 12 months after receipt if opened. Date containers upon opening and dispose of or use within three months. Containers must be stored tightly closed, away from heat and ignition sources, and protected from light (preferably in small metal cans). Storage in a refrigerator approved for flammable chemicals will reduce peroxide-formation, as will the addition of water."

Finding

Ames has not adequately managed peroxide-forming chemicals to minimize the potential for release to the environment as required by the Ames Safety Manual.

Discussion

Chemicals, such as dioxane and ethyl ethers, can form potentially explosive peroxide-forming chemicals if stored for extended periods once the container is opened. In 1984, Ames defined proper management of peroxide-forming chemicals in Section III of the Ames Safety Manual (TCM-60). Labeling, tracking, storage, and disposal within a limited time frame were defined to limit extended storage and improper handling of peroxide-forming chemicals. During the 1989 Environmental Survey Preliminary Report, an evaluation of these management procedures resulted in a finding detailing inadequate labeling, tracking, storage, and disposal of peroxide-forming chemicals.

Laboratory inspections and interviews conducted by the Tiger Team at Ames indicated that requirements of the Ames Safety Manual are not consistently implemented by laboratory personnel. The deficiencies included the following:

- A can of dioxane was observed in 0716 Gilman Hall in a cabinet which was not approved for flammable storage, and was not labeled as to date of receipt or opening. The user stated awareness of the labeling and storage requirement, and acknowledged the can had been opened more than 3 months which required its disposal (I-TCM-18).

- Ethyl ether in 0705 Gilman Hall was undated as to day of receipt or the initiation of use, and was not stored in a refrigerated area (I-TCM-18).

- A dated ethyl ether can in 1109 Gilman Hall exceeded the 1-year deadline. This can was stored in the refrigerator awaiting ES&H removal for disposal (I-TCM-18).

- A can of ethyl ether dated December 17, 1990, was stored in B-55 Spedding Hall, awaiting disposal. However, the can was stored in a flammable storage cabinet (I-TCM-17).

- The Chemical Storeroom in 160 Spedding Hall does not routinely date peroxide-forming chemicals upon receipt (I-TCM-17).

Interviews with Ames staff indicated varying levels of awareness of the potential hazard, and the written sitewide procedures to date, track, and properly store peroxide-forming chemicals (I-TCM-17 and I-TCM-18). The written procedures have not been consistently implemented to ensure compliance, or minimize the threat for a release to the environment.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation of Ames written procedures; inadequate training of staff on peroxide-forming chemicals requirements and related risk associated with improper storage of peroxide-forming chemicals; and appraisals/audits/reviews by Ames, in that storage of peroxide-forming chemicals is not subject to adequate oversight.

FINDING TCM/CF-3: Management of Polychlorinated Biphenyls

Performance Objective

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of the applicable environmental statutes, regulations, and standards." In addition, DOE is committed to good governmental management of all its programs and at all its facilities to correct existing environmental problems, to minimize risks to the environment or public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public welfare.

40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," "establishes prohibitions of, and requirements for the manufacture, distribution in commerce, use, disposal, storage and marking of polychlorinated biphenyls (PCBs) and PCB items." "The basic requirements applicable to disposal and marking of PCBs and PCB items are set forth in Subparts D - Disposal of PCBs and PCB Items and in Subpart C - Marking of PCBs and PCB Items of 40 CFR 761."

Finding

Ames has not developed an effective PCB management program, and does not comply with 40 CFR 761 requirements for labeling, storage and inventorying of PCB containing materials.

Discussion

Ames staff, in the early to mid 1980's, surveyed transformers to identify and dispose of PCBs to comply with recently promulgated regulations. Since that time, PCB transformers have been routinely phased out of sitewide operations, such as those maintained by Facilities Services. Documented PCBs remaining at Ames are managed as the property of Metallurgy and Ceramics Group.

Examples of deficiencies in Ames' PCB management program include, but are not limited to, the following:

- ES&H does not have a formal inspection program for PCBs in scrap or excess equipment that could reasonably be expected to have come into contact with PCBs during its useful life prior to release. Lack of a formal inspection program for PCBs in scrap or excess equipment increases the potential for improper release of PCBs into the environment or commerce (I-TCM-5, I-TCM-6, and I-TCM-14) (40 CFR 761.120(c)).

- Ames has not comprehensively sampled for PCBs in hydraulic fluid, electromagnets, or scientific apparatus on a sitewide basis, and as a result has not developed a complete inventory of PCBs (I-TCM-12 and I-TCM-14; TCM-60). An example of the Ames incomplete inventory is the recent discovery of PCB hydraulic fluid and 39 small capacitors which were not tracked or managed under the sitewide inventory and management program.

- Incomplete PCB inventory reporting and tracking does not meet the requirements of 40 CFR 761.180.

- PCB sampling procedures have not been documented to ensure consistency in the collection of valid and verifiable samples (I-TCM-14).

- Formal definitions of line management responsibilities have not been developed for inspections, sampling or labeling of PCB items which would help to ensure compliance with inspections (40 CFR 761.30), sampling (40 CFR 761.60), and labeling (40 CFR 761.40 and .45) requirements (I-TCM-12, I-TCM-14, and I-TCM-16).

- Inspection of the PCB transformer in 144 Metals Development Building (MD) could not be performed (as required by 40 CFR 761.30(a)(ix)) due to the close proximity of additional equipment (I-TCM-16).

- Ames did not designate or maintain a PCB storage area for PCB wastes conforming to 40 CFR 761.65(b) requirements for adequate roof and walls, 6-inch curbing, specified containment volumes, absence of drains or other openings, and a smooth impervious floor (I-TCM-14 and I-TCM-16).

- A leaking capacitor is currently located in 130 MD within a piece of electrical equipment. The equipment does not conform to temporary storage secondary containment requirements.

- Documentation is not available for the calculation of secondary containment volumes surrounding the 144 MD Transformer (TCM-60). Inadequate secondary containment capacity increases the potential for uncontrolled release of PCB in the event of a transformer system, failure, or leak.

- Ames does not have written procedures for the management of PCB wastes in storage to ensure compliance with the 30-day limit for temporary storage, and 1-year disposal requirements imposed in 40 CFR 761.65.

- Records for PCB management are incomplete, and do not meet the requirements of 40 CFR 761.180. For example, Ames' annual document log of the disposition of PCBs and PCB items is inaccurate in the inventory of capacitors (TCM-5, 6, 7, 23, and 30).

- Procedures for proper PCB transformer decontamination and retrofilling, as defined in 40 CFR 761.79, have not been developed at Ames.

- The spill response and sampling requirements stated in 40 CFR 761.120-135 are not formally addressed or referenced in the sitewide spill procedures established in the Emergency Plan, the Chemical Hygiene Plan, or the Ames Safety Manual (TCM-24, TCM-59, and TCM-60). The lack of specificity in Ames procedures increases the potential for improper response to PCB releases.

The listed deficiencies support the concern that Ames lacks comprehensive systems in place to ensure that PCB management meets the DOE and Federal requirements.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991 and partially identified in the Ames Laboratory Self-Assessment, December 1991. These assessments identified specific concerns but did not address comprehensive, sitewide management issues.

The apparent causal factors for this finding are inadequate policy implementation of PCB management requirements; incomplete sitewide and functional group procedures which do not address regulatory requirements; and insufficient training of ES&H and other Ames staff in compliant regulatory practices and recordkeeping.

FINDING TCM/CF-4: Pollution Prevention Awareness Program Plan

Performance Objective

DOE 5400.1, "General Environmental Protection Program," establishes DOE policy on environmental protection. Chapter III.4.c requires the Head of Field Organization to prepare a Pollution Prevention Awareness Program Plan (PPAP) that includes elements for employee awareness. "All mission statements and project plans shall recognize a requirement for pollution prevention, where appropriate. The documented program, including elements for employee awareness through specific training . . . campaigns, and incentives and awards programs shall be implemented." The plan was to be implemented by November 9, 1989, reviewed annually, and updated every 3 years.

Finding

The PPAP developed by Ames does not include all of the specific elements required by DOE 5400.1.

Discussion

The Ames PPAP is incorporated into the Waste Minimization Plan. However, elements of the PPAP required by DOE 5400.1 are not addressed. The elements not addressed include providing for pollution prevention in mission statements and project plans, specific training for other than waste generators, related awareness campaigns, and incentives (TCM-63; I-TCM-2). These elements of the PPAP are intended to promote the goals of DOE 5400.1.

Formalized pollution prevention awareness training serves to minimize the potential for improper handling or storage of materials that pose a threat if released into the environment. Comprehensive training programs for researchers, management, or contractors to raise awareness of pollution prevention are not established at Ames.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, or the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are the lack of policy implementation concerning PPAP elements as required by DOE 5400.1; and the lack of appraisals/audits/reviews by CH to effectively oversee implementation of this requirement.

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3.5.6 Quality Assurance

3.5.6.1 Overview

The purpose of the quality assurance portion of the Tiger Team Assessment was to evaluate the Ames 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 (QA) standards. Table 3-9 lists the regulations and requirements used in this assessment.

The general approach of the QA portion of the environmental assessment included the following activities: review of QA Plans and Procedures; observation of sampling techniques; and interviews with CH and ISU personnel that interface with Ames and site contractor personnel.

During the assessment, the QA specialist coordinated efforts with each of the other Environmental Subteam specialists, quality verification specialists of the Safety and Health Subteam, and various members of the Management Subteam. This included joint sampling observations, concern followup, and general environmental communication. Specific input into QA findings were provided by the waste management, toxic and chemical materials, radiation, surface water, inactive waste sites, and air specialists.

Primary responsibility for environmental programs and their quality resides with the Environmental, Safety, and Health (ES&H) Group, who are listed as Safety, Health, and Plant Protection (SH&PP) in the Ames Laboratory Quality Assurance Program of November 1991. Environmental sampling is performed by ES&H. They have responsibility for the procurement of environmental analytical services. ES&H has secured analytical services from laboratories located at the ISU campus and from external vendors. According to the Ames Laboratory Quality Assurance Program, independent oversite at Ames, including the ES&H Group, is provided by the Quality Assurance Committee. CH also provides independent oversight of Ames Environmental QA activities.

The Quality Assurance Committee, which is a small group appointed by the Laboratory Director, has responsibility for formulating QA Policy and monitoring QA activities throughout the Ames site. The QA Committee presently consists of seven members who represent a cross-section of the laboratory. In January 1991, the QA Committee took steps to select an individual from each group to serve as its QA Representative or QA point-of-contact. Each of the three operating divisions develop and implement QA programs appropriate to the needs within each division. The ES&H Group has procedures relating to QA activities that it controls. These mostly address calibration of equipment and document control.

CH is required to oversee QA throughout Ames, including ES&H. CH is expected to guide and advise Ames in pursuing operations which will ensure environmental protection.

TABLE 3-9
LIST OF QUALITY ASSURANCE
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 1324.5	Records Management Program	DOE
DOE 5400.1	General Environmental Protection Program	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 5700.6B	Quality Assurance	DOE
DOE 5700.6C	Quality Assurance	DOE
NQA-1-1989	Quality Assurance Program Requirements for Nuclear Facilities	DOE
Quality Assurance Program	Ames Laboratory Quality Assurance Program, November 1991	Ames

In the past, Ames prioritized its research activities while addressing little attention to environmental protection. Although Ames has recently attempted to comply with QA requirements, they have not raised their level of environmental quality assurance to a level that is required by DOE Orders.

DOE 5700.6B, "Quality Assurance," was superseded by DOE 5700.6C on August 21, 1991. DOE contractors are expected to implement the new revision into their QA Programs 180 days after the date this Order becomes effective. As allowed in DOE 5700.6C, Section 9.a.(2), an implementation guide for Research and Development will be developed. Nuclear Energy (NE) is expected to issue this implementation guide to field offices about May 1992 as a DOE standard. This guide will pertain to Ames with implementation into their QA Program expected about November 1992. Since the memo from ER-1 to CH states that DOE 5700.6C and the draft guidance (sent to Ames by CH in December 1991) should be used to begin consideration of the revised QA Program, these two documents are part of the governing QA directives, as of the time of this assessment.

There are 11 compliance findings in the QA section. These findings cover deficiencies in DOE oversight, Ames QA program, environmental QA planning documentation, environmental monitoring plan, internal QA audits and corrective action, environmental training, calibration, environmental recordkeeping, independence of QA, sampling procedures, and environmental services procurement.

3.5.6.2 Compliance Findings

FINDING QA/CF-1: DOE Oversight of Environmental Activities

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Section 9.f.(2)(7)(5), states that Heads of Field Organizations (HFO) shall "ensure that all operations under their authority comply with applicable environmental protection laws and regulations, and directives." DOE 5400.1 also states that HFOs shall "develop and implement programs that direct contractors to execute environmental protection compliance programs and policies, and provide for oversight, confirmation, and independent verification of those contractor programs." DOE 5400.1 further states that HFOs shall "conduct environmental appraisals of programs, projects, and facilities in accordance with DOE 5482.1B, and other ES&H requirements, and provide copies of appraisal reports to EH-1 and the appropriate program office."

DOE 5482.1B, "Environment, Safety, and Health Appraisal Program," Section 8.e, states that HFOs shall "conduct management appraisals of ES&H programs of subordinate field activities at least once every 3 years" and HFO's shall "conduct functional appraisals of contractor activities with sufficient scope and frequency to ensure effectiveness of the ES&H activities."

DOE 5400.1, Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity."

DOE 5700.6C, "Quality Assurance," Section 9.b.(3)(a), states that "management (field office managers) at all levels shall periodically assess the integrated quality assurance program and its performance."

DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities," Section 6.e.(1), states that "heads of field elements shall ensure that adequate contractor plans, procedures, and programs are in place and assess the effectiveness of their implementation at sites under their jurisdiction."

Finding

CH has not fully complied with their administrative duties regarding oversight of Environmental QA related issues, as required by DOE 5400.1, 5480.19, 5482.1B, and 5700.6C.

Discussion

To carry out DOE policy, CH is required to actively oversee contractors activities. Oversight of environmental program activities is the principal method for reviewing the day-to-day effectiveness of the overall environmental program. The field office is expected to guide and advise their management and operations (M&O) contractors in pursuing operations which will ensure

environmental protection. Specific examples of CH deficiencies in performing their oversight of Ames include the following:

- CH has not met the functional and management appraisals requirement of DOE 5482.1B. The ES&H appraisal of December 2-13, 1991, was the first comprehensive environmental assessment conducted at Ames (I-QA-13; QA-8). An earlier environmental assessment, conducted February 12-16, 1990, was not comprehensive.

- CH has not taken the initiative to improve communication between Ames, ISU, and itself. CH has not advised Ames in pertinent QA areas, e.g. confusion at Ames regarding which revision of DOE 5700.6X is applicable (I-QA-15). Some of the in-place ISU capabilities have not been utilized by Ames, e.g. certified health physicist, environmental samplers, environmental oversight (I-QA-13 and I-QA-20).

- CH did not act as a catalyst to bring to closure the open findings from the Environmental Survey Preliminary Report of March 1989 (QA-10). The last action taken by the field office was a transmittal of comments to Ames on January 26, 1990 (QA-11).

The CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and the Ames Laboratory Self-Assessment, December 1991 did not include oversight activities by CH. This finding was identified in the CH Self-Assessment of September 1991.

The apparent causal factor for this finding is a lack of policy implementation by CH to fully implement DOE regulations.

FINDING QA/CF-2: **Ames Environmental Quality Assurance (QA) Program**

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity."

DOE 5700.6C, "Quality Assurance," Section 9.b.(1)(a), states that "the Quality Assurance Program (QAP) shall describe the organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing adequacy of work. The QAP shall describe the management system, including planning, scheduling, and cost control considerations."

"Ames Laboratory Quality Assurance Program," November 1991, requires the Quality Assurance (QA) program to be in accordance with DOE 5700.6 (no revision level specified) and the basic requirements of ASME NQA-1, as appropriate. Chapter II, Section 2, states that "the program shall identify the activities and items to which it applies. The establishment of the program shall include consideration of the technical aspects of the activities affecting quality." and "management of those organizations implementing the quality assurance program shall regularly assess the adequacy of that part of the program for which they are responsible and shall assure its effective implementation."

Finding

Ames has not prepared or implemented an environmental quality assurance program that meets the requirements of DOE 5400.1 and 5700.6C, and the Ames Laboratory Quality Assurance Program.

Discussion

A QAP is prepared as a top-level guide in implementation of a QA regulatory standard. The program assigns responsibilities and authorities, defines policies and requirements, and provides for measures of performance and its own effectiveness. Also the QA Program establishes criteria for which the contractor shall develop appropriate lower-level plans, as appropriate, for their projects/programs/activities. An environmental quality assurance program shall consist of field and laboratory quality control, recordkeeping and chain-of-custody procedures, audits, performance reporting, and validation and verification of data, as well as other requirements. Examples of inadequacies in the Ames environmental QA program include the following:

- Ames does not have an Environmental Quality Assurance Program prepared, or in place, by which it can assess its compliance. The Ames QA Program for Safety, Health and Plant Protection (SH&PP) appears to only address isolated topics, such as calibration.

- The present Ames QA Program does not address DOE 5700.6C and its implementation guide (guide is presently in draft form) (I-QA-11).

- Environmental responsibilities are clearly deficient. The mission of the QA Program seems oriented towards safety and health and plant protection. DOE environmental policy is not addressed (I-QA-30).

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation and risk evaluation. Ames did not formalize the DOE requirement for environmental QA and the responsible parties at Ames did not elevate the ineffectiveness of this program to a sufficient level to effect correction.

FINDING QA/CF-3: Environmental Quality Assurance (QA) Planning Documentation

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter II, requires that an Annual Site Environmental Report (ASER), which presents site summary environmental data covering the previous calendar year be prepared annually.

DOE 5400.1, Chapter III, requires that the Environmental Protection Implementation Plan (EPIP) shall be updated annually and approved by the appropriate Program Senior Official. Also, DOE 5400.1 requires that each site develop a Groundwater Protection Management Program, a Waste Minimization Program, and a Pollution Prevention Awareness Program.

DOE 5400.1, Chapter IV, states that "a written Environmental Monitoring Plan shall be prepared for each site, facility, or process that uses, generates, releases, or manages significant pollutants or hazardous materials."

Finding

Ames has not prepared, maintained, and implemented required environmental quality assurance documentation, as specified by DOE 5400.1.

Discussion

At Ames, responsibility for Environmental Quality Assurance (EQA) rests primarily in the ES&H Group, which is within the Operations Division. The purpose of EQA planning documentation is to formally set up a mechanism by which the contractor will characterize site environmental management performance, evaluate hazardous materials generation by user, determine the quality of the site's environment, and take documented steps to maintain and improve it. Specific examples of Ames deficiencies in EQA planning documentation include the following:

- The Annual Site Environmental Report (ASER) for 1991 has been submitted to CH (I-QA-13). ASERs have not addressed all environmental activities that occur at Ames, do not contain details of all activities that occur, and occasionally contain incomplete information. The 1989 ASER, and its addendum prepared by CH, included surface water monitoring program descriptions at Ames that were not consistent. Interviews conducted during this assessment determined that surface water monitoring programs described in the 1989 ASERs had not started (I-QA-13 and I-QA-21).

- Ames has not completed an Environmental Monitoring Plan and submitted it for CH approval (see Finding QA/CF-4). Although a draft has been prepared, and work is in progress (I-QA-6), approval by CH was required by November 9, 1991.

- The Ames Pollution Prevention Awareness Plan (PPAP) is incorporated into the Ames Waste Minimization Plan. However, the PPAP does not comply with all of the elements of DOE 5400.1 (see Finding TCM/CF-4). The elements that were not addressed include providing for pollution prevention in mission statements and

project plans, specific training for other than waste generators, related awareness campaigns, and incentives.

- The Waste Minimization Program Plan does not meet all of the DOE requirements (see Finding WM/CF-9). The plan is in draft and was deemed insufficient to meet all requirements by CH. There is no mechanism to measure waste generation and there is no review of purchases to promote waste reduction.

- The Groundwater Protection Management Program Plan has been completed and submitted to CH in December 1991. It was required to be submitted by May 1990. The plan is considered to have deficiencies that may hinder its acceptance (see Finding GW/CF-2).

- The Environmental Protection Implementation Plan (EPIP) which was due on November 9, 1991, was submitted to CH on or about February 10, 1992. It is presently in the review cycle at CH (I-QA-13).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of policy implementation to formalize the DOE requirement for EQA planning documentation.

FINDING QA/CF-4: Environmental Monitoring Plan

Performance Objective

DOE 5400.1 "General Environmental Protection Program," Chapter IV, Section 4, requires that, by November 9, 1991, an Environmental Monitoring Plan be prepared for each site, facility, or process that uses, generates, releases, or manages pollutants or hazardous materials. The plan is required to identify and discuss effluent monitoring and environmental surveillance with respect to the rationale and design criteria for monitoring programs, the extent and frequency of monitoring and measurements, the procedures for laboratory analysis, quality assurance requirements, program implementation procedures, and direction for the preparation and disposition of reports.

Finding

Ames has not developed and implemented an Environmental Monitoring Plan by November 9, 1991, as required by DOE 5400.1.

Discussion

DOE 5400.1 required Ames to develop and implement an Environmental Monitoring Plan by November 9, 1991. In response to this requirement, Ames developed the first draft of their proposed Environmental Monitoring Plan in January 1992 (QA-17). Ames has not submitted its Environmental Monitoring Plan to CH. In general, the Ames Environmental Monitoring Plan lacks many of the elements required by DOE 5400.1, including: the extent and frequency of monitoring and measurements; the procedures for laboratory analysis; quality assurance requirements; program implementation procedures; and direction for the preparation and disposition of reports.

Specific deficiencies in environmental monitoring activities at Ames are noted in all environmental media (see Findings A/CF-1, A/CF-2, SW/CF-1, RAD/CF-1, GW/CF-1, and GW/CF-2).

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation and resources. Ames did not implement requirements of DOE 5400.1 for an Environmental Monitoring Plan. Personnel resources at Ames were not adequate to prepare and implement a comprehensive Environmental Monitoring Plan.

FINDING QA/CF-5: Internal Quality Assurance (QA) Audits and Corrective Action

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs."

DOE 5700.6C, "Quality Assurance," Section 9.b.(3)(b), states that "planned independent assessments shall be conducted to measure item quality. The organization performing independent assessments shall have sufficient authority and freedom from the line organization to carry out its responsibilities. Persons conducting independent assessments shall be knowledgeable in the areas assessed." DOE 5700.6C Section 9.b.(1)(c), states that "processes shall be established to detect and prevent the recurrence of quality problems. Items that do not meet established requirements shall be identified, controlled, and corrected. Correction shall include identifying the causes of problems and preventing recurrence."

The "Ames Laboratory Quality Assurance Program," November 1991, requires the QA program to be in accordance with DOE 5700.6 (no revision level specified) and the basic requirements of ASME NQA-1, as appropriate. Chapter II, Section 18, states that "planned and scheduled audits shall be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness. These audits shall be performed in accordance with written procedures or checklists by personnel who do not have direct responsibility for performing the activities being audited." Chapter II, Section 16, states that "conditions adverse to quality shall be identified promptly and corrected as soon as practical." The cause shall be determined and corrective action taken to preclude recurrence.

Finding

Ames does not conduct planned and periodic independent quality assessments of its ES&H operations, and has not established and implemented a system to detect and prevent the recurrence of quality problems, as required by DOE 5700.6C.

Discussion

Auditing is the principle mechanism for monitoring the effectiveness of a quality assurance program. Through the systematic application of internal audits conducted by an independent group, it is possible to not only identify a threat to quality, but also to conduct a process of continuous quality improvement. Once quality defects have been identified by auditing, it is the responsibility of the corrective action system to determine the cause of problems, institute corrective action to prevent recurrence, and monitor these corrective actions to determine effectiveness. Quality defects are not being properly identified, controlled, and systematically corrected at Ames. Steps

are not being taken to prevent recurrence. The following deficiencies were observed in the Ames auditing and corrective action system:

- The Ames QA Committee has not established and implemented a policy in which QA representatives audit the processes and operations that their groups perform (I-QA-15). The QA representatives have not yet received guidance in carrying out their audit responsibilities and procedures. The internal auditor has conducted safety and financial audits of operations, but does not have the qualified resources to conduct assessments of quality (I-QA-17).

- The Ames QA Committee has not established and implemented a corrective action program to track and bring to closure quality defects that are found during internal and external audits (I-QA-15). Internal audits are conducted by the Ames QA representatives in their normal surveillance function, and by an Ames QA audit group; whereas external audits are considered to be those conducted by an external to Ames source (e.g., CH, ISU ES&H, EPA, state, and Tiger Team).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991 and was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of policy implementation to meet DOE requirements for quality assurance activities.

FINDING QA/CF-6: Training of Environmental Personnel

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs." Some elements specifically required, per DOE 5400.1, are procedures, field quality control, laboratory quality control, recordkeeping, chain-of-custody procedures, and independent data verification.

DOE 5700.C, "Quality Assurance," Section 9.b.(1)(b), states that "personnel shall be trained and qualified to ensure that they are capable of performing their assigned work. Personnel shall be provided continuing training to ensure that job proficiency is maintained."

The "Ames Laboratory Quality Assurance Program," November 1991, required the QA program to be in accordance with DOE 5700.6 (no revision level specified) and the basic requirements of ASME, as appropriate. Chapter II, Section 2, states that "the QA Program shall provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to assure that suitable proficiency is achieved and maintained."

Finding

Ames personnel performing environmental sampling are not provided adequate training to ensure that quality assurance objectives are maintained while performing their duties, as required by DOE 5700.6C and the Ames Laboratory Quality Assurance Program.

Discussion

To carry out the DOE policy, personnel who perform functions vital to the generation, maintenance, and preservation of defensible environmental data must be knowledgeable of environmental quality assurance requirements. However, personnel at Ames responsible for environmental monitoring are not knowledgeable of environmental quality assurance requirements, specifically:

- Ames personnel witnessed taking environmental samples during this assessment were not familiar with some requirements that are necessary to maintain defensibility of data (I-QA-7 and I-QA-21). Areas of unfamiliarity included chain-of-custody procedures, recordkeeping, laboratory holding times, sampling methods and procedures (see Findings QA/CF-6 and GW/CF-1), and the need to utilize sampling laboratories with accepted and defensible certification.

- Two of the most experienced environmental sampling people shall be retiring in June 1992 (I-QA-7 and I-QA-21). There are currently no in-house replacements (I-QA-13), and a training program for ES&H samplers has not been established (I-QA-23). The replacement issue is yet to be addressed (I-QA-13).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are risk and resources. The responsible parties at Ames have not evaluated the risk of compiling environmental data which may not be defensible. Ames management has not provided resources to ES&H which are necessary to assure their environmental compliance.

FINDING QA/CF-7: Calibration and Traceability of Standards

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity."

DOE 5700.6C, "Quality Assurance," Section 9.b.(2)(a), states that "equipment used for process monitoring or data collection shall be calibrated and maintained."

The "Ames Laboratory Quality Assurance Program," November 1991, requires the QA Program to be in accordance with DOE 5700.6 (no revision specified) and the basic requirements of ASME NQA-1. Chapter II, Section 12, states that "tools, gages, instruments, and other measuring and test equipment used for activities affecting quality shall be controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits."

Finding

The calibration program for tools, gages, instruments, and other measuring and test equipment at Ames that is being used for environmental sampling and analytical activities does not meet the requirements of DOE 5400.1, 5700.6C, and the Ames QA Program.

Discussion

To ensure the defensibility of data, equipment used to measure environmental data must be regularly checked against standards with known relationship to national standards. Records of calibration must be maintained, and evidence of calibration must be shown on each instrument on which calibration is required. Traceability of the standard's lot number is essential to provide the isolation of data that would be questionable in event of a standard manufacturer's recall. Specific examples of calibration deficiencies are as follows:

- Ames ES&H Group has not established which instruments should be on a calibration program, and the frequency and type of calibration required (I-QA-13).
- ES&H instruments, which were calibrated by Ames ES&H personnel, were not tagged to identify next recall date, or the person who performed the last calibration (I-QA-21 and I-QA-22).
- Lot number of standards used to calibrate the pH meter was not recorded during a groundwater sampling event (see Finding GW/CF-1) conducted in mid-February 1992 (QA-12).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991. It was partially identified in the CH QA

Audit Report performed on the Scientific and Technology Division during February 25-28, 1991.

The apparent causal factors for this finding are policy implementation and risk. Ames did not formalize the DOE requirement for calibration and traceability and the responsible parties did not evaluate the relative degree of risk involved.

FINDING QA/CF-8: Environmental Records

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity." DOE further requires that the Quality Assurance Plan shall include auditable records.

DOE 5700.6C, "Quality Assurance," Section 9.b.(1)(d), states that "records shall be specified, prepared, reviewed, approved, and maintained."

The "Ames Laboratory Quality Assurance Program," November 1991, requires the QA Program to be in accordance with DOE 5700.6 (no revision level specified) and the basic requirements of ASME NQA-1, as appropriate. Chapter II, Section 17, states that "records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented."

DOE 1324.5, "Records Management Program," sets forth the DOE policy for records management programs. Section 5.b.(2) requires the development and application of standards, procedures, techniques, and technology designed to ensure the maintenance, security, and preservation of and access to records of continuing value. Section 6.b.(2) requires that departmental records be maintained and used in an effective, efficient, and authorized manner.

Finding

Ames ES&H has not implemented a QA records management program to ensure the maintenance, security, preservation of, and access to environmental sampling records of continuing value, as required by DOE 5400.1, 5700.6C, 1324.5, and the Ames Laboratory Quality Assurance Program.

Discussion

As a DOE facility, Ames is required to monitor and maintain records of environmental surveillance. To ensure legal defensibility, records of these activities must be maintained and be auditable. Records of environmental sampling are incomplete, not standardized, and are stored in an impromptu manner with little regard for potential damage or misplacement. Specific examples of records management deficiencies are as follows:

- Records of groundwater environmental surveillance activities are kept in a standard lined notebook with data entered at the discretion of the sampler. Since the pages are blank, information entered may not be consistently recorded and vital information may be omitted. No record of past sampling events was found, although groundwater sampling is supposedly performed on a 3-month cycle (I-QA-21).

- Records for use of the alpha containment facility are kept on a log sheet that requires specific information (I-QA-7). However, not all pertinent information is required on the form. For example, time between completion of an operation at the glovebox and time of sample analysis is not required data. Some sample data was not completed. Time of day was entered in some cases, and in others it was not.

- Records of groundwater and alpha containment activities are kept on paper in the ES&H area. There is no backup, and this information could be misplaced, discarded, or damaged by fire or water.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991. It was partially identified in the CH QA Audit Report, performed on the Scientific and Technology Division during February 25-28, 1991.

The apparent causal factors for this finding are policy implementation and risk. Ames did not formalize the requirement for defensible recordkeeping and the responsible parties did not evaluate the risk associated with the potential loss of environmental records.

FINDING QA/CF-9: **Independence of Quality Assurance (QA) Committee/QA Committee Manager**

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity."

DOE 5700.6C, "Quality Assurance," Section 9.b.(1)(a) and (3)(b), state that "the QAP shall describe the organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing adequacy of work" and "the organization performing independent assessments shall have sufficient authority and freedom from the line organization to carry out its responsibilities."

The "Ames Laboratory Quality Assurance Program," November 1991, requires the QA Program to be in accordance with DOE 5700.6 (no revision specified) and the basic requirements of ASME NQA-1. Chapter II, Section 1, states that "(quality organizations) shall have direct access to responsible management at a level where appropriate action can be effected. Such persons shall report to a management level such that required authority and organizational freedom are provided, including sufficient independence from cost and schedule considerations."

Finding

The QA Committee and its manager are not independent of line organization cost and schedule responsibility, as required by DOE 5700.6C and NQA-1.

Discussion

The independence and impartiality of quality assurance personnel are an essential and integral part of an effective QA Program. Persons responsible for quality attainment shall have sufficient authority and organizational freedom to identify problems, initiate solutions to quality problems, verify solutions, and control deficiencies. Specific deficiencies pertaining to independence of quality that could affect environmental QA are as follows:

- QA policy is formulated by the Ames QA Committee, who are appointed by the Ames Director. While these members have an interest in QA, all have overriding interests in the performance of their regular duties; therefore, the potential for conflict of interest exists.

- Meetings of the Ames QA Committee are not conducted on a frequent, routine basis. Minutes of QA Committee meetings were reviewed which showed group meetings on May 15, 1990, September 7, 1990, November 19, 1990, and January 10, 1992 (QA-13). This level of activity is not sufficient to formulate Ames QA policy and monitor Ames QA activities, as required by the Ames QA Program.

- A preliminary roster of QA representatives made up of quality oriented individuals across the lab was discussed during the January 10, 1992, QA Committee meeting. These representatives have not been instructed on the requirements of their additional duties, and the mission and appointment of these people has not been publicized (I-QA-27, I-QA-28, and I-QA-29).

- The manager of the QA Committee is also responsible for all activities within the Administrative Services Division. Impartial monitoring of QA Committee duties could be a potential conflict of interest in an area over which he has cost and schedule responsibilities. An example of this could be quality oversight of the procurement of analytical services (see Finding QA/CF-11). Efforts to oversee procurement of laboratory analysis, as required by an effective environmental quality assurance program, might be overshadowed by cost and schedule priorities within this group.

This finding was not identified in the ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation and risk evaluation. Ames did not formalize an effective quality assurance program which would assure the independence of quality personnel and did not evaluate the risk in not maintaining their independence.

FINDING QA/CF-10: Environmental Quality Assurance (QA) Procedures

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs."

DOE 5700.6C, "Quality Assurance," Section 9.b.(2)(a) states that "work shall be performed under controlled conditions using approved instructions, procedures, or other appropriate means."

Finding

Environmental sampling activities are being performed at Ames with procedures that are not consistent with the operation, lack sufficient detail, or are inaccurate as required by DOE 5400.1 and 5700.6C.

Discussion

Quality assurance procedures are the mechanism which ensures that operations are conducted in accordance with regulatory requirements, and are the functional implementation of a quality assurance policy. The use of approved procedures ensures that quality assurance practices are performed in a uniform, consistent, and auditable manner. Specific deficiencies in Ames procedures include the following:

- The procedures to sample the groundwater monitoring wells associated with the inactive waste site are not dated or signed by a QA representative (QA-14). The procedures did not follow a logical sequence of activities, and omitted specific crucial steps in obtaining the samples (see Finding GW/CF-1). Corrections to the procedures were made during the sampling operation (I-QA-21).

- The procedures to sample the groundwater monitoring wells associated with the diesel fuel underground storage tanks are not dated or signed by a QA representative (QA-15). Procedural direction was not firm; use of wording, such as "if necessary," leaves further analysis up to the discretion of the sampler.

- The air sampling procedure did not follow a logical sequence of activities, and did not contain enough detail to minimize the chance of error (QA-16). Procedural direction was not firm; use of wording, such as "if practicable," makes certain steps optional to the sampler.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of <u>policy implementation</u> to effectively implement DOE 5700.6C.

FINDING QA/CF-11: Quality Assurance (QA) Overview of Environmental Procurement

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10.a, states that "a quality assurance program consistent with DOE 5700.6B (revised to DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs." DOE 5400.1, Section 10.b, further states that "DOE contractor laboratories shall confirm the need and apply for any certification requirements with appropriate Federal, State or local agencies. Where DOE operations secure the support of outside contractor laboratories, this work shall be conducted by appropriately certified laboratories."

DOE 5700.6C, "Quality Assurance," Section 9.b.(2)(c), states that "prospective suppliers shall be evaluated and selected on the basis of specified criteria."

The "Ames Laboratory Quality Assurance Program," November 1991, requires the QA program to be in accordance with DOE 5700.6 (no revision level specified) and the basic requirements of ASME NQA-1, as appropriate. Chapter II, Section 7, states that "the procurement of items and services shall be controlled to assure conformance with specified requirements. Such control shall provide for the following, as appropriate: source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services upon delivery or completion."

Finding

Ames does not apply quality assurance requirements to the procurement of environment analytical services, as required by DOE 5400.1, 5700.6C, NQA-1, and the Ames Quality Plan.

Discussion

To ensure that Environmental Quality Assurance (EQA) requirements are applied to the procurement of environmental analytical services, and that only certified sources are used, a quality assurance review must be a part of the procurement process. This will ensure a valid and defensible position regarding validity of environmental data. Specific examples of deficiencies are as follows:

- Requisitions for ES&H analytical services are completed and sent to procurement without a review for environmental quality assurance. After completion of the requisition, the ES&H administrative assistant reviews the form for Safety and Health impact, but not for environmental concerns (I-QA-26). A list of laboratories certified for environmental analysis is not used as a checklist. There is no review by a QA representative to assure that all EQA requirements are met, and that the supplier of services is properly certified.

- Groundwater samples taken at the inactive waste sites have been sent to the Analytical Lab at ISU (I-QA-21). This facility is not

certified by EPA or the State of Iowa; therefore, their results may not be defensible.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was fully identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are policy implementation and risk. Ames did not communicate the DOE requirement regarding certification of environmental analytical vendors to its responsible parties and did not evaluate the risk in accepting data that could be questionable.

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3.5.7 Radiation

3.5.7.1 Overview

The radiation portion of the Tiger Team Assessment consisted of evaluating current operational practices and programs at Ames to determine compliance status with applicable 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 assessment included interviews with DOE and Ames employees; inspection of selected Ames facilities and locations; and review of documents, procedures, and records associated with environmental radiation programs. Table 3-10 lists environmental radiation protection regulations, DOE Orders, and guidelines that were used to conduct this assessment.

As a part of the environmental radiation assessment, reviews were coordinated with other Environmental Subteam specialists to ensure that all potential environmental radiation problems were identified and evaluated. Reviews were conducted with the surface water specialist to evaluate liquid effluent monitoring and release control programs; the groundwater specialist to evaluate sources of potential groundwater contamination from historical and present releases of radioactive liquids, and existing soil contamination; the quality assurance specialist to assess environmental program oversight and control; the waste management specialist to assess the adequacy of radioactive and mixed waste management, storage, and disposal; the inactive waste site specialist to evaluate surveillance and maintenance of inactive radioactive waste disposal sites; and the air specialist, to evaluate process effluent monitoring, ambient air sampling, and meteorological data acquisition systems. Environmental radiation findings are included in the report sections of other disciplines, as appropriate.

The general approach to the radiation portion of the assessment included the following activities: (1) an examination of the environmental surveillance activities; (2) an examination of the effluent monitoring activities; (3) review of the decontamination and decommissioning (D&D) activities; (4) radiological facility design; and (5) a review of assessment of doses to the public from airborne and liquid effluents and direct radiation.

The Ames Environmental, Safety and Health (ES&H) Group is responsible for radiation protection at Ames. The personnel responsible for radiation protection of the public and the environment include: a manager of ES&H, a health physics technician, a chemist with environmental radiation responsibilities, and an operational health physicist/industrial hygienist who is responsible for radioactive and mixed waste management.

The present activities at Ames result in low amounts of radioactivity being discharged in liquid and air effluents. At present, uranium and thorium isotopes are emitted in small quantities from air effluents. The total quantity of air effluents released during normal operations, and the resulting potential dose to the public, is far below the exposure standards established by the EPA in 40 CFR 61 Subpart H, "National Emissions Standards for Emission of Radionuclides Other than Radon from DOE Facilities."

TABLE 3-10
LIST OF RADIATION
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE 5400.5	Radiation Protection of the Public and the Environment	DOE
DOE 5480.1B	Environment, Safety, and Health Programs 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 5480.11	Radiation Protection for Occupational Workers	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 5500.3A	Planning and Preparedness for Operational Emergencies	DOE
DOE 5700.6C	Quality Assurance	DOE
DOE 5820.2A	Radioactive Waste Management	DOE
DOE 6430.1A	General Design Criteria	DOE
10 CFR 834 (Draft)	Radiation Protection of the Public and the Environment	NRC
40 CFR 61, Subpart H	National Emissions Standards for Emission of Radionuclides other than Radon from Department of Energy Facilities	EPA

TABLE 3-10
LIST OF RADIATION
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE/EH-0173T	Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance	DOE
ANSI N13.1-1969	American National Standards Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities	ANSI
ASME NQA-1	Quality Assurance Program Requirements for Nuclear Facilities	ASME

Uranium, thorium, activation product and mixed fission product (primarily Co-60 and Cs-137) isotopes have been released in small quantities through liquid effluents (primarily from past operations of the Ames Laboratory Research Reactor) (see below). Liquid radioactive effluents are released from the Radioactive Waste Disposal Building (monitored releases) and from the laundry for handling suspect radioactive clothing in Spedding Hall (unmonitored releases). All liquid radioactive releases are directed to the City of Ames water pollution control plant.

Spread of radioactive contamination to the environment has resulted from past operations. In the early 1950's, thorium wastes were released to the City of Ames water pollution control plant, resulting in thorium contamination of the sludge. This sludge was reported to have been spread over four areas in the City of Ames. Cleanup operations have removed most of this contamination from the water pollution control plant (the only verified location of contamination spread). However, some residual contamination, close to the unrestricted release limits, still remains at the plant. Other areas with unquantified residual contamination include the areas from where Annexes I and II were removed, the Chemical Disposal Site, and the uranium burn area.

In general, the radiological risks to the public and the environment from past operations at Ames are low. Residual contamination in the environment results in a low radiation dose rate potential. However, the environmental radiation/prevention management at Ames requires improvement to meet the requirements of DOE Orders and applicable Federal, state, and local regulations. Documentation to demonstrate compliance with applicable Orders and regulations needs to be maintained and formalized into an auditable format.

Although protection of the public and the environment from radioactive materials has not been an issue, improvements in the overall program are necessary. Ames lacks formal programs and procedures to document proper protection of the public and the environment. Ames does not have a formalized radioactive effluent and environmental surveillance program. Although a draft Environmental Monitoring Plan is in the review process, it does not contain all the required elements of an effective environmental protection program.

The radiation portion of the Tiger Team Assessment identified four compliance findings. The findings pertain to a lack of formalized radioactive effluent monitoring and environmental surveillance programs; inadequate controls for the release of real and personal property; lack of demonstration of compliance with public dose limits; and lack of an environmental ALARA program.

3.5.7.2 Compliance Findings

FINDING RAD/CF-1: Radiological Effluent Monitoring and Environmental Surveillance Programs

Performance Objective

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 5.a, requires that effluent monitoring be conducted at all DOE sites to verify compliance with applicable DOE Orders.

DOE 5400.1, Chapter IV, Section 5.b, requires that environmental surveillance be conducted to monitor the effects of DOE facilities on onsite and offsite environmental and natural resources. It also requires that an environmental surveillance screening program be undertaken to determine the need for a permanent surveillance program.

DOE 5400.1, Attachment II, Section 5, provides guidance on the suggested format of the Annual Site Environmental Report Summary and states that "The total quantity of radioactivity by radionuclide released as airborne and liquid effluents should be included, along with descriptive information on nonradioactive effluents."

DOE 5400.5, "Radiation Protection of the Public and the Environment," Chapter I, Section 8.a, states that "Demonstrations of compliance with requirements of this Order generally will be based upon calculations that make use of information obtained from monitoring and surveillance programs."

DOE 5400.5, Chapter II, Section 6, contains the requirements for demonstration of compliance with dose limits and Section 6.a states that "General requirements for routine effluent monitoring are part of the environmental monitoring plan prescribed in DOE 5400.1. . . . The monitoring requirements are applicable to all DOE or DOE contractor operations that are subject to the standards and requirements of this Order."

DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," contains "elements of a radiological effluent program considered acceptable to DOE, . . ." The following are requirements of this guidance document:

- Section 1.d of the "Summary of Effluent Monitoring and Environmental Surveillance" states that "The potential for airborne or liquid release of radioactive material (including accidental releases) *should* be evaluated and documented in the Environmental Monitoring Plan."

- Section 5.0 states that "An evaluation *should* be conducted and used as the basis for establishing an environmental surveillance program for all DOE-controlled sites."

- Section 5.2.1 states that "An annual review for the radionuclide composition of effluents or emissions *should* be made and compared with those used to establish the Environmental Monitoring Plan."

Finding

Ames has not implemented radiological effluent monitoring and environmental surveillance programs as required by DOE 5400.1, 5400.5, and DOE/EH-0173T.

Discussion

Ames has not implemented comprehensive radioactive effluent monitoring and environmental surveillance programs. Examples of deficiencies include, but are not limited to, the following:

- Radioactive air emissions are not routinely monitored, and some radioactive air emissions have never been monitored. Ames has not adequately inventoried and characterized all radioactive air emission sources. As a result, Ames is not able to provide accurate Radioactive Effluent and On-site Discharge Data Reports (as required by DOE 5400.1, Chapter II, Section 5.a).

- Radioactive liquid effluents are monitored from the Radioactive Waste Disposal Building, including the radioactive laundry in that facility. However, there is a laundry for handling suspect radioactive clothing in Spedding Hall which is not monitored prior to discharge. Discussions with site personnel (I-R-12) indicated that there are no other radioactive liquid effluents from Ames.

- Ames does not perform radioactive air effluent monitoring, or radioactive liquid effluent monitoring of the laundry for handling suspect radioactive clothing in Spedding Hall. Therefore, Ames does not provide accurate data concerning quantities of radioactivity released by radionuclide in the Annual Site Environmental Report (ASER) as suggested in Chapter II of DOE 5400.1.

- The potential for radioactive liquid releases from Ames has not been documented in the draft Environmental Monitoring Plan (EMP) (R-44) as suggested in the "Summary of Effluent Monitoring and Environmental Surveillance" section of DOE/EH-0173T.

- Radiological environmental surveillance of past operational areas (i.e., the four alleged thorium contaminated sludge disposal areas and Annex I) does not meet current DOE standards. While radionuclides potentially present from Ames operations are relatively insoluble in soil, and recent surveys of these areas demonstrate no contamination is present in these areas, Ames has not positively demonstrated that soils, surface water, and groundwater are uncontaminated. Defensible characterization of these sites could eliminate the need for continued environmental surveillance. Additionally, there are no vegetation samples where there is known contamination, e.g., the Chemical Disposal Site.

- Ames has not documented the evaluation used for establishing their environmental surveillance program for radionuclides as recommended in Section 5.0 of DOE/EH-0173T.

- Ames does not perform and document annual reviews for the radionuclide composition of their effluents or emissions as recommended in Section 5.2.1 of DOE/EH-0173T.

- Ames is not able to provide a demonstration of compliance with the public dose limits of DOE 5400.5 because it does not have the effluent monitoring and environmental surveillance data necessary to perform this evaluation (see Finding RAD/CF-3).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are policy implementation concerning the effluent monitoring and environmental surveillance requirements of the DOE Orders and guidance documents; and inadequate appraisals/audits/reviews of these requirements.

FINDING RAD/CF-2: Release of Real and Personal Property

Performance Objective

DOE 5400.5, "Radiation Protection of the Public and the Environment," Chapter IV, contains the requirements for monitoring and the allowable radioactive contamination levels for property and materials being released for unrestricted use. Chapter II, Section 5, contains additional requirements for release of property having residual radioactive material.

Finding

Ames radiological release surveys for real and personal property are not in accordance with the requirements of DOE 5400.5.

Discussion

Ames performs release surveys of real and personal property and of materials and equipment from laboratories and controlled areas. Examples of deficiencies in connection with these surveys include, but are not limited to, the following:

- Documentation of release surveys is not maintained, including a description of the property, date of last radiation survey, results of monitoring, and identification of recipient receiving the released material, etc. (R-25 and R-42; I-R-12).

- Contamination control is not maintained during storage of materials prior to release surveys. Materials requiring release surveys are not always surveyed at the point of generation, or prior to exit from a controlled or radiologically controlled area. Central accumulation areas are sometimes used to collect potentially contaminated items, where they may be surveyed collectively at a convenient time. Though the potential for spread of contamination may be low, movement of potentially contaminated materials, prior to release surveys, could result in the spread of contamination to the environment. If contamination is detected on materials in the central collection area, surveys are not necessarily performed to verify that the route used to transport the contaminated item is free of contamination (I-R-7).

- Release of real property is not conducted as required by DOE 5400.5. Residual contamination, in excess of release limits, remains in the Ames Laboratory Research Reactor (R-35) and may remain in pipes embedded in the walls of the former reactor. Residual contamination, in excess of the limits of DOE 5400.5, Chapter IV, Section 4.a.(2), remains at the City of Ames water pollution control plant. Residual contamination, possibly in excess of release limits, remains in the soils where Annexes I and II were previously located (R-28). Comprehensive sampling of these areas has not been conducted to verify that these properties can be released for unrestricted use. The soil survey at the site of the former Ames Blockhouse at the Applied Science Center samples soils in two 15 cm layers. DOE 5400.5 requires samples in the 0-5 cm layer, and the 15 cm layer below the 0-5 cm layer meet

the release criteria. The first 15 cm sample performed does not meet the 0-5 cm requirements. Additionally, the area where Little Ankeny was buried and later removed from contains areas with doserates significantly above background (up to 0.375 mR/hr with a background of around 0.007 mR/hr).

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation concerning the release survey requirements of DOE 5400.5; inadequate resources to ensure that proper release surveys are conducted; and inadequate appraisals/audits/reviews of these issues which were not previously identified.

FINDING RAD/CF-3: Demonstration of Compliance with Public Dose Limits

Performance Objective

DOE 5400.5, "Radiation Protection of the Public and the Environment," contains the requirements for demonstration of compliance with the public dose limits. Chapter I, Section 10.a, requires that "calculations of dose to the public from exposures resulting from both routine and unplanned activities be performed using standard EPA or DOE dose conversion factors or analytical models prescribed in regulations applicable to DOE operations."

Chapter II, Section 6, states that "Compliance with the dose limits of this Order shall be demonstrated by documentation of an appropriate combination of measurements and calculations to evaluate potential doses and the results of the evaluations." Section 6.b states that "Doses to members of the public in the vicinity of DOE activities shall be evaluated and documented to demonstrate compliance with the dose limits of this Order and to assess exposures of the public from unplanned events. Collective doses to the public within 80 km of the site shall also be evaluated and documented at least annually."

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 7.b, states that "An assessment of the potential radiation dose to members of the public which could have resulted from site operations shall be made for facilities required to conduct effluent and environmental radiological monitoring."

Finding

Ames has not demonstrated compliance with public dose limits (including dose to the maximally exposed individual and collective population doses) as required by DOE 5400.5.

Discussion

Ames has not demonstrated compliance with public dose limits, and has not verified that dose limits have not been exceeded. DOE 5400.5 requires that dose to the maximally exposed individual and collective population doses be evaluated by methods which include exposure from all pathways (i.e., direct radiation, air, water, food, etc.), by use of appropriate models, and by use of appropriate dose conversion factors. Section 6.b.(1) of Chapter II allows the use of the AIRDOS computer program to calculate airborne doses.

Ames has attempted to demonstrate compliance with the 40 CFR 61 Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities," (NESHAP) using AIRDOS. However, this standard is only for exposure by the airborne pathway, and only calculates dose to a maximally exposed individual. It does not take into account other pathways such as direct radiation, ingestion of foodstuffs, milk, or water. Also, the NESHAP calculation did not evaluate all airborne pathways. The NESHAP calculations did not include all releases or potential releases from the Metals Development Building, and doses to the public from releases of tritium from the walls of the former Ames Laboratory Research Reactor.

Annual Site Environmental Reports (R-2 and R-16) have included a section on reporting potential dose to the public. However, of the last 3 years, only the 1988 report included a dose estimate to a maximally exposed individual, and this dose estimate was incomplete. This report included a dose estimate for workers involved in maintenance activities at the water pollution control plant where thorium contaminated sludge was spread onto the ground. The dose estimate included a direct radiation dose estimate only, and did not consider doses from possible worker inhalation, and subsequent internal deposition, of thorium from dust generated during lawn mowing operations in this area.

To date, no estimates of the collective population doses to members of the public within 80 km of the site have been performed. Also, no dose estimates of any kind have been performed that assess all potential environmental pathways.

A final concern in this area is the "Statement of Certification for DOE Order 5400.5," (R-29). This letter is required by Section 4 of DOE 5400.5 to certify compliance with all requirements contained within the Order. Based on the lack of demonstration of compliance with public dose limits, this certification is not accurate.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of policy implementation to fully meet the requirements of DOE 5400.5; and inadequate appraisals/audits/reviews of these issues which were not previously identified.

FINDING RAD/CF-4: Environmental ALARA Program

Performance Objective

DOE 5400.5, "Radiation Protection of the Public and the Environment," Chapter II.2, states that "Field Elements shall develop a program and shall require contractors to implement the ALARA process for all DOE activities and facilities that cause public dose."

Finding

Ames has not developed and implemented an ALARA program to minimize doses to the public and the environment as required by DOE 5400.5.

Discussion

DOE 5400.5 requires that all DOE operations maintain radiation exposures to the public and the environment at levels that are "as low as reasonably achievable" below the applicable dose limits. In March 1991, the DOE Office of Environment, Safety and Health provided guidance to field offices for implementation of the ALARA process to protect the public and the environment. The guidance was intended to supplement the requirements of DOE 5400.5. It was also to be used for ALARA programs in controlling exposures to the public from normal operations, and in developing authorized radiological limits for the release of DOE property and materials.

Ames has not developed an ALARA program to minimize doses to the public and the environment from Ames activities that may result in radiological exposures to the public. These activities include plutonium operations in the alpha glovebox facility; uranium, depleted uranium, and thorium processing in the Materials Preparation Laboratory; and radioactive waste management activities throughout the laboratory.

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of training of personnel implementing the DOE 5400.5 ALARA process; and policy implementation in that the ALARA process has not been implemented for radiological effluents that cause public dose.

3.5.8 Inactive Waste Sites

3.5.8.1 Overview

The purpose of the inactive waste site (IWS) portion of the Tiger Team Assessment was to evaluate: (1) management of inactive waste sites located at Ames; (2) management and conduct of studies to respond to these sites; (3) compliance with Federal, state, and local requirements dealing with inactive waste sites and releases, such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, the National Contingency Plan (NCP), 40 CFR 300 et seq., and DOE 5400.4; and (4) adherence to best management practices. SARA 311 and 312, Emergency Planning and Community Right to Know (EPCRA) requirements do not apply directly to Ames because it is a research laboratory. However, DOE has recommended that its facilities report to local emergency committees to provide them with information about the quantity and nature of hazardous substances present at the facility. Therefore, adherence to the provisions of EPCRA, was evaluated as a best management practice. The regulations, requirements, and guidelines used in this assessment are presented in Table 3-11.

The scope of this assessment included a review of documents, plans, sampling results, and correspondence; inspections of facilities and inactive waste sites; interviews with Ames staff, regulatory personnel, ISU staff, and local citizens; and evaluation of the spill reporting process. During the assessment, Environmental Subteam members from the groundwater/soils, sediments and biota; toxic and chemical materials; surface water; and radiation disciplines were consulted regarding the potential for contamination at various locations.

Duties and activities pertaining to inactive waste site management, characterization, and documentation are handled informally among the Ames Operations Division. Roles and responsibilities necessary to coordinate and manage activities associated with inactive waste sites, or to implement the requirements of DOE 5400.4 and DOE 5400.1 have not been developed by Ames at the time of this assessment. Ames also has not developed policies and procedures to implement state regulations and DOE requirements for the identification and characterization of inactive waste sites.

The 1987, "Installation Assessment Report for Ames," identified nine sites for further consideration and evaluation (IWS-7). These sites included: the City of Ames Municipal Cemetery, Grand Avenue Underpass, Municipal Airport and Water Pollution Control Plant, ISU's former Chemistry Annex I and Annex II sites, and Ames' Chemical Disposal Site (CDS), Blockhouse, and Ames Laboratory Research Reactor Building (ALRR Building) at the Applied Science Center (ASC) site.

The DOE Preliminary Environmental Survey Report (IWS-4) identified an additional seven potential sites. These seven potential sites included: portions of Gilman Hall and Wilhelm Hall, the ALRR Building septic system, the ASC acid neutralization tank, the ASC Warehouse septic system, the out-of-service sulfuric acid storage tank at the ASC, and potential chromium contamination of soils as a result of drift from the ALRR Building comfort cooling towers. Although one site reported by Ames (ALRR Building), and two

TABLE 3-11
LIST OF INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 4300.1A	Real Estate (Real Property) Management, Chapter III 1.g(18)	DOE
DOE 4300.1B	Real Property and Site Development Planning	DOE
DOE 4320.1B	Site Development Planning	DOE
DOE 4700.1	Project Management System	DOE
DOE 5000.3A	Occurrence Reporting and Processing of Operations Information	DOE
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.19	Conduct of Operations	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 Guidance Document	Natural Resource Trusteeship and Ecological Evaluation for Environmental Restoration at DOE Facilities	DOE
CERCLA/SARA	Section 120 - Federal Facilities	EPA
29 CFR 1910	Part 1910.120 Occupational Safety and Health Standards	OSHA
40 CFR 300	National Oil and Hazardous Substances Contingency Plan	EPA
40 CFR 302	Designation, Reportable DOE-Headquarters Quantities, and Notification	EPA
40 CFR 372	Toxic Chemical Release Reporting	EPA
40 CFR 373	Reporting Hazardous Substance Activity when Selling or Transferring Federal Real Property	EPA
40 CFR 600	Trustees for Natural Resources	EPA

TABLE 3-11
LIST OF INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
OSWER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OSWER Directive 9950.3-01	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	EPA
OSWER Directive 9230.0.3B	Community Relations in Superfund - A Handbook, Interim Version	EPA
Iowa Administrative Code/Chapter 131	Notifications of Hazardous Conditions	State of Iowa

sites identified during the DOE Preliminary Environmental Survey (IWS-6), (Gilman Hall and Wilhelm Hall) possessed internal building radioactive contamination, information available to the Tiger Team indicates that they do not represent a significant source of environmental contamination.

The City of Ames Municipal Cemetery, Grand Avenue Underpass, Municipal Airport, and Water Pollution Control Plant (WPCP) sites were evaluated by Ames for thorium contamination. The source of the thorium resulted from the inadvertent disposal of mesothorium-laden nitrate and oxalate by Ames into the sanitary sewer system in the early 1950s. The problem was identified by Ames and the discharge was ceased. However, subsequent studies by Ames revealed that the mesothorium was bound in the sewage sludge. The thorium contaminated sludge was segregated by Ames personnel, and stored at the City of Ames Water Pollution Control Plant. The thorium contaminated sludge was then reported to have been land applied by the City of Ames in the above-mentioned areas.

Ames conducted the surveys of the City of Ames Municipal Cemetery, Grand Avenue Underpass, Municipal Airport and WPCP in 1976, and conducted remediation of thorium contaminated soil at the WPCP in 1988. Thorium contamination was verified at the Ames Municipal Airport; however, cleanup activities were not performed because the contaminated area was covered with pavement. Ames' survey of the Municipal Cemetery and the Grand Avenue Underpass did not identify the presence of thorium contamination.

The CDS is currently undergoing characterization. The CDS was used in the early 1950s for disposal (burial) of laboratory equipment and chemicals. Disposal occurred in 9 pits within a 2,800 square foot area. The site has a "c" classification on the State of Iowa disposal registry. The "c" classification is assigned to sites that, in the opinion of the Iowa Department of Natural Resources (IDNR), do not pose a significant health or environmental threat, and does not require immediate action. This site is presently the subject of a remedial investigation/feasibility study (RI/FS) that is in the early stages of development.

The remaining four areas identified in the 1987 Installation Report for Ames have been subjected to varying levels of investigations. The investigations involved radiological surveys and soil sampling for radiological parameters. Removal actions were performed to address areas of elevated levels of radiological contamination at the Blockhouse Site. Ames concluded, based on their investigations, that residual levels of radiological contamination did not pose a significant threat to the health and safety of the public or the environment at these sites.

The potential inactive waste sites identified during the Preliminary Environmental Survey Report (IWS-4) were included in the 1987 transfer of ASC to Iowa State University, with the exception of Gilman and Wilhelm Halls.

Generally, Ames management of inactive waste sites will require significant improvements to meet the requirements of DOE Orders. Ames has not taken a comprehensive approach, incorporated the necessary framework, or documented their activities aimed at bringing to closure the issues pertaining to known and potential inactive waste sites. As a result, Ames cannot demonstrate that all inactive waste site concerns have been addressed.

The inactive waste sites portion of the Tiger Team Assessment identified four compliance findings. The findings pertain to inactive waste site program planning; inactive waste site identification and characterization; spill response; and site development planning. A best management practice finding relating to a lack of reporting of Ames' inventories of hazardous material to the local emergency planning organization was also identified.

3.5.8.2 Compliance Findings

FINDING IWS/CF-1: Inactive Waste Site Program Planning

Performance Objective

DOE 5400.4. "Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Requirements," Sections 7.a and 7.c, require that DOE respond to hazardous substance releases in accordance with CERCLA and the National Contingency Plan (NCP) regardless of whether the site is included on the National Priorities List, and that in instances where corrective actions are carried out under other authorities, DOE needs to ensure that these corrective actions are not inconsistent with the NCP.

DOE 5400.4, Section 8.e, states that DOE facilities shall "gather information with respect to releases and potentially imminent releases of hazardous substances and maintain a field organization-wide record of all actions taken under this Order, CERCLA, as amended, the NCP, and applicable DOE policies, requirements, and procedures related to such releases."

40 CFR 300.430(d)(2) states that the lead agency shall characterize the nature of, and threat posed by, contaminant releases and gather data necessary to assess the extent to which it poses a threat to human health or the environment.

DOE 4700.1, "Project Management Systems," Section 7.a, states that "the primary objective of this Order is to assure the application of sound management principles to provide a disciplined, systematic and coordinated approach to project management resulting in efficient planning, organization, coordination budgeting, management, review, and control of DOE projects."

DOE 5480.19, "Conduct of Operations," states that it is DOE policy to conduct its operations with a consistent and auditable set of requirements, standards, and responsibilities. Chapter 1 of the Order states that "effective implementation and control of operating activities are primarily achieved by establishing written standards in operations, periodically monitoring and assessing their performance and holding personnel personally responsible for their performance."

Finding

Ames does not have a program in place to identify, characterize, and manage inactive waste site activities in accordance with the requirements of DOE 5400.4, CERCLA, the NCP, and Executive Order 12850.

Discussion

DOE 5400.4 requires that its facilities follow the provisions of CERCLA, the NCP, and Executive Order 12850 for investigation and remediation of hazardous materials releases. This procedure is to be followed regardless of whether the site is listed on the National Priorities List. If state or local authorities are the lead agencies, and the remedial action is carried out under these authorities, DOE recommends that the site enter into a formal arrangement with the appropriate authorities to clearly define the roles and responsibilities of each party, and to ensure that the actions are not

inconsistent with the NCP. The Order also defines the responsibilities of the Head of Field Organizations (CH) to include the oversight of the implementation of this Order.

Ames does not have a management system, with defined roles and responsibilities, to effectively manage a program to identify and characterize inactive waste sites. Because there is no specific management system in place at Ames to provide structure and develop policies and procedures to ensure that the requirements of DOE 5400.4 are met, historic responses to contaminated areas resulting from Ames activities were disjointed. Historic responses were also often performed without work plans or formal approval from either DOE or state authorities, and were poorly documented (see Finding IWS/CF-2). Specific examples of deficiencies are discussed in more detail below:

- Ames does not have a written procedure to implement the requirements of DOE 5400.4. This was exemplified by the interpretation of DOE 5400.4 as it applies to the Ames facility described in their self-assessment. A concern relating to DOE 5400.4 titled "Management of Inactive Waste Sites," was identified; however, it only addressed the characterization of the Chemical Disposal Site. The finding did not address any other inactive waste sites. In addition, the Annual Site Environmental Reports state that the only portion of CERCLA to apply to the Ames site is the Superfund Amendments and Reauthorization Act (SARA). This is a clear indication of the lack of understanding the requirements of DOE 5400.4, and how they apply to the Ames facility.

- Documentation of previous assessment activities and remedial actions has been incomplete, and is fragmented. Comprehensive final reports for cleanup and post-closure sampling of former hazardous material release areas do not exist (see Finding IWS/CF-2).

- Work plans, health and safety plans, and QA plans were not prepared for many assessments and remedial actions.

- There is presently no formal method to assess, prioritize, and track inactive waste sites.

- Ames personnel who have participated in assessment, monitoring, and remedial activities were not properly trained in those activities, and have not received health and safety training and certification as required by CERCLA.

- Ames has not been diligent in responding to environmental regulatory agencies requests for information, and for notification of site environmental activities (I-IWS-12).

- The site has not entered into formal agreements with the state and local agencies to identify roles and responsibilities in remedial actions. DOE 5400.4 suggests the use of formal agreements with state and local agencies, and where appropriate, Federal

authorities, to ensure that remedial responses are consistent with local, state, and Federal laws and regulations.

- The investigation planned for the Chemical Disposal Facility (CDS) does not include all requirements of CERCLA. Elements missing from the scope include: Administrative Record; a formal Community Relations Plan (note: Ames has been performing activities to update the public on the CDS status); Natural Resource Damage Assessment; and Baseline Risk Assessment.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991 and was partially identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are lack of resources to perform the tasks required to maintain compliance, lack of policy implementation, and lack of personnel with relevant experience.

FINDING IWS/CF-2: Inactive Waste Site Identification, Characterization, and Documentation

Performance Objective

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 103(c) requires that any owner or operator of a facility that discovers a site that treated, stored, or disposed of hazardous substances, and that is not under the Resource Conservation and Recovery Act (RCRA) Subtitle C authority (i.e., inactive waste sites), notify the Administrator of EPA.

40 CFR 300.410 and 420 specify the procedures for preliminary assessments (PA) and site investigations (SI).

DOE 5400.1, "General Environmental Protection Program," states that "it is DOE policy to conduct the Department's operations in compliance with the letter and spirit of applicable environmental statutes, regulations and standards."

DOE 5400.4, "Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Requirements," Sections 7.a and 7.c, requires that DOE respond to hazardous substance releases in accordance with CERCLA and the National Contingency Plan (NCP) regardless of whether the site is included on the National Priorities List, and that in instances where corrective actions are carried out under other authorities, DOE needs to ensure that these corrective actions are not inconsistent with the NCP.

DOE 5400.4, Section 8.e, states that DOE facilities shall "gather information with respect to releases and potentially imminent releases of hazardous substances and maintain a field organization-wide record of all actions taken under this Order, CERCLA, as amended, the NCP, and applicable DOE policies, requirements, and procedures related to such releases."

40 CFR 430(b) of the NCP requires that the scope and timing of remedial investigations and feasibility studies be tailored to the nature and complexity of the problem and the response alternatives being considered.

40 CFR 430(d)(2) states that the lead agency shall characterize the nature of, and threat posed by, contaminant releases and gather data necessary to assess the extent to which it poses a threat to human health or the environment.

Finding

Ames has not adequately identified, and systematically and consistently characterized inactive waste sites, and maintained complete documentation of these activities to ensure compliance with DOE 5400.4.

Discussion

The identification and characterization of inactive waste sites at Ames has been incomplete and poorly documented (I-IWS-11). In addition, existing documents were not kept in organized files to allow for easy review and verification that appropriate types of sampling and analysis had been performed and to ensure that characterization and remedial activities were complete to protect public health and the environment.

Ames identified seven potential inactive waste sites using the methodology presented in DOE 5480.14, performed limited characterization activities, and reported them in their CERCLA Phase I Installation Assessment Report in August of 1987.

Once identified, Ames performed limited characterization activities on their sites. These activities were often performed without input or formal approval from CH (I-IWS-6, I-IWS-11, and I-IWS-49). The activities were not comprehensive, often performed without a sampling plan, were conducted in a disjointed manner, and were not of sufficient scope to fully characterize the subject site.

Examples of deficiencies in characterization activities performed at Ames, and their documentation include, but are not limited to the following:

Blockhouse Site

- The installation report addressed the potential for radioactive contamination of the blockhouse area resulting from historic operations (IWS-7). It did not address the potential for other hazardous materials to be present at the site.

- A memorandum report dated April 1990, discusses survey and removal activities that occurred at the Blockhouse. It states three stainless steel tanks stored behind the Blockhouse released some of their contents resulting in soil contamination. The date that this release occurred, or was discovered is not noted in the memorandum. The tanks were removed to the Waste Disposal Facility, and the contaminated soil was removed on May 6, 1986. There was no documentation of methods employed to remove the soil and verify that all contaminated material was removed. A document (IWS-011) provided to the Tiger Team, as well as interviews conducted during this assessment, do not indicate that soil sampling was performed to verify the results of survey (I-RAD-10) (see Finding RAD/CF-2).

- According to the memorandum, the next radiological survey was not performed until April 7, 1988, when a gamma survey was performed. On August 7, 1988, an alpha/beta survey was performed. The memorandum indicates that soil samples were collected on May 10, 1989. The purpose of the survey or sampling program is not discussed.

- During subsequent characterization activities, an above ground fuel tank was found to be leaking petroleum fuel to the ground beneath it. In response to discovery of the petroleum contaminated soil, a front end loader was brought out to the site, and two buckets of soil were excavated. Although elevated levels of radioactivity were known to be present at the Blockhouse area, the soil was removed from the Blockhouse area, and transported to the ISU landfarm for remediation without a radiological survey (I-IWS-11). Documentation for this activity does not exist (I-IWS-11) (see Finding IWS/CF-1).

- Annex I and II residual contamination, possibly in excess of release limits, remains in the soils where Annexes I and II were previously located (R-28). Comprehensive sampling of these areas has not been conducted to verify that these properties can be released for unrestricted use (see Finding RAD/CF-2).

Wilhelm Hall

- The level and extent of soil and groundwater contamination resulting from a historic diesel fuel release from an underground storage tank has not been properly characterized. The number of wells and the scope of the sampling and analytical program is not sufficient. Two wells were installed and are currently "monitored." However, the samples do not undergo laboratory analysis; they are observed visually and smelled for signs of overt contamination. One set of groundwater samples was sent for analysis; however, they were not sent to a certified laboratory (see Finding QA/CF-11).

- Borings were performed to determine the extent of soil contamination. However, as with the groundwater samples, the soil samples were not submitted to a certified laboratory for analysis (see Finding QA/CF-11).

The 1989 Environmental Survey conducted by DOE found seven additional inactive waste sites, indicating that the identification methods described in DOE 5480.14 were not fully implemented by Ames, and documenting that site identification activities were not complete (IWS-4).

Interviews conducted during the assessment indicate that some actions were taken in response to some issues raised in the survey report; however, these activities were not of sufficient scope and were not documented. Therefore, issues raised in the 1989 Survey Report, in addition to several of the issues raised in Ames 1987 installation report, have not been defensibly closed.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are lack of resources to effectively carry out site characterization activities, and lack of procedures at Ames to conduct inactive waste site identification and characterization.

FINDING IWS/CF-3: Spill Response

Performance Objective

DOE 5400.4, "Comprehensive Environmental Response, Compensation and Liability Act Requirements," states that "It is the policy of DOE to respond to releases and potentially imminent releases of hazardous substances where such releases are on, or the sole source of the release is from, any facility or vessel under DOE jurisdiction, custody, or control, . . ." in accordance with the provisions of CERCLA, as amended, as well as those of the National Contingency Plan (NCP) and Executive Order 12580.

DOE 5400.1, "General Environmental Protection Program," states that "It is DOE policy to conduct its operations in an environmentally safe and sound manner . . . has an equal commitment to advance the goals of restoring and enhancing environmental quality, and ensuring public health . . . is DOE policy to conduct the Department's operations in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards."

Iowa Administrative Code (IAC), Chapter 131, requires that persons observing a hazardous condition notify the authorities of that condition verbally within 6 hours, and in writing, within 30 days of learning of the existence of the hazardous condition.

IAC, Chapter 131 defines "hazardous condition" as "any situation involving actual, imminent, or probable spillage, leakage, or release of a hazardous substance onto the land, into a water of the state or into the atmosphere . . . ." "Hazardous substance" is defined as "any substance or mixture of substances that presents a danger to the public health or safety and includes, but is not limited to, a substance that is toxic, corrosive, or flammable, or that is an irritant or that, in confinement, generates pressure through decomposition, heat, or other means."

Finding

Ames does not have procedures in place to report hazardous material releases and conditions to the State of Iowa pursuant to IAC, Chapter 131, "Notification of Hazardous Conditions."

Discussion

Procedures are necessary to ensure that programs and associated activities are carried out in conformance with state and Federal regulations, and DOE requirements. Ames has not yet developed procedures to ensure that their activities are in conformance with IAC, Chapter 131. This regulation requires that any release or threat of release of a hazardous material to the environment, or any hazardous condition found to be existing in the environment, be reported to the state, regardless of the quantity of material present, or the apparent threat to human health and the environment (I-IWS-25).

Ames has had releases of hazardous materials to the environment, and has had hazardous conditions existing at their facility. Although the threat posed by

these releases and conditions does not appear to be significant, these releases are to be reported to the state pursuant to IAC Chapter 131. Examples of such instances include the following:

- Petroleum contaminated soil at the Blockhouse at the Applied Science Center was discovered and removed without notifying the authorities in mid-1988. This activity was not documented. The contamination resulted from the release of fuel from a rusty, above ground storage tank with approximately 75 - 80 gallon capacity. It was estimated that approximately 30 - 40 gallons were released. Ames contacted the individual at ISU responsible for waste management to determine the response action. The soil was removed from the Blockhouse area, and disposed at an adjacent landfarm site without any radiological survey even though the Blockhouse area was known to previously contain elevated levels of radioactivity. Several gallons of fuel remaining in the tank were removed prior to tank removal (I-IWS-8 and I-IWS-53).

- Disposal activities, and the potential for associated soil and groundwater contamination at the Chemical Disposal Site were not reported to the state. The state discovered these activities during a meeting on the Ames Five Year Plan (I-IWS-13; IWS-25).

Interviews with Ames personnel revealed that they were not aware of the state's non-threshold reporting requirements (I-IWS-53).

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are a lack of <u>policy</u> and lack of <u>training</u> in the requirements of Iowa Administrative Code, Chapter 131, to ensure that releases to the environment and hazardous conditions found in the environment are reported to the authorities in conformance with the requirements of CERCLA and the state notification regulations.

FINDING IWS/CF-4: Site Development Planning

Performance Objective

DOE 4320.1B,"Site Development Planning," states that "all sites shall have in place a process to plan for and develop real property holdings to support the missions of the site. This process shall result in two documents: (1) the 'Technical Site Information' described in Chapter I for use by technical and staff personnel, and (2) the 'Site Development Plan' described in Chapter II for use by senior managers."

DOE 4320.1B, "Site Development Planning," Chapter I, outlines the requirement for the Technical Site Information document to include maps indicating buildings, or lands that are contaminated as well as types of contamination, and to address the potential impacts of siting of facilities. The document is also required to indicate areas suspected of being contaminated for which no data exists.

Finding

Ames has not prepared a Technical Site Information Document as required by DOE 4320.1B.

Discussion

DOE 4320.1B, "Site Development Planning," replaces portions of DOE 4300.1B, "Real Property and Site Development Planning." DOE 4300.1B required the preparation of a Site Development Plan only. DOE 4320.1B requires that a Site Development Plan and Technical Site Information document be prepared. Ames has prepared a Site Development Plan in accordance with the requirements; however, they have not prepared a Technical Site Information document.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991, although they were aware of the deficiency.

The apparent causal factor for this finding is a lack of sufficient resources to carry out the requirements of DOE 4320.1B.

3.5.8.3 Best Management Practice Finding

FINDING IWS/BMPF-1: Hazardous Materials Inventory and Emergency Coordination

Performance Objective

To minimize the potential impact of releases of hazardous materials, it is a best management practice to have a system of Materials Safety Data Sheet (MSDS) tracking for all chemicals present, to maintain current information of the quantities and annual use of chemicals and wastes onsite, and to identify their location. The Superfund Amendments and Reauthorization Act (SARA) Title III requires certain facilities to submit an inventory of hazardous chemicals to the local emergency organizations each year. Also, all facilities that manage significant quantities of hazardous materials should submit accurate inventories to their local emergency organizations.

Finding

Ames lacks a comprehensive, accurate, and quantitative hazardous materials inventory, and has not submitted current hazardous materials information to local emergency organizations.

Discussion

Many toxic chemicals and hazardous materials are used at Ames. While SARA 311 and 312, "Emergency Planning and Community Right to Know" (EPCRA) requirements do not apply directly to Ames because it is a research laboratory, DOE has recommended that its facilities report to local emergency committees to provide them with information about the quantity and nature of hazardous substances present at the facility (I-A-30).

Ames maintains all the Material Safety Data Sheet (MSDS) information for materials it uses (A-22 and A-49; I-A-19). In 1987, Ames reported these chemicals to the Ames Fire Department, Iowa Emergency Response Commission, and the Story County Emergency Planning Committee (A-61 and A-64). However, Ames has not updated this information since the 1987 submission, even though many research activities and materials have changed.

Ames has prepared an inventory of materials purchased (I-A-4; A-62), and has started to collect an inventory of chemicals present in its 12 research programs (I-A-7, 9, 23, 51, and 41). However, Ames has not integrated this information, and calculated its annual chemical use.

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are procedures that are not effective for preparing a hazardous chemical and release inventory; and lack of training with regard to chemical management programs.

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3.5.9 National Environmental Policy Act

3.5.9.1 Overview

The purpose of the National Environmental Policy Act (NEPA) portion of the Tiger Team Assessment of Ames was to: (1) evaluate Ames' NEPA management structure and NEPA review processes; (2) review NEPA procedures and documentation; (3) evaluate compliance with NEPA, Council on Environmental Quality (CEQ) regulations, and DOE NEPA Guidelines, Orders, and guidance memoranda; and (4) evaluate the adequacy of guidance and oversight from Program Secretarial Officers and the Assistant Secretary for Environment, Safety and Health (EH-1). Table 3-12 lists the regulations and requirements used to evaluate NEPA compliance.

The NEPA assessment included interviews, document reviews, and onsite verification. Interviews were conducted with Ames and CH staff responsible for NEPA compliance, training, finance, facilities, program management, and project leadership. Documents were reviewed for technical content, and for compliance with environmental laws, regulations, and guidelines. Onsite verification of Ames activities was used to determine whether projects (e.g., maintenance, construction, and research) have been implemented with approved NEPA documents, and whether activities and resultant impacts are consistent with those described in the NEPA documents.

Ames NEPA documents provided to the Tiger Team for review include the following:

- The 1991 "Environmental Assessment for the Construction of a Technical and Administrative Services Facility at Ames Laboratory" (currently in pre-approval review with the State of Iowa).
- Seventeen approved categorical exclusions (CXs).
- Two CXs that are not yet approved. An environmental assessment prepared in 1977 for the decommissioning of a research reactor was not reviewed because of its age.

Ames conducts work for a number of DOE program offices, as well as for other Federal agencies. Approximately 65 percent of Ames funding is from the Energy Research Office (ER), and ER has programmatic "landlord" responsibility for most operations and maintenance at Ames. Other DOE program offices sponsor work at Ames, and have NEPA compliance responsibility for their activities. Activities at Ames are managed through CH. CH has been delegated authority by ER and by the Office of Fossil Energy (FE) to make NEPA determinations for the types of proposed actions listed in Section D of the DOE NEPA Guidelines. For actions sponsored by other DOE program offices, the appropriate Secretarial Officers retain authority to make such determinations. For actions not listed in Section D, the Assistant Secretary for Environment, Safety, and Health (EH-1) has authority to make the determinations. At Ames, NEPA activities are coordinated by the Associate Director, Operations Division. NEPA oversight is provided by the CH contracting officer for Ames, with matrix support from CH laboratory management office personnel.

TABLE 3-12
LIST OF NATIONAL ENVIRONMENTAL POLICY ACT REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements Guidelines	Sections/Titles	Authority
42 U.S.C. 4321, et seq.	National Environmental Policy Act (NEPA)	U.S. Congress
SEN-15-90	NEPA	DOE
DOE 4700.1	Project Management System	DOE
DOE 5100.3	Field Budget Process	DOE
DOE 5400.1	General Environmental Protection Program Requirements	DOE
DOE 5400.4	Comprehensive Environmental Restoration, Compensation, and Liability Act	DOE
DOE 5440.1D and DOE 5440.1C	NEPA	DOE
CH 5440.1C	NEPA	CH
46 FR 18026	Forty Most Asked Questions Concerning CEQ's NEPA Regulations	CEQ
52 FR 47662 55 FR 37174	DOE NEPA Guidelines	DOE
10 CFR 1021	Compliance with NEPA	DOE
10 CFR 1022	Compliance With Floodplain/Wetlands Environmental Review Requirements	DOE
40 CFR 1500-1508	Regulations for Implementing the Procedural Requirements of NEPA	CEQ
N/A	Interim Procedural Guidance for Implementation of SEN-15-90 (March 2, 1990); Supplemented September 20, 1990	DOE
N/A	Draft NEPA Compliance Guide (October 1988)	DOE
N/A	Guidance Related to Analysis of Impacts to Workers in NEPA Documentation (June 10, 1988)	DOE

Ames policies and procedures for NEPA review and documentation are informal and incomplete. The majority of DOE actions at Ames receive no formal NEPA review. Most DOE actions at Ames fall into the following five categories:

- Research projects funded by DOE and other sponsors.
- Support functions, including budgeting; planning; procurement (purchases of capital equipment and materials, subcontracting, and rental of laboratory space); personnel management; occupational medicine; and environment, safety, and health management.
- Major construction projects (only one of which has been approved since the enactment of NEPA).
- Construction and maintenance conducted under general plant projects.
- Minor repair and maintenance actions conducted under service orders, day tickets, and other authorizations.

Prior to June 1990, only one NEPA document ("Environmental Impact Assessment for Decommissioning the Ames Laboratory Research Reactor," 1977) was prepared for DOE activities at Ames. Since June 1990, most (but not all) general plant projects have been reviewed for NEPA compliance. In addition, the one major construction project, and the investigation of a waste disposal site have received NEPA review. However, Ames has no formal NEPA program and all other actions, including all research activities and all minor maintenance and repair work, currently receive no NEPA review. Many Ames materials procurements receive prior approval from the laboratory Environment, Safety and Health Group, but this review and approval does not include NEPA considerations. Ames has not prepared a sitewide or programmatic NEPA document to cover its actions.

Secretary of Energy Notice (SEN)-15-90 and DOE 5440.1D altered the implementation of NEPA by squarely placing the responsibility for NEPA compliance with the DOE program offices. The concept of a DOE "action" has been broadened to include all DOE actions, as illustrated by the list of categorical exclusions found in the proposed NEPA rule (55 FR 46444, November 2, 1990).

Overall Ames compliance with the requirements of NEPA is below average. In June 1990, Ames began attempts to comply with NEPA. Even though understanding the NEPA review process is improving, it is still incomplete. At the time of the Tiger Team Assessment, most Ames staff did not realize that all of their proposed actions are subject to NEPA review and determination by DOE. The site lacks formal procedures for NEPA review, documentation, and coordination. Staffing for compliance with NEPA at Ames is inadequate; the staff that have been delegated NEPA responsibility do not have the background, training, or time required to meet these responsibilities.

The NEPA assessment resulted in four compliance findings concerning completion of NEPA review and documentation prior to initiation of actions; adequacy of NEPA procedures, tracking, and recordkeeping; integration of NEPA in project

planning and budget review; and adequacy of NEPA documentation. The assessment also resulted in one best management practice finding concerning NEPA training and staff.

3.5.9.2 Compliance Findings

FINDING NEPA/CF-1: National Environmental Policy Act (NEPA) Review and Documentation

Performance Objective

Council on Environmental Quality (CEQ) regulations 40 CFR 1500.1 and DOE 5440.1D, Section 6, require a NEPA review process for the consideration of environmental factors in decisionmaking. Secretary of Energy Notice (SEN)-15-90 states that if DOE should err relative to the extent of NEPA review required of new projects, "it should err on the side of full disclosure and complete assessment of environmental impacts." SEN-15-90 (Part I.A.), DOE 5440.1D, Section 7.a.(11) and 7.b.(1) and CH 5440.1C, Section 6, require that the determination of the level of NEPA documentation required for DOE actions be made by the appropriate DOE official. For actions which are not specifically listed in Section D of the DOE NEPA Guidelines, the determination shall be made by the Assistant Secretary for Environment, Safety and Health (EH-1); for actions listed in Section D, the determination shall be made by the appropriate Program Secretarial Officer (PSO) unless the PSO specifically delegates that authority to the DOE Field Office Manager.

Finding

Most of the FY 1991 DOE actions at Ames reviewed by the Tiger Team received neither a NEPA review nor a determination by the appropriate DOE official of the level of NEPA documentation necessary as required by CEQ Regulations, DOE 5440.1D, CH 5440.1C, and SEN-15-90.

Discussion

Currently at Ames, most DOE actions receive neither a NEPA review nor the required determination by the appropriate DOE official of the level of NEPA documentation needed (I-N-1, 2, 3, 11, 12, and 13). Furthermore, since Ames has no sitewide or programmatic NEPA document, the potential impacts of ongoing and reasonably foreseeable activities at the site have not been fully considered. Ames has no vehicle to serve as the basis for tiering other NEPA reviews, or to provide baseline information for later decisionmaking.

The absence of a NEPA review process appears to be the result of an assumption on the part of key laboratory personnel, until recently, that laboratory actions do not require NEPA review. The majority of laboratory personnel in positions that involve NEPA responsibilities remain unaware of their full responsibility regarding NEPA (I-N-2, 3, 8, 9, and 10). Ames has no staff dedicated to compliance with NEPA. Interviews with NEPA contacts at Ames (I-N-1, I-N-2, and I-N-3) showed that very little (individuals were unable to quantify percentages) of their time is devoted to compliance with NEPA.

Activities with potential environmental impacts that do not receive NEPA review include the following:

- DOE-sponsored research (approximately 12 major research programs).
- Work-for-others (four research programs).

- Most subcontract, purchasing, rental, maintenance, facilities, and engineering activities.

Most maintenance, facilities, and engineering activities are conducted via a system of service orders and daytickets. Dayticket activities do not receive NEPA review; most service order activities do not receive NEPA review. Ames processes approximately 6,500 purchase orders and 400-500 service order activities annually; thousands of daytickets are processed each year (I-N-1, I-N-8, and I-N-10). NEPA has been addressed in the Ames waste site characterization effort and (since June 1990 receipt of direction from CH) for construction actions (N-43). The construction actions include only major new construction and general plant projects.

In 1991, Ames grouped and requested NEPA review and determination from CH for a set of seven proposed several plant projects. While there were flaws in the content of some of the environmental evaluations submitted (see Finding NEPA/CF-4), this approach is a positive example of providing for NEPA review in an efficient manner. However, Ames is not currently working to develop consolidated categorical exclusions (CXs) (I-N-2) which incorporate similar, routine activities to streamline the NEPA review and determination process, reduce paperwork, and improve tracking of NEPA review status.

This finding was partially identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and partially identified in the Ames Laboratory Self-Assessment, December 1991. Both of these assessments noted that policies to ensure that DOE actions receive NEPA review are lacking. The Ames Laboratory Self-Assessment lists several categories of actions that should be, but are not, receiving NEPA review; however, this list is not complete.

The apparent causal factors for this finding are a lack of policy implementation, since Ames has not complied with DOE policy; and inadequate appraisals/audits/reviews of compliance with these policies by CH.

FINDING NEPA/CF-2: **National Environmental Policy Act (NEPA) Procedures, Tracking, and Recordkeeping**

Performance Objective

Secretary of Energy Notice (SEN)-15-90, Section I.I; DOE 5440.1D, Sections 7.a.(2), 7.b(8), 7.c(3), and 7.d(4); the DOE NEPA Guidelines, Section A.1; and the Interim Procedural Guidance for Implementation of SEN-15-90 establish requirements and guidance for written procedures to ensure consistency in the agency-wide application of NEPA and compliance with the Council on Environmental Quality (CEQ) regulations. DOE 4700.1 requires a disciplined, systematic, and coordinated approach to project management that results in efficient planning, organization, coordination, budgeting, management, review, and control of DOE actions. In particular, the objectives of DOE 4700.1, Section 7, include the monitoring (e.g., tracking) of project planning and execution, and the evaluation of progress on actions in relation to specific milestones.

Finding

Ames has not established and implemented written NEPA procedures as required by SEN-15-90, DOE 5440.1D, the DOE NEPA Guidelines, the Interim Procedural Guidance for the Implementation of SEN-15-90, and DOE 4700.1. Ames does not have an integrated system for tracking the status of NEPA review and documentation in relation to other project milestones as required by DOE 4700.1. Ames has no formal NEPA recordkeeping system as required by DOE 5440.1D.

Discussion

Ames has not developed and institutionalized procedures to implement NEPA (I-N-2, 3, 8, 10, 11, 12, 13, and 14). The current draft "Ames Laboratory NEPA Policy," which includes a laboratory NEPA procedure, is not fully consistent with DOE NEPA requirements, and does not address significant areas required to achieve compliance. For example:

- Sections 2.12 and 3.1.2 imply that the approval of NEPA documentation may be made by someone other than the appropriate DOE official.
- The document does not address DOE's requirement that NEPA milestones be included in planning and internal budget review documents.
- The document does not address compliance with CEQ's and DOE's requirement that the potential impacts, including cumulative impacts, of ongoing and reasonably foreseeable activities be addressed.

Ames does not have an integrated system for tracking the status of NEPA review and documentation for purchasing, facilities, engineering, budget, research, and work-for-others actions. General plant projects are tracked separately from Ames' other activities (e.g., the waste site characterization and line item actions).

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factor for this finding is a lack of an approved Ames policy to ensure the development of appropriate NEPA procedures.

FINDING NEPA/CF-3: **Integration of National Environmental Policy Act (NEPA) in Project Planning and Budget Review**

Performance Objective

The Council on Environmental Quality regulations, 40 CFR 1501.2; DOE NEPA Guidelines 52 FR 47663, Section A.1.(b); Secretary of Energy Notice (SEN)-15-90, Part 1.D; DOE 5440.1D, Section 7.a.(1), "National Environmental Policy Act Compliance Program"; and DOE 4700.1, Part F, "Project Management System," require integration of the NEPA process with project planning at the earliest possible time to ensure that decisions reflect environmental values and to avoid delays. SEN-15-90, Part I.D; DOE 5440.1D, Section 7.a.(5); DOE 5700.7B, "Work Authorization System"; and DOE 5100.3 require the incorporation of NEPA milestones into financial planning and project planning documents and the inclusion of NEPA compliance activity status reports in internal budget reviews.

Finding

Ames does not routinely apply NEPA early in the planning process for proposed actions as required by 40 CFR 1501.2, DOE NEPA Guidelines, SEN-15-90, DOE 5440.1D, 4700.1, 5700.7B, and 5100.3. Project and financial planning documents for most DOE-sponsored research, procurement (not related to construction), and work-for-others (reimbursables) do not include NEPA milestones as required by SEN-15-90, DOE 5440.1D, 5700.7B, and 5100.3.

Discussion

Consideration of the NEPA process early in planning at Ames is inadequate (I-N-2, 8, 9, 10, and 14) because NEPA is not explicitly considered in planning and budgetary documents (e.g., the work authorization system; work-for-others authorizations; Ames Site Development and Institutional Plans; and purchasing, rental, and service order authorizations). Internal budget review documents for most DOE actions at Ames do not indicate the NEPA compliance status as required by DOE Orders. Thus, these documents do not ensure valid, early consideration of environmental issues. NEPA compliance status reports are not part of Ames' internal budget review process.

Inadequate integration of the NEPA process with early project planning (particularly the absence of: NEPA milestones in project planning documents and NEPA compliance status in internal budget review documents) probably contributed to the deficiencies noted in Finding NEPA/CF-1 of this report.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991. The finding was fully identified in the Ames Laboratory Self-Assessment, December 1991, which found a need to integrate NEPA compliance with planning procedures.

The apparent causal factors for this finding are: insufficient <u>policy implementation</u>, since Ames has not complied with DOE NEPA policy.

FINDING NEPA/CF-4: **Adequacy of National Environmental Policy Act (NEPA) Documentation**

Performance Objective

CH 5440.1C, Section 6, requires that: (1) Management and Operating (M&O) contractors provide information on the potential environmental impacts of actions to CH; and (2) CH ensure that M&O contractors identify and evaluate such potential impacts. Under CH 5440.1C, Section 6.d, the NEPA Compliance Officer is responsible for reviewing and concurring with CH line recommendations on appropriate levels of NEPA review. Council on Environmental Quality regulations require that NEPA documents consider the requirements of other environmental laws (40 CFR 1500.2(a)) and be concise and analytic in nature (40 CFR 1502(a) and 1508.9(a)). "DOE Guidance Related to Analysis of Impacts to Workers in NEPA Documentation," dated June 10, 1988, states that worker safety should specifically be addressed in NEPA documents.

Finding

The Environmental Assessment (EA) prepared for the proposed Technical and Administrative Services Building (currently in pre-approval review by the State of Iowa), and information provided by Ames to support some categorical exclusions (CXs) do not provide the evidence CH 5440.1C requires for the analysis of potential environmental impacts. As a result, determinations by CH were made without complete information. Also, some Ames NEPA documents do not consider other related environmental laws and worker safety as required by 40 CFR 1500.2(a) and "DOE Guidance Related to Analysis of Impacts to Workers in NEPA Documentation."

Discussion

All approved Ames CXs and the 1991 EA recently submitted to the State of Iowa for pre-approval review (N-44) were reviewed by the Tiger Team. Eight of the 17 CXs contain insufficient information to fully support a determination of the appropriate level of NEPA review. The 1991 EA contains conclusions that are not clearly supported by consultations with appropriate authoritative sources.

The EA for the proposed Technical and Administrative Building (N-44) states that sensitive resources such as floodplains, wetlands, historical/cultural resources, and threatened and endangered species would not be affected. However, these statements are not supported by citation of authoritative references (e.g., floodplain maps, the National Register of Historic Places), by consultation with authoritative officials (e.g., wildlife officials responsible for threatened and endangered species management, the State Historical Preservation Officer), or by environmental analyses (e.g., a description of existing vegetation and soil type). The possibility of encountering contaminated soil at the site was not addressed in the EA. Since not all of the issues addressed by the EA are significant concerns, brief analyses are generally appropriate. However, the evidence upon which each conclusion is based should be provided. The focus of the EA should be on environmental issues most likely to be significant (e.g., potential chemical or radiological contamination).

Information on reasonably foreseeable impacts has been missing from Environmental Evaluation Notification (CH 560) forms prepared by Ames and from CX determinations approved by CH. Ames has submitted CH 560 forms requesting NEPA determinations for at least 19 actions (including one action that is a consolidation of seven minor actions) listed in Section D of the DOE NEPA Guidelines. Of these, 17 have resulted in CX NEPA determinations by CH (determinations are pending for the remaining 2 actions). A review of the CX determinations found that many contained insufficient information on environmental issues that, given the nature of the proposed action, should have reasonably been foreseen. Additionally, some DOE actions have been defined too narrowly in the environmental evaluations prepared by Ames. For example, the information provided on the upgrade of emergency diesel generators (N-34) addressed the relocation of a generator from the Metals Development Building to Wilhelm Hall. However, the associated disposition of the generator's fuel tank at the Metals Development Building was not addressed. Information on environmental resources potentially affected by a proposed action or by any secondary effects resulting from the action is necessary to support a determination of the appropriate level of NEPA review.

Table 3-13 summarizes, for specific CXs, the issues judged to have insufficient supporting information. While the environmental issues listed as having insufficient information probably are not of significant concern in most cases, the information needed to document the absence of significance has not been provided.

Inadequate information could lead to an inappropriate determination of the level of NEPA review required. For example, the CXs issued for renovation of the heating, ventilation, and air conditioning system in Wilhelm Hall (N-10 and N-12) do not mention the radioactive contamination that was known to exist in some ducts. Therefore, these CXs were apparently issued without consideration of potentially significant effects to worker safety and the local environment. Information to show that no impacts to these resources would result was absent from the CX, and therefore the determination that no significant impacts would occur is not clearly supported.

A positive example is provided by the CX issued for upgrading a glass washing facility (N-32). In this example, additional information was attached to the CH 560 form concerning potential effects on hazardous materials and worker safety. This brief additional information helps justify the determination that an EA need not be prepared.

This finding was not identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and was not identified in the Ames Laboratory Self-Assessment, December 1991.

The apparent causal factors for this finding are inadequate personnel and training for the identification and analysis of potential environmental impacts; and inadequate appraisals/audits/reviews of environmental information provided by Ames to CH.

TABLE 3-13
CATEGORICAL EXCLUSIONS WITH INSUFFICIENT INFORMATION

Document Number*	Categorical Exclusion Title	Issues for Which Information is Insufficient
N-1	Chemical Waste Site Assessment	Threatened/endangered species, wetlands, prime farmlands, water supplies (there is a discrepancy in depth to water table between the CX and supporting information).
N-10	HVAC Upgrade, Wilhelm Hall, Phase II	Radioactive contamination, worker safety
N-12	Seven Proposed FY 1992 GPPs (including Phase III of Wilhelm Hall HVAC upgrade)	Radioactive contamination, worker safety
N-33	Renovation of Rooms 323 and 324 Spedding Hall	Worker safety (including positive effects from new labs), chemical contamination
N-34	Building Renovation, Radioactive Waste Disposal Building	Radioactive contamination, waste storage and handling, spill prevention, worker safety (including positive effects)
N-35	Upgrade Emergency Diesels	Fuel storage and spill prevention, air emissions
N-36	Upgrade Motor Control Center, Spedding Hall	PCB contamination
N-37	Upgrade Uninterruptable Power Source System, Spedding Hall	PCB contamination, hazardous waste generation

*Tiger Team document number

3.5.9.3 Best Management Practice Finding

FINDING NEPA/BMPF-1: National Environmental Policy Act (NEPA) Training and Staff

Performance Objective

DOE 5440.1D, Section 7.b.(4), includes the following among the responsibilities of Field Office Managers: "Augment, as appropriate, and maintain an environmental compliance staff so that a variety of environmental disciplines is represented sufficient to ensure that properly supervised and technically accurate and complete NEPA documents are prepared." DOE 5440.1D, Section 7.c.(2), includes the following among the responsibilities of a NEPA Compliance Officer: "provide NEPA training and disseminate NEPA guidance materials and related information" and "Participate in periodic NEPA training, meetings, and workshops conducted by the Office of NEPA Oversight (EH-25)." Under CH 5440.1C, Section 6.c, the Director, Environment, Safety, and Health Division, is responsible for providing NEPA guidance and training. As a best management practice, contractors implementing DOE program activities should receive similar training to ensure that the objectives of NEPA are met.

Finding

Many Ames staff with NEPA-related responsibilities have not had training in NEPA requirements and procedures. Moreover, NEPA documents have been prepared by staff without the environmental backgrounds sufficient to ensure that such documents are complete and accurate, as required by best management practice.

Discussion

Many Ames staff who are, or should be, responsible for various aspects of NEPA compliance are inadequately trained. In addition, there is a lack of staff with environmental backgrounds qualifying them to prepare NEPA documents. Ames' NEPA coordinator has no formal training in NEPA compliance or environmental impact assessment (I-N-2). The staff responsible for facilities projects requiring environmental review, and for preparation of NEPA-related documents also have had no formal training in NEPA or impact assessment (I-N-1 and I-N-2). Procurement staff responsible for purchasing or subcontracting actions requiring NEPA review have had minimal NEPA training and no training in NEPA procedures (I-N-6). Program managers responsible for research activities requiring NEPA review do not have NEPA training (I-N-11, I-N-12, and I-N-13). Such staff should be routinely involved in conducting and tracking NEPA review of projects. In addition, the Environment, Safety, and Health Office at Ames does not have staff with backgrounds in NEPA compliance or environmental impact assessment. It is clear that the inadequacy of NEPA training has contributed to the deficiencies noted in the NEPA compliance findings.

The NEPA compliance inadequacies at Ames appear to result in part from a lack of communication between CH and Ames. There appears to have been little guidance from CH on the extent of NEPA review requirements, and Ames staff have not been provided with NEPA training opportunities.

This finding was fully identified in the CH ES&H Assessment of Ames Laboratory, December 2-13, 1991, and in the Ames Laboratory Self-Assessment,

December 1991. These assessments identified the needs both for additional NEPA training and for qualified staff to conduct, manage, and oversee the NEPA program.

The apparent causal factors for this finding are inadequate policy implementation to ensure that CH and Ames conduct their NEPA training responsibilities; and insufficient personnel with appropriate educational and work experience backgrounds.

4.0

SAFETY AND HEALTH ASSESSMENT

4.0 SAFETY AND HEALTH ASSESSMENT

4.1 PURPOSE

The objective of the Safety and Health (S&H) Subteam assessment was to determine the effectiveness of site safety and health programs at the Ames Laboratory (Ames) in Ames, Iowa. A Technical Safety Appraisal (TSA) team (also referred to as the Safety and Health Subteam) was assembled for this purpose by the Department of Energy (DOE) Deputy Assistant Secretary for Safety and Quality Assurance, Office of Safety Appraisals. The S&H Subteam assessment was performed concurrently with assessments conducted by the Environmental and Management Subteams.

4.2 SCOPE

Performance within the safety and health programs of Ames Laboratory was appraised in the following functional areas: Organization and Administration, Quality Verification, Operations, Maintenance, Training and Certification, Auxiliary Systems, Emergency Preparedness (including an emergency response exercise), Technical Support, Packaging and Transportation, Site/Facility Safety Review, Radiological Protection, Worker Safety and Health (OSHA) Compliance (including a compliance inspection), Personnel Protection, Fire Protection, and Medical Services. The appraisal for the Security/Safety Interface functional area was incorporated into that for Organization and Administration, and the appraisal for the Experimental Activities functional area was incorporated into appraisals for Operations and for Site/Facility Safety Review.

4.3 APPROACH

The S&H Subteam was composed of experts from DOE Headquarters, employees of DOE contractors, and outside consultants. The TSA was conducted according to criteria set forth in draft DOE/EH-0129, "Procedures for Conducting Technical Safety Appraisals," dated February 1991, and Appendix A to this document, "Protocol for the Conduct of Concurrent Tiger Team Assessments and Technical Safety Appraisals," dated January 16, 1990.

The S&H Subteam assessment (TSA) was conducted from February 10 through February 28, 1992. Guidance and direction were provided by the Acting Director, Technical Safety Assessment Division. A list of the Subteam members together with their areas of responsibility is provided in Section 4.9; biographical sketches of the Subteam members are provided in Appendix A-3.

The TSA focuses on safety of operations and the condition of equipment and facilities. This approach is based on the assumption that the facility and its equipment have been appropriately designed and constructed. Each appraisal addresses whether current operations are being conducted within the scope of operational safety procedures and programs established for specific facilities and activities.

The activities of the S&H Subteam were guided by the performance objectives and supporting criteria contained in DOE/EH-0135, "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites," dated June 1990.

The findings and resulting concerns identified by the S&H Subteam were developed using established performance objectives for each of the functional areas evaluated. Although nearly all of the performance objectives were addressed, this report cites only those objectives for which a concern was identified. Therefore, the reader is cautioned against forming an opinion of the safety and operational performance within an area without first reading the overview concerning that area. When a performance objective is not listed, the omission implies that the S&H Subteam judged all applicable criteria to be met.

The findings and concerns identified by the S&H Subteam were obtained in three ways: (1) observing routine operations, an emergency exercise, and the physical condition of the site and facilities; (2) interviewing management, staff, operators, and crafts personnel; and (3) reviewing policy statements, records, procedures, and other relevant documents. In addition, the self-assessments performed by Ames Laboratory and the Chicago Field Office (CH) were reviewed.

A concern addresses a situation that in the judgment of the S&H Subteam either (1) reflected less than full compliance with a DOE safety and health requirement or mandatory safety standard; (2) threatened to compromise safe operations; or (3) if properly addressed, would substantially enhance the excellence of a particular situation, even though that part of the operation was judged to have a currently acceptable margin of safety. Because this last category addresses the excellence of operation, more concerns are reported than would result from a strictly compliance-oriented appraisal.

The findings that support each concern immediately precede the concern. The category rating, potential hazard level, and level of compliance for each concern were determined by using the criteria presented in Section 4.7. All concerns were judged to be Category III, with the exception of eight that were evaluated as Category II. A Tabulation of Concerns from this appraisal is contained in Section 4.8.2.

A comprehensive OSHA-type compliance (worker safety) appraisal covering general industry worksites was performed. Compliance with standards of the construction industry was not addressed during this appraisal because there were no ongoing construction projects at the site. The scope of this appraisal involved specific facilities owned or rented by DOE. Facilities satisfying this criterion include maintenance shops, materials storage areas, and laboratories. As a result of the appraisal for the Worker Safety functional area, 155 noncompliance issues were identified, all of which were categorized as "serious." The high number of "serious" noncompliance issues results from the emphasis on identifying that level of deficiency. This part of the appraisal effort focuses on "serious" noncompliance issues rather than on those designated as "other than serious." Furthermore, de minimis issues noted during the appraisal are not included in the inspection forms. (See Appendix F.)

Drawing on the extensive experience of its appraisers, the S&H Subteam has made an effort to identify some of the responsible factors in each statement of concern. However, the Subteam recognizes that this effort has limitations because Subteam members are not fully familiar with the details of day-to-day operations at Ames Laboratory. Therefore, the S&H Subteam believes that the site contractor, Iowa State University (ISU), should consider the findings,

and even the statements of concern, as possibly symptomatic of some set of deeper root causes. ISU management should search out and correct those root causes to ensure that improvements in the safety of the operation will be sustained.

4.4 SAFETY AND HEALTH ASSESSMENT SUMMARY

The appraisal by the S&H Subteam of activities at Ames Laboratory indicated that during the past 6 months Laboratory management has initiated a sincere effort to enhance and upgrade the program for environment, safety, and health (ES&H). The objective of this initiative is to achieve an acceptable ES&H performance level with respect to the improved safety culture stipulated for all DOE sites. Because of the brief period since this effort began, progress has been limited. Planning, however, is proceeding at a reasonable pace and the orientation of Ames personnel on the new safety culture has been very effective.

A total of 126 concerns are presented in this section of the report. Four of the concerns (all Category III) are addressed to the Chicago Field Office. No concerns were designated as Category I concerns; eight were designated as Category II; and the remainder (118) were designated as Category III. Tables 4.4-1 and 4.4-2 present a breakdown of statistics comparing identification of concerns between the TSA report and the Ames and CH self-assessment reports. Of the eight Category II concerns identified in this report:

- One concern in the Quality Verification area pertained to welding on structural components performed by uncertified welders, contrary to the requirements of DOE Orders and ASME NQA-1-1989.
- One concern in the Emergency Preparedness area resulted from the lack of an effective emergency preparedness program that meets the requirements of the DOE 5500 series of Orders.
- Four concerns in the Radiological Protection area dealt with the following issues:
  - radiological occurrences are not recognized, documented, or corrected as required by DOE 5480.11;
  - reliance on administrative controls rather than physical barriers to prevent dangerous extremity exposure from x-ray diffraction units;
  - inappropriate or insufficient posting of radiation control areas as required by DOE 5480.11; and
  - absence of a program to ensure control of radioactive contamination as required by DOE 5480.11.
- One concern in the Personnel Protection area related to the lack of a monitoring program that meets requirements of DOE 5480.10.

Table 4.4-1 Statistics for Concerns Addressed to Ames Laboratory
COMPARISON OF SELF-ASSESSMENT PROBLEM IDENTIFICATION WITH TSA CONCERNS
NUMBER OF SELF-ASSESSMENT CONCERNS/PERCENTAGE OF TSA CONCERNS/TSA DISCIPLINE BY SERIOUSNESS CATEGORY

	Category I			Category II			Category III		
TSA DISCIPLINE	*Self	TSA	▪ %TSA	*Self	TSA	▪ %TSA	*Self	TSA	▪ %TSA
Organization & Administration							8	11	73
Quality Verification				1	1	100	6	8	75
Operations							3	5	60
Maintenance							1	10	10
Training & Certification							6	6	100
Auxiliary Systems							2	7	29
Emergency Preparedness				1	1	100	4	5	80
Technical Support							11	14	79
Packaging & Transportation							6	7	86
Site/Facility Review							3	3	100
Radiological Protection				2	4	50	3	8	38
Personnel Protection				1	1	100	8	12	67
Worker Safety				0	1	0	6	8	75
Fire Protection							5	5	100
Medical Services							2	5	40
Totals				5	8	63	74	114	65

* "Self" is the number of TSA Concerns identified either in whole or in part in the Ames self-assessment.

▪ "% TSA" indicates the percentage of TSA concerns identified in whole or in part in the Ames self-assessment.

Table 4.4-2 Statistics for Concerns Addressed to Chicago Field Office (CH)
COMPARISON OF SELF-ASSESSMENT PROBLEM IDENTIFICATION WITH TSA CONCERNS
NUMBER OF SELF-ASSESSMENT CONCERNS/PERCENTAGE OF TSA CONCERNS/TSA DISCIPLINE BY SERIOUSNESS CATEGORY

	Category I			Category II			Category III		
TSA DISCIPLINE	*Self	TSA	▪ %TSA	*Self	TSA	▪ %TSA	*Self	TSA	▪ %TSA
Organization & Administration									
Quality Verification							0	1	0
Operations									
Maintenance									
Training & Certification									
Auxiliary Systems							0	1	0
Emergency Preparedness									
Technical Support									
Packaging & Transportation									
Site/Facility Review									
Radiological Protection							1	2	50
Personnel Protection									
Worker Safety									
Fire Protection									
Medical Services									
Totals							1	4	25

* "Self" is the number of TSA Concerns identified either in whole or in part in the Ames self-assessment.

▪ "% TSA" indicates the percentage of TSA concerns identified in whole or in part in the Ames self-assessment.

One concern in the Worker Safety area pertained to storing flammable liquids using methods that fail to meet the requirements of 29 CFR 1910.106.

Past practice at Ames Laboratory did not produce a strong commitment to the safety culture on the part of employees at Ames. Safety management program elements often do not exist, including performance indicators and goals, regular safety meetings, safety responsibility assignments, and safety performance evaluations. The line safety program has not been well defined or implemented. The independent safety oversight program requires few audits and has not assured compliance with DOE safety Orders. Moreover, the independence of the safety organization can be challenged on several grounds. The document control and procedures assurance program has neither provided adequate control nor promoted proper usage of procedures. Self-assessment programs at the Laboratory are neither institutionalized nor operational. As the management and operations contractor, ISU has exercised little oversight or control over Ames to ensure compliance with the DOE contract.

Elements of the current quality assurance (QA) program at Ames range from weak to nonexistent. QA procedures and methodologies are not formally recognized, understood, or followed. The QA concerns identified during this appraisal focused primarily on the absence of a sitewide QA program and the lack of formality exercised during the conduct of operations. The most serious QA concerns at Ames include (1) the lack of a formal calibration program for measurement and test equipment (M&TE), (2) lack of controls and practices that permit fabrication of structural weldments to structures supporting safety-related equipment, and (3) practices that encourage machine shop personnel to alter engineering drawings during fabrication without any review or approval.

The management structure for technical operations is geared appropriately to an academically oriented research program. However, Ames management has not established a system of administrative controls that formally articulates safety limits, limiting conditions of operations, or surveillance requirements. A Conduct of Operations Coordinator, appointed to promote and organize efforts to achieve compliance with DOE 5480.19, has only recently initiated activities in this area. A current program to draft and implement operations procedures suffers from a lack of formal management guidance on the requirements of and format for these procedures. The status of facility controls is monitored on a laboratory-by-laboratory basis. "Operators" may be Ph.D. candidates, post-doctoral appointees, highly experienced technicians, or advanced undergraduate students, all of whom have excellent knowledge of their operations. Human factors engineering has not been consciously used in assembling research facilities; however, no gross violations were observed in person-machine interfaces.

A clear division of personnel responsibilities for maintenance has not been established at Ames. Scheduling and tracking of maintenance work packages are accomplished with a Computer-Aided Maintenance System. Most equipment critical to safe operations is well maintained, but the work control system lacks the formality stipulated by DOE 4330.4A. Maintenance instructions do not always contain sufficient detail to ensure that work is performed in a safe and controlled manner, and records of post-maintenance inspection do not always include certification that the work has been completed. Practices for

inspection of hoists, rigging, and slings do not fully address all applicable criteria cited in the DOE Hoisting and Rigging Manual. The lack of formal certification to qualify welders performing work at Ames constitutes a major deficiency in the maintenance area.

Until recently, training at Ames was very informal. Many programs are being developed, but most are not yet fully functional. The General Employee Training program is evolving in content and still has not been presented to all employees. Training records are not currently auditable, but an automated program under development should correct this deficiency. Job or task analyses have not been performed to determine the extent and number of training programs required (e.g., maintenance training, quality assurance training, management and supervisory training, instructor training, and radiological protection training). Training will remain substandard until adequate facilities are dedicated to that purpose.

Auxiliary systems operations at Ames lack formality with respect to description, procedures, training, intergroup communications, and trending of operational data. A lack of direction from senior management has resulted in a situation in which most auxiliary systems providing support for experiments have not been subjected to a formal documented review process. Insufficient maintenance of exhaust stacks and the absence of a sampling program for stack effluents raise doubts about the adequacy of auxiliary systems configuration. Existing ventilation systems have not been analyzed to ensure airflow that minimizes risks to workers and the environment.

The Ames Laboratory Emergency Preparedness Program was not developed using the DOE 5500 Series of Orders. The Ames Emergency Plan does not comply with DOE 5500.3A. A training program for emergency planning has not been developed for the Emergency Response Organization, emergency response designees, or Laboratory employees. No emergency plan implementing procedures have been developed. Ames Laboratory has not prepared safety analysis documentation to cover all credible emergency incidents. The position of Emergency Preparedness Coordinator is an incremental duty assigned to the Manager of the Facility Services Group.

Technical support for the Ames program organizations is provided by the Materials Preparation Center Analytical Group, the Facilities Services Group, and the Engineering Services Group. Program organizations also have the option of obtaining engineering services for their equipment from any other source. The services provided by the Ames technical support groups encompass the appropriate disciplines and expertise; however, in some areas resources are limited, and the technical support process lacks formality and structure. Concerns were identified in areas related to (1) responsibility/authority definition; (2) knowledge of equipment, codes, and standards; (3) safety analysis documentation; (4) procedures; (5) design review; (6) operational readiness reviews; and (7) exhaust filter testing and emission monitoring. The Laboratory has recognized the need for manuals, procedures, and more structured programs and has initiated measures to address these needs.

Hazardous and radioactive material packaging and transportation activities at Ames are infrequent, consisting of only a few shipments and receipts per month. Responsibilities assigned for these activities include substantial involvement by the Ames ES&H Group. Concerns were identified in the areas of procedures, training, audits and appraisal, and regulation compliance for

onsite storage and transportation. Resources applied to the program are limited; moreover, although key personnel are scheduled to retire within the next few months, no replacements have yet been identified.

No independent safety review system currently functions at Ames in a manner that complies with the requirements of DOE 5482.1B, paragraph 9.d. The Laboratory Director has appointed a planning group to achieve compliance by establishing a Safety Review Committee to perform all functions required for an internal appraisal system. These functions include independent review of experiment proposals; a periodic, comprehensive facility safety review; and a triennial appraisal of the safety review system. The ES&H Group collects information about safety-related experiences at other sites and makes it available for circulation to Ames personnel, but no formal system exists to organize and circulate onsite and offsite safety-related experiences throughout the Laboratory.

The radiation protection program at Ames in many cases does not assure compliance with even the most fundamental requirements of applicable DOE Orders. The most serious observed violations of DOE Orders involved contamination control practices and posting of areas for radiation control purposes. Ames is not able to demonstrate the absence of internal depositions of radioactive material or quantify them either by in-vivo analysis or air sampling. Another serious concern is that many x-ray diffraction units at Ames rely on administrative controls rather than physical barriers to prevent operators and casual visitors from exposing their extremities to x-ray beams. Some operations with radioactive material are performed by the radiation protection organization and therefore have no oversight. Internal audits of radiation protection are not performed. Ames has not required detailed procedures for handling radioactive materials or operating radiation-generating devices and has not assured formal review when such procedures are prepared. The unsatisfactory state of radiation protection at Ames does not result from degradation of the program with time. Rather, it stems from the failure of the Laboratory to commit the resources necessary to keep up with the more stringent requirements currently in effect. The failure of CH to enforce current requirements has clearly contributed to this situation.

Personnel protection programs at Ames show signs of ineffective oversight by Laboratory management. The Laboratory is working toward change but has not established control over health and safety issues. Personnel protection programs do not incorporate many mandatory industry requirements, and efforts at oversight or enforcement of safety requirements at Ames are not evident. The three key deficiencies in personnel protection at Ames are as follows: (1) health and safety issues are pushed up from the bottom and not down from the top; (2) enforcement of health and safety requirements does not exist; and (3) most documented programs do not reflect mandated requirements.

The Ames Laboratory program for worker safety and health does not reflect an understanding of greater adherence to current safety and health requirements as adopted by the Department of Energy. Ames Laboratory is beginning to develop a proactive attitude toward the development and implementation of an effective safety and health compliance program; however, managers, supervisors, and employees are not yet sufficiently trained to recognize and inspect for safety and health noncompliances within their work areas.

The Fire Protection Program at Ames Laboratory does not comply with the requirements of the DOE 5480 series of Orders. Qualified personnel are not available to perform (1) routine inspections, (2) repairs and testing of automatic sprinkler systems, and (3) testing of fire alarms, all of which are required by National Fire Protection Association standards. The Laboratory has not developed a fire hazard analysis, safety analysis documentation, or fire risk analyses that are needed to support development of a formal fire protection program. The Life Safety Code has not been addressed in the Ames Laboratory Safety Manual. Responsibility for the fire protection program has been assigned to the ES&H Manager as an incremental duty.

The Occupational Medicine Department does not meet the specific personnel requirements defined by draft DOE 5480.8A or its predecessor, DOE 5480.8. Medical facilities at Ames have recently been enlarged; however, storage space is still inadequate. A new dispensary is scheduled for completion in FY 94. The Occupational Medicine Department lacks a formal self-assessment program and a documented wellness program. Medical records are not protected against fire, and there is no interaction with safety or industrial hygiene personnel to track employee exposure to hazardous conditions. The Medical Director is not afforded the opportunity to participate in efforts to contain medical costs.

4.5 SAFETY AND HEALTH FINDINGS AND CONCERNS

4.5.1 Organization and Administration

4.5.1.1 Overview

This appraisal of the Organization and Administration functional area as it pertains to safety and health at Ames Laboratory addressed all eight performance objectives. The appraisal was performed by (1) interviewing all levels of management and staff within the Laboratory; the Director of the Institute for Physical Research and Technology (IPRT), to whom the Laboratory reports; the Iowa State University (ISU) Provost, to whom IPRT reports; and the ISU Coordinator for Substance Abuse; (2) reviewing documents; (3) touring facilities and observing activities; and (4) interacting with other Tiger Team members. Concerns were identified in all eight performance objectives.

Many safety improvements have been made in the past few months. Many deficiencies noted during the Ames self-assessment were corrected when noted, and many more are being corrected or corrective actions are in the planning stage. However, past practices at the Ames Laboratory did not indicate a strong commitment to safety. Recognition and personal advancement were based on research and technological achievements and were measured in terms of publishing academic papers and attending professional meetings. Programs to set safety goals, plot and trend safety performance indicators, and conduct regular safety meetings do not exist.

The line safety program at Ames has not been well defined and implemented. Walkthrough inspections are not always documented, and followup on corrective actions for problems noted is not formalized. The safety expectations, responsibilities, and authorities of the Safety Coordinators and Safety Representatives have not always been understood and executed. Line safety responsibilities and performance evaluations have not always been defined and assessed. Finally, space ownership for safety has not always been assigned, and training for walkthrough inspectors has not been completed.

Independent safety overview at Ames has been performed by the Environment, Safety, and Health (ES&H) Group. However, the independence of this group could be compromised by the reporting level within the Laboratory. This independence is also called into question by having the training organization report programmatically to the ES&H Group, which also has responsibility for the independent safety overview of training. Further, the ES&H Group provides functional support and assistance in areas for which it should only provide safety oversight.

The pre-Tiger Team self-assessment conducted by Ames Laboratory was performed using a plan that was subsequently rejected by the responsible program office at the Department of Energy (DOE) (i.e., the Office of Energy Research, Headquarters). As a result, an ongoing self-assessment program has not yet been defined and institutionalized. Moreover, safety overview of Ames by ISU and IPRT was neglected until just before the Tiger Team visit; therefore, a continued safety oversight program needs to be institutionalized.

The document control program at Ames does not provide assurance that all controlled documents are current or that uncontrolled copies do not become working-level documents. A formal Laboratory-wide procedures control program

does not exist for all procedures at Ames. Mandatory procedures are not always defined, and a Laboratory-wide program has not been developed to ensure that the current version of a procedure is available in the workplace. Management has not systematically evaluated the need for procedures in all areas of the Laboratory.

The informal fitness-for-duty program does not define physical restraints for specific jobs, rather it simply limits an employee's activity if a problem is identified during a medical or physical examination. In the ISU Substance Abuse and Drug Free Workplace Programs, available to Ames employees, there are no provisions for continued training of supervisors to help detect substance abusers. Positions, jobs, or tasks for which routine substance abuse training is needed have not been identified, and neither ISU nor Ames has provisions in place to perform substance abuse testing for cause. It is recognized that drug testing is not compatible with University policy; however, DOE policy should either be followed or a waiver should be obtained.

For the Organization and Administration functional area as it pertains to safety and health, the Laboratory performed a good self-assessment using Technical Safety Appraisal (TSA) performance objectives and criteria. Of the 11 concerns identified in this functional area, three were fully identified, five were partially identified, and three were not identified at all in the "Ames Laboratory Self-Assessment," dated December 1991. Ames personnel are eager to receive outside safety information, and many safety misconceptions have been cleared up by members of the Tiger Team.

4.5.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

FINDINGS:

- Most professional staff (exempt, nonfaculty personnel) and nonexempt personnel (merit system employees) at Ames have job or position descriptions; however, faculty employees, post-doctoral staff, graduate assistants, and casual or hourly employees do not.
- Job and position descriptions are maintained only in the Ames Personnel Office. Therefore, some professional staff were unaware that descriptions for their positions were on file, while others did not know the content of these descriptions.
- Most existing job and position descriptions for line personnel do not contain explicit assignments of responsibilities or delegation of authorities for safety responsibilities; however, it was reported that safety will be added as an element of new position descriptions. Modifications to existing position descriptions are reportedly more complicated because of the fact that ISU currently controls position descriptions.
- See Concerns TS.1-2 and PP.4-1.
- See Section 4.5.15.2, MS.3.
- The following concern was identified in the Ames self-assessment.

CONCERN: OA.1-1) (H2/C1) Line safety authorities and responsibilites at Ames Laboratory are not documented, defined delegated, and understood as required by DOE 5480.19.

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administration programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

FINDINGS:

- Although the ES&H Group at Ames reports to the Associate Director for Operations, it provides ES&H oversight of other groups within the Operations Division as well as elsewhere within the Laboratory. This situation constitutes a potential conflict-of-interest. It was reported that this organizational structure is currently under review by Ames management.
- The ES&H Group writes Occurrence Reports and conducts occurrence investigations, which are line safety functions.
- The ES&H Group provides support and assistance to line organizations. This function could result in a potential conflict-of-interest whenever the ES&H Group is required to overview activities for which it has provided direct support. For example, the ES&H Group provides radioactive and hazardous waste management functions for the Laboratory while also providing the safety overview.
- As currently planned, the ES&H Group will provide support and assistance to the newly proposed Safety Review Committee (SRC), thereby creating a potential conflict-of-interest for the SRC whenever it is required to overview the activities of the ES&H Group. This plan for support and assistance is reportedly under review by the Laboratory.
- The ES&H Group provides independent oversight of the training organization, which in turn reports to the ES&H Group. This situation represents a direct conflict-of-interest.
- See Concerns QV.1-1 and FR.1-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (OA.2-1) (H2/C1) **The Environment, Safety, and Health Group at Ames Laboratory is not independent as defined in DOE 5480.1B.**

FINDINGS:

- The self-assessment plan developed by Ames was subsequently not formally approved by the Office of Energy Research, Headquarters, DOE. However, a self-assessment based on this plan was performed in December 1991 using a 10-man team, five from the ES&H Group and five from elsewhere in Operations.
- A second self-evaluation using a second plan that had not been formally approved was reportedly performed from mid-December 1991 through early February 1992 by the Division of Science and Technology.

- See Section 4.5.15.2, MS.2.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (OA.2-2) (H2/C1) **Ames Laboratory does not have an approved, institutionalized plan and program for performing ongoing self-assessments as required by Secretary of Energy Notices and letters and by DOE 5480.19.**

OA.3 MANAGEMENT OBJECTIVES

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

FINDINGS:

- Ames does not consistently set auditable, measurable, realistic, and challenging goals as required by DOE 5480.19. (See Concerns RP.11-1 and PP.1-5 and Section 4.5.15.2, MS.1.)
- Safety meetings for all Ames personnel have not been scheduled and held on a regular and consistent basis.
- Safety performance indicators are not consistently developed and posted in an effort to promote safety.
- Safety functions have not been specifically assigned to all line personnel, nor has safety been consistently evaluated as a performance element for line personnel. (See Concerns OA.1-1 and OA.6-1.)
- A tracking system has not been implemented to ensure that noted deficiencies are corrected.
- Recognition and advancement at Ames have been the result of scientific accomplishments (e.g., publishing papers, advanced research, technological achievements, and patents). Safety has not historically played a significant role in this process of recognition and advancement.
- See Concerns OP.1-2 and AX.1-4.
- The following concern was identified in the Ames self-assessment.

CONCERN: (OA.3-1) (H2/C1) **Ames Laboratory has not historically demonstrated a commitment to safety as required by DOE 5480.19.**

OA.4 CORPORATE SUPPORT

PERFORMANCE OBJECTIVE: Corporate interest and support for safe operation should be evident.

FINDINGS:

- The DOE contract for Ames Laboratory is with Iowa State University. The Laboratory reports to the Institute for Physical Research and Technology (IPRT), which in turn reports to the University Provost. ISU has an ES&H committee, but in the recent past, this committee has exercised very little oversight of Ames.

- In preparation for the Tiger Team Assessment, ISU organized another ES&H oversight committee chaired by the Vice Provost to review the Laboratory. ISU will reportedly keep this new ES&H oversight committee but plans to appoint the IPRT Director as chairperson. However, ISU is currently evaluating this arrangement for potential conflicts-of-interest.

- The following concern was identified in the Ames self-assessment.

CONCERN: (OA.4-1) (H3/C2) **Iowa State University has not provided regular and consistent oversight of Ames Laboratory in a manner that ensures compliance with the safety and health components of the Department of Energy/Iowa State University contract.**

OA.5 MANAGEMENT ASSESSMENT

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

FINDINGS:

- The line safety program consists of (1) walkthrough inspections conducted by line management and (2) the appointment of Safety Coordinators and Safety Representatives to assist management; however, the program is not well defined.
- No requirement exists whereby line management must spend a specific amount of time in the workplace observing personnel and facilities or must perform walkthrough inspections. (See Section 4.5.5.2, TC.10.)
- Not all managers at Ames have received special training to assist in walkthrough inspections. (See Concern TC.10-1.)
- Not all Safety Coordinators and Safety Representatives at Ames have been trained in all aspects of their assigned duties. (See Concern TC.1-1.)
- Expectations for Safety Coordinators and Safety Representatives are not always clearly stated or well defined.
- Some responsibilities assigned to Safety Coordinators and Safety Representatives are not clearly separated from their line responsibilities, especially those for supervisors.
- The responsibilities and authorities of Safety Coordinators and Safety Representatives vary greatly.
- Some Safety Coordinators and Safety Representatives are appointed for a specific length of time, while others have no "sunset clause" in their appointment.
- See Section 4.5.3.2, OP.1.
- Walkthrough inspections by managers, Safety Coordinators, and Safety Representatives are not always documented.
- The assignment of space ownership as a safety responsibility has not been accomplished for all areas, buildings, and laboratories used by Ames.
- The process for tracking identified concerns to completion has not been formalized.
- See Concerns TC.1-1, PP.2-1, and QV.1-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OA.5-1) (H2/C1) The line safety program required by DOE 5480.19, SEN-6A, SEN-6B, SEN-6C, and SEN-6D is not well defined and institutionalized at Ames Laboratory.

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

FINDINGS:

- Annual performance evaluations are completed for professional staff (exempt, nonfaculty personnel), nonexempt personnel (merit system employees), and faculty employees; however, no documented evaluations are performed for post-doctoral staff, graduate assistants, and casual or hourly employees. However, graduate assistants are constantly evaluated by their University professors.
- Safety has not always been an element of past performance evaluations; however, plans are reportedly in place to evaluate safety performance in future reviews.
- Performance expectations have not always been discussed with employees before an evaluation is conducted.
- The following concern was identified in the Ames self-assessment.

CONCERN: (OA.6-1) (H2/C1) **Safety accountability in personnel performance evaluations at Ames Laboratory is not consistently defined and evaluated as required by DOE 5480.19.**

OA.7 DOCUMENT CONTROL

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

FINDINGS:

- Controlled safety documents consist of the Ames Laboratory Safety Manual and the Ames Laboratory Emergency Plan; both are maintained up to date by the ES&H Group. However, in some cases, the ES&H Group actually replaces outdated pages in the Safety Manual, while in other cases, the owner of the manual agrees to insert the new pages and destroy the old pages.
- No independent overview process is in place to ensure that pages are actually inserted in the correct order by manual owners.
- More uncontrolled copies of the safety manual are reportedly in circulation than are controlled copies. These uncontrolled copies may consist of reproductions of the entire document, or they may be excerpts of specific sections of individual interest.
- See Concerns TS.2-1, TS.2-2, QV.5-1, and TC.1-1.
- See Section 4.5.7.2, EP.2.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OA.7-1) (H2/C2) **Ames Laboratory has not established a process to assure that all controlled copies of safety documents are maintained current, and controls are not in place to ensure that outdated, uncontrolled copies do not become working documents.**

FINDINGS:

- A high percentage of the procedures at Ames Laboratory has been developed within the past year. However, training on procedures and retraining when procedures are significantly modified have not been institutionalized. (See Concern TC.1-1.)
- A system has not been developed to distinguish between procedures that are mandatory, and therefore should be controlled, and those that are for information only.
- A Laboratory-wide program has not been developed to ensure that the most recent version of a procedure is in the workplace and that all outdated procedures are destroyed.
- A review and approval system has not been developed for safety-related procedures.
- See Concerns TS.2-4 and OP.3-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OA.7-2) (H2/C1) **Ames Laboratory does not have a formal procedures control program as required by DOE 5480.19.**

FINDINGS:

- A lack of procedures and inadequate procedures was observed throughout the Laboratory, as noted by the following:
  - Concerns OA.7-2, QV.6-1, OP.3-1, OP.4-1, AX.1-3, EP.1-1, EP.6-1, TS.2-3, TS.2-4, TS.3-2, PT.1-1, PT.12-1, RP.1-1, PP.2-1, and PP.2-2.
  - Sections 4.5.7.2, EP.4; 4.5.7.2, EP.5; 4.5.7.2, EP.6; and 4.5.7.2, EP.7.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (OA.7-3) (H2/C1) **Management has not systematically reviewed all operations and activities at Ames Laboratory to ensure that procedures exist for all activities as required by DOE 5480.19.**

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: The Fitness for Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use or other physical or psychological conditions and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

FINDINGS:

- The Drug Free Workplace Program is administered and is available to Ames employees by ISU. The program includes (1) periodic distribution of literature on substance abuse and the drug-free workplace, (2) a 1-hour training program for all employees, (3) a 2 1/2-hour training program for supervisors, (4) a new employee training program, and (5) an Employee Assistance Program. However, about 10 percent of Ames employees reportedly have not participated in the 1-hour training program, and about half of the supervisors have not completed the 2 1/2-hour training course.

- There are no plans for a mandatory refresher training program on substance abuse for either employees or supervisors.

- There has been no job evaluation for the purpose of determining the need for routine substance abuse testing for those persons whose jobs present opportunities to cause serious harm or damage to themselves, other employees, the public, the environment, or government property.

- Provisions to conduct for-cause testing for substance abuse do not exist within either the Laboratory or ISU.

- Current ISU policy reportedly prohibits mandatory substance abuse testing.

- See Concern MS.5-1.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OA.8-1) (H2/C2) **The fitness-for-duty program at Ames Laboratory is informal and does not provide for continued training to help identify substance abusers; has not identified jobs, tasks, or positions for which routine substance abuse testing is required; and has not provided for substance abuse testing for cause.**

4.5.2 Quality Verification

4.5.2.1 Overview

This appraisal addressed all seven performance objectives in the Quality Verification functional area. The evaluation process included interviews conducted with personnel from the DOE Chicago Field Office (CH) and Ames Laboratory as well as walkthrough inspections in Spedding Hall, the Physics and Metals Fabrication Buildings, the Campus Warehouse, and machine shops located adjacent to the warehouse. The keystone quality assurance (QA) document, entitled "Ames Laboratory Quality Assurance Program," November 1991, was reviewed, as were a substantial number of other documents, procedures, reports, and records pertaining to the QA effort at Ames Laboratory.

The current QA program at Ames ranges from weak to nonexistent. QA procedures and methodologies are not formally recognized, understood, or followed. However, the recent formation of an Ames Laboratory Quality Assurance Committee is a positive development and may herald the beginning of a major effort to overhaul and consolidate the diverse and fragmented attempts to promote quality assurance at Ames. Another revision of the "Ames Laboratory Quality Assurance Program" document is under way and promises to provide clearer guidance on such issues as who is responsible for QA in various organizations and how the program should be implemented.

The 10 concerns identified during this appraisal focused primarily on the absence of a sitewide QA program and the informal manner in which operating procedures are conducted. It is disturbing to find that a research-oriented institution like Ames does not maintain formalized calibration intervals for its measurement and test equipment (M&TE). Other areas of serious concern include the weak controls that (1) permit noncertified welders to fabricate weldments across the site, (2) encourage machine shop personnel to perform design review of engineering drawings on the shop floor, and (3) foster informal attitudes regarding QA practices at the Campus Warehouse.

Areas of excellence were also noted at the Ames site. Most admirable is the effort by the Procurement and Property Management Group to establish an item nonconformance data base that, upon approval, will track the vendors of nonconformance items. It will replace the voluntary notification system currently being used. Still another bright spot is the almost-finalized M&TE calibration program, which was devised by the Metallurgy and Ceramics Materials Program and is slated for implementation by July 1992.

Oversight of Ames Laboratory by the Chicago Field Office is weak. All managers and staffers interviewed at Ames indicated that CH was "reactive" to questions from Ames but not "proactive" in furnishing routine guidance and oversight to the Laboratory. Only one QA audit has been performed during the past several years, and it took place in February 1991. The CH self-assessment is quite candid in admitting inadequate ES&H oversight at Ames; however, it does not offer definitive guidance as to what corrective steps or timelines are needed to remedy QA shortcomings.

The Ames self-assessment identified most of the QA programmatic concerns observed by the Safety and Health (S&H) Subteam. The self-assessment fully addressed five and partially addressed two of the nine concerns identified by the Subteam. A tenth concern involved lack of CH oversight for Ames, which was not addressed in the CH self-assessment. No corrective actions or timelines were offered in the Ames self-assessment.

4.5.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

FINDINGS:

- The Ames Laboratory Quality Assurance Program does not fully address who is responsible for quality implementation or how quality practices should be accomplished on a sitewide basis.
- Two shortcomings identified in the CH QA audit (No. 91-002-Ames) conducted in February 1991 persist throughout the Ames Laboratory site: (1) a formal M&TE calibration program does not exist, and (2) provisions for the storage and protection of laboratory notebooks are inappropriate. (It should be noted, however, that a photographic reduction program is currently being implemented to resolve the latter shortcoming.)
- Formal division-level QA audits, surveillances, or inspections are not being performed at Ames.
- Meetings of the Ames QA Committee have not been scheduled and held on a regular and consistent basis.
- The Chairman of the QA Committee at Ames is also one of the Laboratory's four Associate Directors, which represents a fundamental conflict-of-interest. The Chairman must seek voluntary cooperation from his three peers in order to implement QA policy, thereby undermining the line authority required for an effective sitewide QA program.
- Members of the Ames QA Committee do not have either a formal background in quality assurance or formal training in all elements of DOE 5700.6C.
- No Ames personnel are certified as Lead Auditors.
- Ames Laboratory has failed to provide periodic audits of the effectiveness of its quality assurance program as required by DOE 5700.6C and ASME NQA-1-1989.
- QA representatives at Ames perform quality-related functions as a collateral duty that is not independent of cost and scheduling considerations.
- The level of QA audit training at Ames is still considered to be minimal.
- QA inspectors have not been appointed at Ames.
- Formal training enabling Ames personnel to perform QA inspections has not been developed.

- Formal sitewide training for the machinery operators and chemical laboratory workers at Ames has not been implemented. Current training is informal and consists of verbal instruction from individual researchers, with no requirement that the trainee be able to demonstrate that he or she understands the information provided during training.

- See Sections 4.5.12.2, PP.3, and 4.5.5.2, TC.8.

- See Concerns PT.3-1 and TC.1-1.

- The following concern was identified in the Ames self-assessment.

CONCERN: (QV.1-1) (H2/C1) **The Ames Laboratory Quality Assurance Program does not include all elements of DOE 5700.6C and ASME NQA-1-1989.**

FINDINGS:

- Interviews conducted with Ames personnel revealed that the Laboratory has received minimal QA guidance from the Chicago Field Office.

- CH oversight of past QA activities at Ames was not based on a formal oversight plan.

- The biennial frequency of CH audits at Ames was judged to be inadequate. Only one QA audit, conducted in February 1991, has been performed during the past several years.

- CH has performed only one ES&H assessment of Ames, and it was conducted in December 1991.

- The current CH plan does not include a provision for day-to-day QA oversight of operations at Ames.

- The following concern was not identified in the CH self-assessment.

CONCERN: (QV.1-2) (H2/C1) **The Chicago Field Office does not provide effective oversight of quality assurance activities at Ames Laboratory as required by DOE 5700.6C and ASME NQA-1-1989.**

FINDINGS:

- No formal program exists for the review, approval, or issuance of engineering drawings, including those for structures supporting safety-related equipment.

- Certified release procedures for original engineering drawings, or the subsequent revision of these drawings, are not in place at Ames.

- A traceability or tracking system has not been established to control revisions to engineering drawings, including those for structures supporting safety-related equipment.
- At Ames Laboratory, machine shop personnel are permitted to perform design modifications to engineering drawings during

fabrication, including those for structures supporting safety-related equipment.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (QV.1-3) (H2/C1) **Ames Laboratory does not have a control or approval process for engineering drawings that complies with DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.**

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS:

- The Campus Warehouse has no formal QA policy.
- A sitewide program is not in place to verify that procurement of spare replacement parts is subject to QA program controls or technical requirements. This responsibility is left to individual requisitioners, most of whom lack formal QA training.
- The evidence does not indicate that Ames Laboratory attempts to share historical vendor problems with its requisitioners. Although this information has been collected into a data base, it is not used to improve quality.
- The Campus Warehouse does not perform QA inspections of incoming materials requested by individual researchers, delegating this responsibility to the researchers themselves.
- Since no QA inspections, audits, or surveillances are performed by the Procurement Department at Ames, a consistent process for tracing quality improvements in vendor performance is not in place.
- The Procurement Department at Ames relies on voluntary reporting of nonconforming items by users rather than on a required reporting system.
- The following concern was identified in the Ames self-assessment.

CONCERN: (QV.2-1) (H2/C1) **Ames Laboratory does not provide for the control or verification of purchased material, equipment, and services or for the selection and control of suppliers as required in DOE 5700.6C and ASME NQA-1-1989.**

FINDINGS:

- Documented or formal programs have not been implemented at Ames to control the use of counterfeit or suspect parts.
- Warehouse personnel at Ames are not trained to recognize counterfeit or suspect parts.
- Documented or formal programs have not been developed to control the procurement of commercial off-the-shelf items for safety-related systems.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (QV.2-2) (H2/C1) Ames Laboratory has not implemented formal programs to identify and control safety-related commercial and counterfeit or suspect parts as required by DOE 5700.6C and ASME NQA-1-1989.

QV.3 RECEIVING AND PREINSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

FINDINGS:

- The Campus Warehouse at Ames does not have approved QA procedures for its receiving operations.
- See Concern PT.2-1.
- A systematic and independent verification against QA requirements in the Ames Campus Warehouse is not performed because warehouse personnel have no formal QA training.
- No routine testing of received goods at Ames is performed to verify supplier certifications.
- Warehouse personnel who track purchase order information against vendor shipping documents on a routine basis do not perform formal QA audits, surveillances, or inspections.

CONCERN: See Concern QV.2-1.

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- A formal calibration program is not in place for M&TE at Ames. Each individual researcher has the discretion to choose whether to calibrate M&TE in his or her area.
- Most calibration specialists for M&TE at Ames are not certified.
- The scale used to disburse precious metals such as gold, silver, platinum, palladium, and gallium in Spedding Hall, room 160, has not been calibrated during the past 6 years. This same scale is used to measure returned precious metals for accountability purposes.
- A calibration deficiency in the Materials Processing Center, identified during a QA audit conducted by CH in February 1991, has not been resolved.
- Inaccurate M&TE compromises inspection, test, and research data collected at Ames.
- The following concern was identified in the Ames self-assessment.

CONCERN: (QV.4-1) (H2/C1) **Contrary to the requirements of DOE 5700.6C and ASME NQA-1-1989, a formal calibration program for measurement and test equipment is not in place at Ames Laboratory.**

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

FINDINGS:

- Controls are not exercised over the equipment stored in the Campus Warehouse at Ames. Individual researchers have been "stashing" obsolete or unwanted laboratory hardware in the warehouse for as long as 40 years.
- Laboratory notebooks are stored by the thousands in paper file folders stacked on open warehouse shelves, without any apparent provision for protection against fire, sprinkler damage, or inadvertent loss.
- See Concerns TC.1-1 and PT.2-1.
- See Sections 4.5.11.2, RP.1, and 4.5.11.2, RP.2.
- Campus Warehouse personnel are not trained in the identification and control of chemicals stored indefinitely in the warehouse.
- Warehouse personnel are not trained in the identification, control, and measurement of hardware and materials with high levels of radioactive contamination that are being stored in a shed adjacent to the warehouse, which has not been posted with radiological warning signs.
- Storeroom personnel are not trained in the identification and control of hazardous chemicals such as the large volumes of perchloric acid, nitric acid, and sulfuric acid being stored in a metal locker in Spedding Hall, room 160.
- For approximately 18 months, caustic reagents were issued from Spedding Hall, room 160, without using written authorization or formal procedures. Currently, written authorization is required, but only verbal procedures are in effect, to control the issuance of caustic reagents.
- See Concern TC.1-1.
- Formal procedures have not been implemented for recycling silver refuse.
- Formal procedures have not been established for periodically changing the combination on the rare and precious metals container in Spedding Hall, room 160.
- The following concern was identified in the Ames self-assessment.

CONCERN: (QV.5-1) (H2/C1) Ames Laboratory has not developed or implemented a formal program for the identification and control of hardware and materials as required by DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- Ames has no formal requirements for independent verification to ensure that inspection programs are established.
- Ames has no formal sitewide inspection procedures.
- The following concern was identified in the Ames self-assessment.

CONCERN: (QV.6-1) (H2/C1) **Ames Laboratory does not have written inspection procedures to provide documentation and evaluation of inspection results as required by DOE 5700.6C and ASME NQA-1-1989.**

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, non-destructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- Welders at Ames are not certified in accordance with ANSI/AWS D1.1, Structural Welding Code-Steel, or ANSI/AWS D1.3, Structural Welding Code-Sheet Steel. Yet weldments were, and are fabricated for structural and safety-related equipment by uncertified welders. The three examples that follow indicate the pervasive nature of improper welding activities throughout the site:

  - The fabrication of the supporting structure for the electrical power supply of the overhead 5-ton bridge crane in the machine shop of Metals Fabrication Building, room 160, poses risks to personnel from electrocution or crush hazards.

  - The 1-ton gantry crane fabricated for use in the Metals Development Building, room 159, poses a substantial crush hazard to personnel in the area.

  - In at least three known instances, welding on 6-inch and 8-inch chilled water piping systems was performed without performing pre-heat or post-weld testing, thereby giving rise to potential intergranular cracking and failure. This situation was further complicated by a lack of hydrostatic testing after the welding modifications and before the weldments were covered with insulation. Close proximity of pressure piping and electrical power distribution boxes creates a potentially high risk of electrocution due to water leaks from faulty welds.

- Ames has not established formal welding procedures to identify and predict all welding requirements, specifications, qualifications, and inspections or tests needed to ensure compliance.

- Ames has not provided the welding-rod ovens required for the storage of low-hydrogen welding electrodes (which are used in structural welding) that have been exposed to the atmosphere in excess of 4 hours. Low-hydrogen welding electrodes are stored on open shelves throughout the site, rendering the quality of weldments as indeterminate.

- Ames has not established a maintenance calibration and testing program for welding equipment to assure that the equipment operates within acceptable parameters. For example, the ampere setting on the welder may not match the actual generated ampere load.

- See Sections 4.5.6.7, AX.7, and 4.5.4.2, MA.1.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (QV.7-1) (H1/C1) CAT. II **Controls and procedures are not in place to ensure that structural welding performed at Ames Laboratory complies with the requirements of DOE 6430.1A, DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.**

FINDINGS:

- Approved safe operating procedures are not in place for two floor Heat Treatment Vacuum Furnaces or for the Bottom Pour Chill Casting Unit located in the Metals Fabrication Building, room 187. These machines generate high temperatures and may pose serious safety and health hazards to untrained operators.

- Formal sitewide guidance is not provided to ensure that machinery and chemical equipment operators, mainly ISU graduate students, are properly trained before assuming their duties. Training is left to the discretion of the individual scientists or researchers within each department.

- See Concerns TS.3-3, QV.1-1, TS.1-3, QV.1-3, and TC.1-1.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (QV.7-2) (H1/C1) **Contrary to the requirements of DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989, controls have not been implemented at Ames Laboratory to prevent machinery and chemical equipment operators from performing tasks without appropriate training or procedures.**

4.5.3 Operations

4.5.3.1 Overview

Seven of the eight performance objectives in the Operations functional area were addressed during this appraisal. OP.7 Shift Turnover was not included because technical operations at Ames Laboratory have no shift activities. Because of the essentially identical nature of Operations and Experimental Activities at Ames Laboratory, performance objectives EA.1 Interface with Experimenters and EA.4 Operations of Experiments were incorporated into the appraisal of the Operations functional area. The results of the appraisal were derived from (1) discussions with technical operations management personnel (i.e., the Laboratory Director, Program Directors, and Group Leaders); (2) discussions with operations personnel (i.e., graduate students and technicians); (3) discussions with the Conduct of Operations Coordinator; (4) observations of physical operations in progress; (5) review of safety-related and other operations documents; and (6) discussions with Laboratory Safety Coordinators (who monitor the safety of operations).

The operations appraised were primarily those conducted in the Science and Technology Division. The operations management structure is appropriately geared to an academically oriented research program and, as such, is well understood and functions effectively. However, management has not established a system of administrative controls that formally articulates safety limits, limiting conditions of operations, and surveillance requirements for the various laboratory research programs. For several years, a system of Safety Coordinators and Safety Representatives has been in effect to monitor operational safety, but the requirements and the organizational features of this system are not formally defined. Moreover, most technical operations personnel receive no feedback on safety statistics for their activities and thus are unable to track their own safety performance levels.

Ames has appointed a Conduct of Operations Coordinator to promote and organize the effort to achieve compliance with DOE 5480.19. The program is still in the very early stages of development, but it appears to be properly structured to bring about the desired result. As of this time, however, several DOE 5480.19 requirements are not being met; for example, authorized user lists are not provided for all equipment units.

Operating procedures have not been prepared for all operations for which they are needed. This problem has been recognized by some technical operations managers who have initiated efforts to prepare and implement procedures for their own operations. However, no formal guidance has been provided on either the requirements of or the format for these procedures. As a result, the features and use of operating procedures are not consistent throughout the Laboratory.

Because of the varied nature of the Laboratory's technical programs, Ames has no requirement for central facility operations controls. The status of facility controls is therefore monitored on a laboratory-by-laboratory basis. Overall, the control parameters, which are documented in research notebooks or by computerized electronic recorders, are effectively monitored. A lockout/tagout system is in place, but it has some serious functional problems. (See Section 4.5.13.1 and Concern WS.4-3.) A Laboratory-wide lockout/tagout procedure is included in the Ames Laboratory Safety Manual

(Section II-G, pp. 11-12, dated January 1, 1989). The existence of other lockout/tagout procedures prepared by several technical

operations groups was judged by the TSA Team to contribute to functional misunderstandings throughout the entire lockout/tagout protection system.

On an individual laboratory basis, research equipment supports safe and reliable operations. Housekeeping practices throughout the technical operations laboratories were also generally very good.

The majority of "operators" are graduate students, primarily Ph.D. candidates. Other workers include post-doctoral appointees, a few highly experienced technicians, and a few advanced undergraduates. As a result of this mix, the operators have excellent knowledge of their operations.

Human factors engineering has not been consciously used in assembling research facilities. However, no gross violations were observed in person-machine interfaces. Reagents are labeled and are neatly catalogued and stored in laboratory cabinets. Material Safety Data Sheets, or Summaries prepared by Ames personnel, were conveniently available. Illumination appeared to be adequate.

The Operations section of the Ames self-assessment is structured to facilitate comparison between the concerns cited in this appraisal and those offered in the Ames document. Of the five concerns in this functional area, one was identified in the Ames self-assessment, two were partially identified, and two were not identified. In accordance with the overall findings of this appraisal, the lack of compliance with DOE 5480.19 was singled out in the self-assessment as a major concern. No corrective actions are proposed in the self-assessment.

4.5.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

FINDINGS:

- Although a system including Safety Coordinators and Safety Representatives has been established to monitor safety performance throughout the technical operations organization, this system has not been formally defined.
- Defined responsibilities for Safety Coordinators are not uniform for all assignments, although a generic job description for Safety Coordinators (plus specific job descriptions for some individual Safety Coordinator assignments) is available. Moreover, discussions with a group of Safety Coordinators indicated that they have received relatively little management guidance with respect to job content.
- Safety Coordinator assignments represent part-time commitments (a minimum of 5%); however, these assignments are not routinely rotated to spread the experience between members of a given division, and there is no time limit on the tour of duty.

CONCERN: **See Concern OA.5-1.**

FINDINGS:

- Discussions with Program Directors, Group Leaders (Principal Investigators), and laboratory operators (graduate students and technicians) revealed the absence of formal administrative controls for technical operations as defined in DOE 5480.19, Chapter I, paragraph B, and Chapter VIII, paragraph B.4.
- Although Ames Laboratory documents sometimes refer to administrative controls (e.g., rules against working alone cited in the "Unit Operations Binder" for the Materials Preparation Center), no administrative control documents for the Laboratory or its divisions were available for review.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OP.1-1) (H2/C1) **Technical operations management at Ames Laboratory has not established a system of administrative controls as required by DOE 5480.19.**

FINDINGS:

- Quarterly reports are prepared by the ES&H Group for submission to the Computer-Assisted Incident Reporting System (CAIRS). These reports cite safety performance statistics for the Laboratory; however, they are not widely circulated. In fact, the reports submitted to CAIRS are locally distributed only to the Laboratory Director and the Associate Director of the Operations Division.

- Discussions with technical operations personnel (primarily in the Science and Technology Division) revealed total ignorance of safety performance statistics for the Laboratory, a situation that precludes an understanding of progress (or lack thereof) in resolving fundamental safety-related problems.

- See Concern OA.3-1.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (OP.1-2) (H3/C2) **Technical operations personnel do not receive safety performance statistics reports for Ames Laboratory.**

OP.2 CONDUCT OF OPERATIONS

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

FINDINGS:

- Some operations equipment units in the Laboratory (e.g., the arc melter belonging to the Metallurgy and Ceramics Program) require special training; however, in many cases no formal documentation could be found to indicate that operators had completed the training required by DOE 5480.19, Chapter V, paragraph C.5. (See Concern TC.1-1.)
- Lists of personnel qualified to operate specific units are not routinely developed and posted.
- See Concern QV.7-2.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (OP.2-1) (H2/C1) **Contrary to DOE 5480.19, Ames Laboratory management does not maintain authorized user lists for all equipment.**

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

FINDINGS:

- Formal operating procedures are prepared and used inconsistently and thus do not comply with the guidelines set forth in DOE 5480.19, Chapter XVI, paragraph C.1.
- A substantial effort is currently under way to prepare and implement intelligible procedures for performing laboratory operations; however, no Laboratory-wide guidance has been provided by management on either the format for or content of standardized operating procedures.
- The features of operating procedures vary widely throughout the technical operations organizational units; for example, some are descriptive documents with accompanying hazards analyses rather than instructions on how to perform specific operations.
- See Concerns QV.7-2, TS.2-3, and TS.2-4.
- The following concern was identified in the Ames self-assessment.

CONCERN: (OP.3-1) (H2/C1) **Contrary to the requirements of DOE 5480.19, formal guidance has not been provided for the preparation of operating procedures at Ames Laboratory.**

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- A Laboratory-wide lockout/tagout procedure is included in the Ames Laboratory Safety Manual (Section II-G, pp. 11-12, dated January 1, 1989); however, several technical operations groups (e.g., the Metallurgy and Ceramic Program) have also published their own lockout/tagout procedures.
- The existence of multiple procedures creates misunderstanding regarding the lockout/tagout system.
- See Concerns PP.1-1 and WS.4-3.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (OP.4-1) (H2/C2) **Multiple lockout/tagout procedures are in effect in different parts of the technical operations organization at Ames Laboratory.**

4.5.4 Maintenance

4.5.4.1 Overview

This appraisal of the Maintenance functional area at Ames Laboratory addressed all eight performance objectives. Material for the appraisal was obtained from interviews with maintenance shop managers, supervisors, craftspersons, and personnel from the Facilities Services and Engineering Services Groups. In addition, information has been acquired by reviewing maintenance policy, programmatic policy, and maintenance checklists as well as by onsite inspection of real property and facility equipment. All nine Government-owned buildings at Ames were evaluated, including maintenance shops, welding booths, tool shops, garages, and related structures.

Maintenance activities at Ames are conducted by personnel who also perform work that is commonly referred to as "fabrication." Because of this situation, a clear division of personnel responsibilities for maintenance does not exist. Scheduling and tracking of maintenance work packages are accomplished via utilization of a Computer-Aided Maintenance System (CAMS) job ticket for routine maintenance or a repair and service job ticket for minor maintenance. The engineer in charge of the CAMS program is performing quite well and is attempting to augment the maintenance program by using CAMS to forecast trends and manpower loading. Unfortunately, little direction is being provided by upper management regarding the scope and formality of the program. A sitewide guideline for maintenance policy has been issued by management of the Facilities Services Group, but it lacks formality of structure and specific direction for accomplishing its overall objectives.

Inspections conducted at several Ames buildings and facilities revealed that most equipment critical to safe operations has been well maintained. The work control system used at Ames lacks formality of function regarding issuance of required documentation, the signature process, and reviews of completed work packages. Thus, Ames has not achieved compliance with the maintenance objectives set forth in DOE 4330.4A. Further, periodic walkdowns and inspections of buildings are not consistently conducted with respect to scheduling, format, and degree of formality.

Maintenance instructions do not always contain sufficient detail or carry appropriate approval to ensure that work is performed in a safe and controlled manner. Existing corrective and preventive maintenance instructions do not always include certification of work completion or post-maintenance testing requirements.

The program currently in place for inspection of hoists, rigging, and slings does not fully address all applicable criteria set forth in the DOE Hoisting and Rigging Manual, dated May 1980, nor does the inspection checklist used consistently indicate satisfactory completion of work. In addition, platform lifts are neither inspected nor tracked by maintenance group personnel.

The limited number of maintenance policies currently in place at Ames does not include the elements necessary to achieve compliance with DOE 4330.4A. The backlog that characterizes the maintenance program at Ames is not being formally addressed in a consistent manner. Moreover, a formal, consistent program is not in place to generate and retain maintenance records as required by DOE 1324.2A.

The informality of training makes it more difficult to provide maintenance personnel with consistent direction and instruction. In addition, no process is in place to prevent an employee from continuing to work after his or her scheduled retraining date has passed. The promotion process used to appoint new shop managers lacks formality of function, and no certification is required before managers assume their duties as instructors.

The Ames self-assessment for the Maintenance functional area addressed all eight performance objectives. Unfortunately, in contrast to the appraisal conducted by the S&H Subteam, corrective maintenance, preventive maintenance, and predictive maintenance were found to be satisfactory. The concept of "graded approach" as defined in DOE 4330.4A was applied inappropriately, which contributed to the poor quality of the self-assessment. Among the key concerns not addressed in the self-assessment are the following: (1) lack of certification for welders, (2) supervisory personnel who provide training without being certified, (3) lack of formality in the "walking the spaces" program, (4) lack of formality in the preventive and predictive maintenance program, and (5) maintenance records that are not generated and retained in accordance with DOE 1324.2A.

One of the main issues recurring throughout this appraisal is the lack of formal certification to qualify welders performing work at Ames. This issue is complicated by the fact that Ames currently does not have a formal program to assess when work must be performed by a certified welder, contingent upon high hazard, imminent risk, or code/manufacturer's requirements. For example, the fabrication of structural steel supports for a 10-ton air-conditioning system located above office space would present a much higher degree of hazard to facility personnel than would fabrication of a coat rack. A formal "certified welder assessment" is commonly delineated in a site/facility document or procedure, based on safety analysis documentation, compliance orders, and manufacturers' specifications. Certification encompasses numerous requirements, including, but not limited to, ANSI/AWS D1.1; ANSI/AWS D1.3; ASME Sections III, VIII, IX, and XI; and ANSI B31.1.

This appraisal generated a total of 10 concerns. The Ames self-assessment addressed one of the concerns, and the other nine were not addressed. The CH self-assessment was appropriately critical of numerous deficiencies in the maintenance program at Ames.

4.5.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

- Welders who work on equipment at Ames are not certified.
- Welders who fabricate structural weldments are not certified.
- See Section 4.5.5.2, TC.5.

CONCERN: **See Concern QV.7-1.**

FINDINGS:

- Ames has not established formal sitewide requirements, goals, objectives, or performance indicators for maintenance activities as defined in DOE 4330.4A.
- Ames has not established formal sitewide standards or other requirements for the conduct of maintenance activities.
- Administrative controls and procedures are not employed for all maintenance activities conducted at Ames facilities.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.1-1) (H3/C1) **Contrary to DOE 4330.4A, formal administrative controls for the maintenance organization are not implemented at Ames Laboratory.**

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

FINDINGS:

- Certification of the satisfactory completion of maintenance work activities is not formally required at Ames facilities.
- Weekly preventive maintenance inspections of diesel generators located in Wilhelm Hall do not bear the signatures or initials of the electrical shop personnel who perform the work.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.2-1) (H3/C1) **At Ames Laboratory, requirements for formal certification of satisfactory completion of work for maintenance activities do not comply with DOE 4330.4A.**

FINDINGS:

- Ames has not established a formal lessons-learned program for maintenance activities.
- Formal lessons-learned programs are not in place at the construction; mechanical; electrical; heating, ventilation, and air-conditioning; or paint shops.
- See Concern FR.6-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.2-2) (H3/C1) **Facility and industry experiences are not being distributed to maintenance personnel at Ames Laboratory by means of a formal lessons-learned program that complies with DOE 4330.4A.**

FINDINGS:

- Ames does not have a documented training program that formally qualifies supervisors to direct maintenance activities.
- Plant personnel performing maintenance activities are given directions by a supervisor who is not formally trained or certified.
- See Concerns TC.10-1 and QV.1-7.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.2-3) (H2/C2) **Most maintenance supervisory personnel at Ames Laboratory are not formally certified to direct maintenance work activities.**

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

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

FINDINGS:

- Torque wrenches being used by maintenance groups do not have decals bearing current calibration data.

CONCERN: **See Concern QV.4-1.**

FINDINGS:

- Checklists used by maintenance personnel to inspect lifting, hoisting, and rigging equipment do not fully address the applicable criteria of the DOE Hoisting and Rigging Manual, dated May 1980.
- Maintenance personnel performing inspection of lifting, hoisting, and rigging equipment have not been formally trained.
- See Concern TC.5-1.
- Platform lifts are not inspected by maintenance personnel, nor are they included on any maintenance tracking system.
- The following concern was identified in the Ames self-assessment.

CONCERN: (MA.3-1) (H1/C1) **Not all lifting, hoisting, and rigging equipment at Ames Laboratory is being inspected as required by the Department of Energy Hoisting and Rigging Manual, dated May 1980, nor are personnel performing inspections of this equipment formally trained or qualified.**

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

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

FINDINGS:

- Work packages used by maintenance personnel do not employ welding/burning permits.
- Work packages used by maintenance personnel do not consistently follow a formal process that includes reviews for confined space, lockout/tagout requirements, or identification of special hazards.
- Maintenance backlogs at Ames are not formally tracked.
- See Sections 4.5.13.2, WS.3, and 4.5.13.2, WS.4.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.4-1) (H2/C1) **The planning, scheduling, and control of maintenance activities at Ames Laboratory are not always documented in a formal manner that complies with DOE 4330.4A.**

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

FINDINGS:

- Ames has no formal program to provide periodic maintenance inspections.
- Field inspection of the paint and air-conditioning shops revealed that welding electrodes are not stored in humidity-resistant containers.
- During field inspection of the maintenance shop, a container of lacquer thinner (badly crushed on one bottom corner) was found on an open-sided shelf. In addition, no spill kit or flammable materials container was present.
- During field inspection of the maintenance garage, 3- and 5-gallon containers of motor oil, transmission fluid, and roof paint were observed to be in the potential impact path for vehicles driven in and out of the area.
- See Concern WS.4-4.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.5-1) (H2/C1) **Maintenance managers have not implemented a formal program to assess facility area conditions in accordance with DOE 4330.4A.**

MA.6 PREVENTIVE MAINTENANCE

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

FINDINGS:

- Ames does not have a formal, documented program for preventive maintenance.
- Preventive maintenance job tickets do not undergo a formal review process after work activities are completed.
- Frequency of preventive maintenance activities is not formally reviewed to assure compliance with vendor recommendations or operational experience.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.6-1) (H3/C1) **Preventive maintenance activities at Ames Laboratory are not formalized in accordance with DOE 4330.4A.**

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- Although Ames has buildings and facilities dating from the 1940s, age-related degradation of systems, components, and structures is not addressed in a formal manner.
- See Concern TS.4-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.7-1) (H3/C2) **Ames Laboratory does not have a formal predictive maintenance program to address relevant trends, parameters, properties, and performance characteristics.**

MA.8 PROCEDURES AND DOCUMENTATION

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

FINDINGS:

- Ames has no formal procedures for the generation and retention of maintenance records.
- The Facilities Services Group has not defined applicable retention periods for maintenance records as required by DOE 1324.2A.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MA.8-1) (H3/C1) **Ames Laboratory has established neither formal procedures for recording maintenance activities that comply with DOE 4330.4A nor a records retention program that meets the requirements of DOE 1324.2A.**

4.5.5 Training and Certification

4.5.5.1 Overview

The appraisal of the Training and Certification functional area was performed by interviewing management and staff at Ames Laboratory, visiting facilities and observing activities, reviewing pertinent documents, and interacting with other Tiger Team members. Of the 11 performance objectives for this area, seven were judged to be applicable. The four inapplicable performance objectives were TC.2 Reactor Operations, TC.3 Nuclear Facility Operations Other Than Reactors, TC.6 Criticality Safety, and TC.11 Simulator Training/Facility Exercises. Concerns are noted in all seven of the areas evaluated for this appraisal.

Prior to July 1991, training activities at Ames were very informal. Most training was provided at the program or project level. Some of this training was conducted by means of formal lectures, but most was provided as on-the-job instruction. Safety Coordinators and Safety Representatives were charged with providing part-time instructors and recording all training data for each employee under their purview. The auditability of these records varied considerably from facility to facility.

A full-time Safety Training Coordinator was added to the Ames staff in July 1991. Many training modules have been developed since that time, and many more are either under development or being planned. The training program is not yet formalized and functional for all required training areas. An automated training records system is being developed but is not yet functional. The new computerized system will greatly facilitate the auditability of individual training records.

A General Employee Training program has been developed and is being presented to all new employees as well as to existing employees. The General Employee Training effort is still evolving and does not include all general hazards that an employee could encounter. Emergency preparedness, for example, has been slated for inclusion in General Employee Training.

A training program for maintenance personnel that meets the requirements of DOE 4330.4A does not exist. In addition, the Laboratory reportedly does not have a formal quality assurance program, and personnel performing QA functions receive no specific training to enable them to perform these functions more effectively. In the radiation protection area, there is no documentation showing that technicians have been trained to use existing procedures, and overview of offsite training has not been established to ensure that training for radiation protection technicians meets the needs of the Laboratory.

Management and supervisory training programs have not been developed to improve management skills and to assist management in performing walkthrough inspections. Similarly, a program has not been developed to assist classroom instructors and on-the-job trainers in performing these activities more effectively.

Training facilities at Ames are cramped. Currently, there are no facilities dedicated to continued training. A planned facility addition scheduled for completion in about 24 months should alleviate the problem, but meanwhile the

Training Department must cope with cramped facilities and setting up training aids in Ames conference rooms and rented ISU space.

The Ames self-assessment addressed most of the major training problems related to safety. Of the six concerns identified in this appraisal, four were fully addressed, and two were partially addressed in the Ames self-assessment. The self-assessment took a critical, in-depth look at the safety training program. The training program was in such an embryonic state at the time of the self-assessment that concerns identified were rather global and contained few detailed comments.

4.5.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

- Job and task analyses have not been performed for all positions to determine which training modules are needed; however, a general hazards analysis was performed to help identify training needs. (See Concerns OA.5-1 and OA.7-1.)
- Training modules have not been developed for all currently identified needs; however, many are under development.
- A training manual has not been developed to define the goals and objectives of the training program.
- The current program does not disqualify an employee if refresher training is not obtained in a timely manner.
- Much has been accomplished in the short time since the Training Coordinator has been at the Laboratory; however, many self-identified deficiencies have not yet been corrected.
- Examinations or training objectives have not been developed and implemented for about 25 percent of the training modules at Ames.
- See Concerns QV.7-2, EP.4-2, TS.1-3, and PT.2-1 and Sections 4.5.2.2, QV.5; 4.5.7.2, EP.1; 4.5.7.2, EP.2; 4.5.7.2, EP.3; 4.5.11.2, RP.10; 4.5.12.2, PP.1; 4.5.12.2, PP.3; and 4.5.13.2, WS.3.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TC.1-1) (H2/C1) **The training program at Ames Laboratory is not yet formalized and fully functional as required by DOE 5480.19.**

FINDINGS:

- **Training records have been the sole responsibility of the 17 Safety Coordinators, who individually maintain hard-copy records of training administered to each employee for whom they are responsible. As a result, recordkeeping reportedly varies from very good to minimal.**
- **Training records are maintained in each program or project office, not in a central location.**
- **Training records do not indicate when retraining is required.**
- **The Ames Laboratory Training Records System, a new automated program, is not yet operational.**

- The following concern was identified in the Ames self-assessment.

CONCERN: (TC.1-2) (H3/C1) **Training records at Ames Laboratory are not auditable on a sitewide basis as required by DOE 5480.19.**

TC.4 GENERAL EMPLOYEE/PERSONNEL PROTECTION TRAINING

PERFORMANCE OBJECTIVE: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors, and visitors have an understanding of their responsibilities and expected safe work practices and have the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

FINDINGS:

- Until recently, most new and existing employees did not receive General Employee Training. This training is now being provided to all existing personnel as well as to new employees. About 10 percent of the existing work force still has not received training in this area.
- The General Employee Training module is constantly being expanded to provide greater coverage; however, training is not currently being provided in all general hazard areas (e.g., emergency preparedness, as required by DOE 5500.3A, and radiation protection, as required by DOE 5480.11).
- See Concerns EP.4-2, WS.3-1, and WS.3-2.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TC.4-1) (H2/C1) **General Employee Training currently does not include all general hazards that could be encountered at Ames Laboratory as required by Department of Energy Orders.**

TC.5 MAINTENANCE PERSONNEL

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

FINDINGS:

- Although some modules such as hoist safety and lockout/tagout have been developed, a formal training program is not in place to develop and maintain the knowledge and skills of maintenance personnel as required by DOE 4330.4A.

CONCERN: **See Concerns MA.1-2, MA.2-3, AX.6-1, and QV.1-1.**

TC.7 TRAINING FACILITIES AND EQUIPMENT

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

FINDINGS:

- Training facilities and equipment are minimal.
- Training sessions are scheduled in Ames conference rooms and in space rented from ISU on an "as-available" basis.
- Reference library space, training areas, and training aids are minimal at best.
- A building addition scheduled for completion in about 24 months will reportedly alleviate cramped and minimal training conditions; however, construction on this new addition has yet to begin.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TC.7-1) (H3/C2) **Training facilities, equipment, and materials at Ames Laboratory do not provide all necessary support for required training activities.**

TC.8 QUALITY CONTROL INSPECTOR AND NONDESTRUCTIVE EXAMINATION TECHNICIAN

PERFORMANCE OBJECTIVE: The quality control inspector and nondestructive examination technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Ames Laboratory reportedly does not have a formal QA program as required by DOE 5700.6C.
- The existing QA program is reportedly fragmented and ineffective and lacks direction on a sitewide basis.
- Persons who perform quality control and quality assurance functions receive no specific training to enable them to perform their tasks more effectively.

CONCERN: **See Concern QV.1-1 and Sections 4.5.2.2, QV.2, and 4.5.2.2, QV.3.**

TC.9 RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Radiation protection personnel reportedly receive their training off site, but this training is not monitored.
- Procedures have been established for some radiation protection functions at Ames; however, there are no records indicating that radiation protection personnel have been trained on these procedures.
- See Concerns RP.1-2 and RP.10-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TC.9-1) (H2/C1) **There is no documentation to assure that training for radiation protection personnel meets the needs of the Ames Laboratory or the requirements of DOE 5480.11.**

TC.10 TRAINING FOR SUPERVISORS, MANAGERS, AND TECHNICAL STAFF

PERFORMANCE OBJECTIVE: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

FINDINGS:

- Not all managers have received training to improve their safety awareness during walkthrough inspections. (See Section 4.5.1.2, OA.5.)
- Training to improve management skills for supervisors and managers, especially for new and first-line supervisors, is minimal.
- Ames does not have a formal program to train on-the-job and classroom instructors.
- See Concerns QV.1-1 and EP.3-1.
- See Sections 4.5.1.2, OA.5; 4.5.7.2, EP.3; and 4.5.12.2, PP.3.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TC.10-1) (H2/C1) **Ames Laboratory has not developed a training program for managers, supervisors, and instructors to improve their management skills and instruction techniques and to improve their line safety capabilities as required by DOE 5480.19.**

4.5.6 Auxiliary Systems

4.5.6.1 Overview

This appraisal addressed the Auxiliary Systems functional area for the Ames Laboratory. The appraisal considered functional requirements, procedures, training, maintenance, testing, data trending, and as-low-as-reasonably-achievable (ALARA) goals. The evaluation also included system walkthroughs, personnel interviews, and document reviews. Of the nine performance objectives for Auxiliary Systems, seven were evaluated for this appraisal. AX.3 Solid Wastes is addressed in the Packaging and Transportation section of this report. AX.4 Storage and Handling of Fissile Material was not assessed because the quantity of fissile material maintained at the site is extremely small. Findings relevant to AX.9 are addressed in AX.7 of this appraisal. Field evaluations included surveys on the roofs of three buildings, inspections of numerous exhaust hood configurations, and reviews of cooling systems.

The status of auxiliary systems depends on the age and complexity of the facility or component in question. In general, auxiliary systems at Ames lack formality regarding description, procedures, training, communication with other groups, trending of data, development of performance objectives for goals and trends, monitoring of water-processing equipment, and human-engineering good practices. Most personnel training for auxiliary systems activities is informal, and few instructors have formal certifications.

The lack of formal direction from senior management at Ames has produced a situation in which most auxiliary systems used to support experiments have not been subject to a formal, documented review process (e.g., safety analysis reviews and technical specifications). Formal design drawings are not generated for auxiliary system components before fabrication, and these components are fabricated by welders who are not formally certified by a recognized national board or committee. As-built drawings are not always maintained for auxiliary systems, nor is there a formal system in place to track needed design changes. Finally, programs for monitoring and performing surveillances have not been developed to detect the long-term degradation and aging of auxiliary systems at Ames.

Most effluents at Ames Laboratory consist of airborne releases of various hazardous chemicals (e.g., chlorine, hydrofluoric acid, and nitric acid). Two potential sources of airborne radioactive releases were assessed: (1) the Alpha Containment Facility, which is currently being modified, and (2) the fume hood fitted with a high-efficiency particulate air (HEPA) filter located in Spedding Hall, room B-57, which is currently used about twice a year. Maintenance conditions of exhaust effluent stacks and the absence of an effluent stack sampling program raise doubts concerning the adequacy of auxiliary system configuration.

Ventilation systems at Ames vary in design and complexity, ranging from fume hood systems to ventilation systems using HEPA filters. Existing ventilation systems have not been analyzed to assure that the airflow they provide minimizes risks to workers and the environment. Meteorological data are not being used to predict downdrafts of potentially radioactive effluents from exhaust stacks.

Auxiliary water systems are used to cool experiments, but the maintenance program currently in place for these systems does not fully address all facets of potential testing criteria.

The Ames self-assessment for auxiliary systems was found to be marginal at best. The self-assessment did address deficiencies related to solid waste and ventilation systems; unfortunately, however, heat removal systems and coolant cleanup systems were not addressed at all. Other key concerns not addressed in the self-assessment include (1) the lack of formal procedures, (2) the lack of engineering documentation, (3) improper use of engineering safety systems, (4) poor maintenance of ventilation stacks, and (5) the absence or inconsistent application of safety analysis reviews. This appraisal generated a total of eight concerns. The Ames self-assessment partially addressed two of these concerns, and six were not addressed.

Although the Ames self-assessment of auxiliary systems was sadly lacking in depth and methodology, it is far superior to the assessment conducted by the Chicago Field Office. For reasons not readily apparent, CH chose not to assess auxiliary systems at all. For eight of the nine performance objectives, CH concluded as follows: "Since Ames is not operating any large user facilities or utility systems, this performance objective was not evaluated." The other performance objective was deemed "not applicable" because "Ames Laboratory does not have Reactor or Non-Reactor Nuclear facilities." Lack of guidance from the Chicago Field Office has hindered the Ames Laboratory's ability to achieve acceptable compliance.

4.5.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVES: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modification as the structural, confinement, and primary process system of the facility.

FINDINGS:

- Documentation is not available to describe programmatic monitoring, surveillances, services, and age-related degradation of auxiliary systems observed at Ames Laboratory.
- The blower for ventilation stack No. 361-A on the roof of Spedding Hall was found to be disconnected from its electrical receptacle, and no explanatory tag was attached.
- At least three ventilation systems on the roof of Spedding Hall have unsecured electrical junction boxes that are not of weatherproof construction and that are exposed to the elements.
- Ventilation stacks (Nos. 22 and 322) on the roof of Wilhelm Hall do not have weatherproof electrical connectors.
- Ventilation stack No. 20 on the roof of Wilhelm Hall is connected to an electrical receptacle that does not have a faceplate. The receptacle is covered with black electrician's tape, thereby exposing wiring connections to the atmosphere.
- Ventilation stack No. 340 on the roof of Spedding Hall is supported by three guy wires, all of which are loose.
- See Concern WS.4-2.

CONCERN: **See Concern MA.5-1.**

FINDINGS:

- A safety analysis review for the Alpha Containment Facility lacks sufficient detail regarding maintenance and testing requirements for auxiliary systems. (See Concerns TS.2-1 and TS.2-2.)
- Ames does not have a formal requirement to generate a safety analysis review for experiments requiring auxiliary system support.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (AX.1-1) (H2/C1) **Auxiliary systems at Ames Laboratory are not consistently addressed or clearly defined in safety analysis documentation as required by DOE 5481.1B.**

FINDINGS:

- A program is not in place to maintain as-built drawings of auxiliary exhaust systems at Ames.

- Angle iron frameworks were fabricated for a total of 11 auxiliary exhaust systems without using formal design drawings or installation criteria. These frameworks are located on the roof of Wilhelm Hall.

- A new exhaust system support platform currently being fabricated on the lower roof of the Metals Development Building does not use formal design drawings.

- See Concern QV.1-3.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (AX.1-2) (H2/C2) **Updated drawings and other formal documentation for auxiliary systems at Ames Laboratory are not consistently generated or retained.**

FINDINGS:

- The Chicago Field Office has not provided formal independent verification of auxiliary systems programs at Ames Laboratory.

- The Chicago Field Office did not assess auxiliary systems at Ames in the CH self-assessment. The justifications provided for this non-assessment lacked merit and do not meet exemption criteria.

- The following concern was not identified in the CH self-assessment.

CONCERN: (AX.1-3) (H2/C1) **The Chicago Field Office does not provide independent oversight and formal direction in the area of auxiliary systems at Ames Laboratory to assure compliance with DOE 5400.1.**

FINDINGS:

- Programmatic considerations for monitoring age-related degradation, services performed, and surveillance information on auxiliary systems have not been established at Ames.

- See Concerns OA.3-1 and TS.4-1.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (AX.1-4) (H2/C2) **Formal trending programs are not in place for auxiliary systems at Ames Laboratory.**

AX.2 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases are less than Department of Energy and Environmental Protection Agency standards and are as low as reasonably achievable.

FINDINGS:

- Observations of the maintenance status of exhaust stacks indicated a lack of attention that could affect the quantitative determination of effluents.
- Ames does not have a formal program to assess potential effluent releases into waste water.
- Ames does not have a formal program to monitor effluent releases from exhaust stacks.
- See Concern TS.5-2.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (AX.2-1) (H2/C1) **Ames Laboratory does not have a formal program to measure and record data for effluent pathways in accordance DOE 5400.1 and ANSI N42.18-1974, American National Standard Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents.**

AX.5 VENTILATION SYSTEMS

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

FINDINGS:

- The safety analysis review for the Alpha Containment Facility lacks sufficient detail regarding both bounding conditions of auxiliary systems and appropriate testing requirements.
- Testing of HEPA filters used for auxiliary systems to assure that airflow is from clean to less-clean areas is not performed in a formal manner, and worker training is not being conducted by certified personnel.
- See Concerns TS.5-1 and QV.1-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (AX.5-1) (H2/C2) **Ames Laboratory does not have a formal program to assure that ventilation systems are properly balanced and operated.**

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- Personnel performing testing and maintenance on diesel electric generators have not been formally trained, and training activities are not documented.
- The Facilities Services Group is not aware of tests or checks that can be performed to determine the quality of diesel fuel.
- Surveillance testing and examination of diesel electric generators do not address all requirements of NFPA 110, Standard for Emergency and Standby Power Systems.
- Monitoring systems for the diesel electric generators do not address all criteria necessary to assure the effective operation of the system (e.g., low fuel level alarm).
- Battery-powered emergency lighting is not provided in the diesel electric generator area of Wilhelm Hall, room 29B, as required by NFPA 110.
- The two 12-volt batteries used to start the diesel electric generators in Wilhelm Hall are located on the floor and do not have protective coverings to prevent contact with the terminals, thereby presenting a hazard to personnel and equipment.
- An energized 480-volt wall-mounted panel in Wilhelm Hall, located in the diesel electric generator area, has water dripping within 12 inches of the panel. When it rains, water flows down the wall behind the panel. This situation presents a hazard to both personnel and equipment.
- See Section 4.5.5.2, TC.5.
- See Concerns WS.4-2 and QV.1-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (AX.6-1) (H2/C1) **Ames Laboratory does not have a formal program to establish training, operation, and surveillance requirements for maintaining emergency power equipment as required by NFPA 110, Standard for Emergency and Standby Power Systems.**

AX.7 HEAT REMOVAL SYSTEMS

PERFORMANCE OBJECTIVE: The heat removal systems should reliably remove heat as required from the reactor or process equipment important to safety.

FINDINGS:

- Formal procedures have not been developed for the operation of heat removal systems at Ames.
- Ames does not have a formal program to assess potential equipment loss or personnel hazard due to water coolant system failure.
- As-built drawings of water coolant systems are not being generated or retained by Ames.
- Ames does not have a formal program to monitor or sample auxiliary water coolant systems that minimize the buildup of contamination and or reduce corrosion.
- See Concern QV.7-2.
- Water coolant systems are being modified and fabricated by uncertified welders.

CONCERN: **See Concern TS.2-1.**

AX.8 ENGINEERED SAFETY SYSTEMS

PERFORMANCE OBJECTIVE: Engineered Safety Systems should be reliable and available to provide protection to the facility when required.

FINDINGS:

- The "Safety Analysis Review for the Alpha Containment Facility" (undated) does not fully define testing requirements for interlocks or actions to be taken in the event that operating and safety criteria are not met.
- Ames does not have a formal program addressing preventive maintenance and inservice inspection of engineered safety systems.
- See Concern QV.7-2.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (AX.8-1) (H2/C2) **Ames Laboratory does not have a formal program to define minimum engineering safety features and monitoring devices required for the safe operation of auxiliary systems.**

4.5.7 Emergency Preparedness

4.5.7.1 Overview

This appraisal of the Emergency Preparedness functional area at Ames Laboratory addressed all seven performance objectives. In addition, it addressed the Emergency Public Information System and the Hazardous Materials Response Program. The appraisal included interviews with managers, supervisors, and emergency management personnel; emergency preparedness and Laboratory management; and various members of the Emergency Response Organization. Those interviews were used to ascertain how emergency response activities and the Emergency Preparedness Program were implemented, managed, and maintained. The simulated emergency exercise conducted by the Laboratory involved hazardous materials and was observed by members of the S&H Subteam. The Subteam also reviewed and examined records, emergency plans, and supporting documents against DOE 5000.3A, the DOE 5500 series of Orders, the DOE 5480 series of Orders, standards established by American National Standards Institute (ANSI), and industry good practices.

The Emergency Preparedness Program at Ames is in the initial stage of development and has an extremely limited capability to detect accidents and incidents, respond to these events, and provide guidance and protection to workers. The Emergency Preparedness Program has not been developed using guidance set forth in the DOE 5500 series of Orders.

Ames has developed an Emergency Plan that provides very limited emergency information about the Emergency Preparedness Program. The provisions of this plan do not meet the requirements and recommendations of DOE 5500.3A. Ames has not developed a safety analysis report to describe and evaluate all credible functions that could evolve into emergency situations. The Laboratory has not developed implementing procedures for the Emergency Plan to address emergency action levels, emergency classifications, activation of emergency response facilities and organizations, protective actions, activation of emergency response teams, and notifications.

In addition, Ames has not developed an emergency training program that complies with DOE 5500.3A. Minimal emergency training for the emergency management team and support staff has been accomplished, but none of the anticipated emergency response teams have received required training. Hazardous material (HAZMAT) training required under 29 CFR 1910.120 has not been conducted for Laboratory employees (i.e., 24- or 40-hour training courses), and training documents are not available (e.g., lesson plans, training program descriptions, training records, and training matrix).

Ames has participated in drills and exercises developed each year by Iowa disaster services for tornado-related emergencies. However, exercise and drill schedules have not been developed for a wide variety of other emergencies as required by DOE 5500.3A. Moreover, the organization responsible for emergency preparedness has not established an action plan that meets the requirements of DOE 5500.10.

The oversight being provided by the Chicago Field Office has been very limited over the past 2 years, a circumstance that may have contributed to the failure to establish a satisfactory Emergency Preparedness Program at Ames.

The Laboratory Emergency Public Information Plan, on the other hand, is a well-developed document that addresses all criteria established in DOE 5500.4 and the DOE 5500 series of Orders. During the TSA emergency response exercise, the TSA observer/evaluator was impressed with the ability of the Public Information Department to react, report, and obtain the information necessary to perform its function.

The emergency response exercise conducted during the TSA indicated numerous management problems that are likely attributable to the lack of training, emergency planning, implementing procedures, and resources as well as to a general lack of management participation.

The individual assigned to develop, maintain, and coordinate emergency preparedness at Ames performs this function on a part-time basis. His primary function is Manager, Facilities Services, but he also serves as the operations reviewer for National Environmental Policy Act (NEPA) issues at the Laboratory. On the basis of interviews and conversations with other managers, the S&H Subteam concluded that this individual has attempted to develop the Ames Emergency Preparedness Program without the benefit of assistance or resources from outside the Laboratory.

The S&H Subteam identified seven Emergency Preparedness concerns in this report. The Ames self-assessment identified six of these concerns and partially identified one. No corrective actions were identified in the self-assessment. The fact that the Emergency Preparedness Program at Ames Laboratory was not developed using the DOE 5500 series of Orders is fundamental to the concerns identified in this area. In addition, the Emergency Plan is not in compliance with DOE 5500.1A. There is no emergency planning training program for the Emergency Response Organization, response teams, and Laboratory employees. An emergency plan implementing procedure has not been developed, and Ames has not revised its safety analysis documentation to cover all credible emergencies. The low priority attached to remediation of these concerns may be exemplified by the fact that the position of Emergency Preparedness Coordinator is assigned as an "additional duty" to the Manager, Facility Services.

4.5.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

- Management at Ames does not provide sufficient resources to accomplish assigned emergency preparedness tasks and to comply with the DOE 5500 series of Orders.
- The existing Emergency Plan does not adequately identify, or assign responsibilities to, the emergency management organization.
- Special response teams, support staff for the Emergency Operations Center, and emergency management do not have sufficient training to comply with DOE 5500.3A. (See Concern TC.1-1.)
- Emergency responsibilities are not identified or documented for each member of the Emergency Response Organization.
- Technical support, facility maintenance, and operations personnel are not identified or trained to perform their emergency response functions in accordance with DOE 5500.3A.
- The emergency response plan for Ames does not cover emergencies involving security and HAZMAT (e.g., toxic chemicals), and provisions for shifting from one type of emergency to another have not been developed.
- Letters of agreement and understanding with ISU and offsite emergency response agencies are not sufficiently detailed with respect to the types of response that could be anticipated for emergencies at Ames.
- See Section 4.5.7.2, EP.4.
- The following concern was identified in the Ames self-assessment.

CONCERN: (EP.1-1) (H1/C1) CAT. II **Ames Laboratory has not developed an effective Emergency Preparedness Program as required by DOE 5500.1B, DOE 5500.2B, DOE 5500.3A, and DOE 5500.10.**

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

FINDINGS:

- Ames does not have an emergency response plan that complies with DOE 5500.3A.
- Ames does not have emergency preparedness implementing procedures that address emergency classifications, emergency action levels, emergency notifications, protective actions, sampling and monitoring, and reentry and recovery operations.
- Overall responsibility and authority for developing, maintaining, and coordinating the Ames Emergency Preparedness Program are not identified in the Ames Emergency Plan or in any other document.
- Responsibilities and authorities for each member of the Emergency Response Organization are not defined in the existing Emergency Plan. (See Concern TC.1-1.)
- Emergency documents for Ames are distributed as controlled, numbered documents, but they do not meet the requirements for a controlled document program as set forth in DOE 5500.3A. (See Concern OA.7-1.)
- Emergency plan administrative procedures have not been developed to provide specific instructions on (1) conduct of surveillances of emergency equipment and resources; (2) the testing, development, and conduct of emergency drills and exercises; (3) conduct of the emergency preparedness training program; or (4) the establishment of an emergency preparedness action tracking system.

CONCERN: **See Concern EP.1-1.**

FINDINGS:

- Ames has not developed an emergency preparedness job task analysis study to identify all responsibilities of the Emergency Response Organization (e.g., emergency management, support staff, specialized field teams, and environmental assessment and monitoring teams). (See Concern TC.1-1.)
- Ames has not developed a procedure that provides special instructions for preparing, disseminating, and assigning responsibilities to address actions required by DOE 5000.3A.
- Ames has not revised its safety analysis document as required by the DOE 5500 series of Orders to ensure that all credible emergencies are identified in the existing Emergency Plan. (See Concerns TS.2-1 and TS.2-2.)

- Ames has not developed facility emergency plans to provide special instructions for facility emergencies (e.g., evacuation, assembly areas, emergency action levels, maps and diagrams portraying locations of emergency equipment, and resources).

- Coordination of the Ames Emergency Plan with ISU, State, County, and local emergency management agencies has not been formally documented.

- Checklists of actions to be taken during an emergency have not been developed.

- The Ames Emergency Plan does not include a cross-reference list for the Emergency Plan, emergency procedures, and DOE Orders.

- Ames has no procedure to assure the appropriate notification of next of kin in the event of fatalities or serious injuries.

CONCERN: **See Concern EP.1-1.**

EP.3 EMERGENCY RESPONSE TRAINING

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

FINDINGS:

- Emergency management, support staff, and response teams at Ames have not received sufficient emergency planning or response training to ensure that responsible personnel are capable of performing their assigned emergency functions. (See Concern TC.1-1.)
- HAZMAT training has not been conducted for all Ames employees involved in handling toxic chemicals as required by 29 CFR 1910.120. (See Concerns TC.10-1 and WS.3-4.)
- Ames has no qualified instructors to provide emergency response training.
- Field-monitoring and sampling teams, protective forces, environmental teams, and on-the-scene control personnel have not received adequate emergency response training. (See Concern TC.1-1.)
- The City of Ames Fire Department, Ames ambulance service, and ISU emergency agencies have not received sufficient orientation, information, and site-specific training to develop plans for positive and coordinated efforts to facilitate their responses to emergencies at Ames Laboratory.
- Ames employees are not receiving sufficient emergency preparedness training.
- Designated alternates for the Emergency Response Organization have not participated equally in training or in drills and exercises for emergencies.
- Senior managers (e.g., Associate Laboratory Directors) have not been designated as members of the Ames Emergency Response Organization, nor have they been given adequate emergency response training.

CONCERN: **See Concern EP.1-1.**

EP.4 EMERGENCY PREPAREDNESS DRILLS AND EXERCISES

PERFORMANCE OBJECTIVE: Emergency preparedness programs should include provisions for simulated emergency drills and exercises to develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

NOTE: The drills and exercises referred to in this section are related to tests of and training on the emergency preparedness program. In many cases, these drills and exercises are best initiated using an operational situation. If accomplished that way, an additional benefit is gained by exercising the operations personnel and the interface between operations and emergency preparedness. Therefore, for maximum benefit, an operational drill or exercise can be used to lead into the emergency preparedness event, providing a drill or exercise to each program.

FINDINGS:

- Ames has not developed an emergency preparedness administrative procedure to address scenario development, format, training for controllers and evaluators, development of exercise objectives, and post-exercise activities.
- Ames does not hold frequent drills for response teams (e.g., maintenance/repairs, radiological and hazardous material sampling, and monitoring teams) in order to train response personnel perfecting procedures, techniques, and communications.
- Documentation reviews indicate that Ames does not respond in a timely and effective manner to resolve cited deficiencies after exercises and drills.
- Quarterly communications drills are not being conducted.
- Drills and exercises at Ames are not conducted in accordance with a master plan or schedule to ensure that all procedures, personnel, facilities, and onsite emergency response groups are involved and tested according to the criteria set forth in DOE 5500.3A and DOE 5500.10.
- The following concern was identified in the Ames self-assessment.

CONCERN: (EP.4-1) (H1/C1) **The exercise and drill program at Ames Laboratory does not comply with the requirements of DOE 5500.3A and DOE 5500.10 with respect to preparations, training, and communications for drills and exercising.**

FINDINGS:

- Ames developed its own verbal and written exercise critiques, providing a detailed accounting of items that are in need of corrective action; however, the S&H Subteam noted the following findings:

- Only the City of Ames Fire Department responded with self-contained breathing apparatus (SCBA), whereas Ames emergency response personnel did not bring protective equipment to the exercise scene.

- The On-scene Commander (Operations Leader) proceeded immediately to the basement location of the simulated emergency instead of establishing a command post from which operations could control the incident.

- Several Ames employees, including the Operations Leader, were in the simulated accident area without protective respirators.

- Protective actions were taken to simulate a 100-yard evacuation of the area; however, this action was not ordered in a timely manner.

- After the building in question was evacuated, Plant Protection did not promptly secure or post personnel to ensure that no one entered the area after the evacuation was complete.

- An Assembly Area Supervisor was not designated to provide instructions for evacuated personnel.

- See Concerns TC.1-1 and TC.4-1.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (EP.4-2) (H1/C1) **Ames Laboratory is not in compliance in the development, conduct, and training of emergency response teams to cope with the effects of a toxic chemical emergency operation as required by DOE 5500.3A, DOE 5500.2B, and DOE 5000.3A.**

EP.5 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

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

FINDINGS:

- Ames does not have an emergency plan administrative procedure to address the location of (1) all first-aid kits and lockers; (2) storage areas for emergency equipment; or (3) documentation of inspections, surveillances, and calibration checks of emergency supplies.
- During the TSA emergency exercise, the Emergency Operations Center (EOC) did not have a list of stored emergency equipment or provide the status boards necessary to display exercise information and data.
- The format for initial and followup reports required by DOE 5000.3A and by State, County, and ISU agencies has not been coordinated and approved by offsite agencies, nor has it been stored at the EOC.
- The existing public address system does not allow the three DOE-owned buildings and the maintenance areas at Ames to receive announcements concurrently.
- The Ames emergency response team did not have Level-1 or Level-2 protective clothing available when it responded to the TSA emergency exercise.
- Ames does not have a decontamination facility, and emergency management personnel have no written arrangements with ISU for use of a decontamination unit located in the Student Health Medical Facility.
- The following concern was identified in the Ames self-assessment.

CONCERN: (EP.5-1) (H2/C1) **The Emergency Operations Center and emergency responders at Ames Laboratory do not have the resources to conduct their emergency response activities in accordance with the requirements of DOE 5500.2B and DOE 5500.3A.**

EP.6 EMERGENCY ASSESSMENT AND NOTIFICATION

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

FINDINGS:

- Ames has not developed a system of emergency action levels to facilitate the classification of emergencies.
- Emergency management has not developed notification systems and procedures to minimize distraction or to use preformatted messages.
- Procedures for assessing a release of hazardous material have not been developed, including methods for measuring levels in facilities and for detecting the magnitude of the release and projections of exposure for Ames employees.
- During the TSA emergency exercise, guidance procedures for protective action were not available in the Emergency Operations Center or at the on-scene command post.
- Comprehensive records/logbooks were not kept during the TSA exercise.
- During the TSA emergency exercise, emergency management did not provide the necessary information regarding the nature and magnitude of the hazards associated with the simulated emergency.
- The emergency planning zone has not been established or documented.
- Ames does not have a written procedure to provide detailed instructions and report formats for conducting offsite notifications.
- The following concern was identified in the Ames self-assessment.

CONCERN: (EP.6-1) (H1/C1) **Emergency Assessment and Notification Systems at Ames Laboratory are not documented in written procedures and are not in compliance with DOE 5500.2B and DOE 5500.3A.**

EP.7 PERSONNEL PROTECTION

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

FINDINGS:

- Prearranged plans, mutual aid agreements, and memoranda of understanding have been initiated, but these contingencies do not specify what assistance will be provided to Ames Laboratory during emergencies.
- Individual exposure limits conforming to DOE 5480.1B and DOE 5480.10 have not been developed, and emergency procedures have not been drafted to provide special instructions for guidance to save lives and protect vital equipment. (See Concern WS.3-2.)
- The Ames emergency preparedness organization has not developed a procedure to provide guidance for conducting evacuations, to account for personnel, or to designate assembly areas.
- Evacuation routes and assembly areas are not clearly marked within each facility.
- Ames does not have Level-1 or Level-2 protective clothing available for use by emergency responders.
- The following concern was identified in the Ames self-assessment.

CONCERN: (EP.7-1) (H1/C1) **Personnel protection at Ames Laboratory has not been documented and is not in compliance with DOE 5500.3A and DOE 5480.10.**

4.5.8 Technical Support

4.5.8.1 Overview

The appraisal of the Technical Support functional area addressed five of the eight performance objectives. TS.7 Reactor Engineering is not applicable because the Ames Laboratory has no nuclear reactors. TS.8 Criticality Safety is not applicable, since the entire fissionable material inventory at Ames Laboratory consists of a few grams or less. TS.6 Packaging and Transportation of Hazardous Material was covered as a separate area in Section 4.5.9. Appraisal activities included interviews with the Engineering Services, Facilities Services, and Materials Preparation Center Analytical Groups. Documents and engineering files were also reviewed.

The Technical Support process at Ames Laboratory lacks formality and structure. Ames has not defined requirements, for example, for the design and review process. Detailed procedures are not used by some organizations that provide technical support, and formal training is not provided to ISU graduate students who supplement the staff of the Engineering Services Group. The Laboratory has recognized the need for manuals, procedures, and more structured programs, and measures to address these needs are currently in progress.

The Ames organizational structure is well defined on the Laboratory's organization charts, but the authorities and responsibilities of organizations that provide technical support are not clearly defined in organizational charters or other top-level documents. The responsibilities of the permanent technical staff are defined in written job descriptions, but those for graduate assistants and ISU professors who supplement this staff are not. The Engineering Services Group's knowledge of facility and system operations is largely that provided by the individual or organization who requests support and thus is not always complete.

Only one Ames facility, the Alpha Containment Facility, has a safety analysis document, and that document does not meet DOE 5481.1B criteria for content and format. The Laboratory has not evaluated which other facilities might need such documents in order to comply with the requirements of DOE 5481.1B. Ames has no written policy for procedures, and the use of procedures for technical support activities varies widely.

The permanent technical staff is well qualified in terms of education, experience, and professional certification. However, requests for technical services from other organizations do not always provide all information relevant to the use and safety implications of the requested service. Further, communications about a specific task may take place between two graduate students within the support and program organizations, with neither being experienced in the appropriate technical and safety requirements. Ames has no structured program for monitoring the performance of facility and programmatic systems and equipment.

Ventilation exhausts from facilities in which radioactive and hazardous materials are handled, other than the Alpha Containment Facility, are not monitored to determine whether harmful quantities of these materials are being released, and the Alpha

Containment Facility exhaust monitoring process has not been validated. In addition, facilities equipped with HEPA filters to minimize radioisotope releases from exhaust systems have no provisions for in-place testing to determine whether the filters are effective.

The Ames self-assessment used DOE/EH-0135, "Performance Objectives and Criteria for Technical Safety Appraisals at Department Of Energy Facilities and Sites," dated June 1990, as the basis for its evaluation and addressed all five of the relevant performance objectives. Of the 14 concerns identified by the S&H Subteam, the Ames self-assessment fully addressed seven and partially addressed four.

4.5.8.2 Findings and Concerns

TS.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

- The Engineering Services Group provides design services for program equipment on request from program organization personnel. However, the interactions and relationships are not formalized with respect to the information that the customer must provide.
- Information about facilities or equipment for which a design is requested from the Engineering Services Group is provided by the requester, who does not necessarily provide (and is not required to provide) information about what function a component will perform or in what system it will be installed.
- The Facilities Services Group provides design and maintenance services for facilities and facility systems. A mechanism is in place to inform Facilities Services of any connection of programmatic systems of equipment through the hookup request; however, no formal mechanism exists to ensure that the Facilities Services Group is informed of changes to connected programmatic equipment that might affect facility systems.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (TS.1-1) (H2/C2) **Ames Laboratory has no formal mechanism to ensure that technical support organizations are aware of the safety impact of designs for and modifications to programmatic systems or equipment.**

FINDINGS:

- Although the structures of the organizations that provide technical support are well defined on Ames Laboratory organization charts, not all of their authorities, responsibilities, and interactions with other organizations are documented.
- The Facilities Services Group does not have a written charter.
- See Concern OA.1-1.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.1-2) (H2/C2) **At Ames Laboratory, all authorities and responsibilities of organizations that provide technical support, and their interactions with other organizations, are not documented.**

FINDINGS:

- Engineering Services and Facilities Services have small, permanent professional staffs that are qualified by education and experience to perform their duties, but in order to

accomplish all requested tasks it is necessary to use other resources including, in the case of Engineering Services, ISU graduate students.

- The Engineering Services Group does not have procedures or formal training programs to direct graduate students in performing their engineering tasks, and the Section Heads may not always be available to provide advice and guidance.

- Ames program organizations are not required to use Engineering Services for support and may use any other resources at their own discretion.

- In some cases, a graduate student may deal directly with a requester who is also a graduate student, neither of whom is knowledgeable about the use of design requirements.

- See Concerns QV.7-2 and TC.1-1.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TS.1-3) (H2/C1) **Contrary to DOE 5480.19 and DOE 5700.6C, engineering design activities at Ames Laboratory may be performed by supplemental personnel who are not qualified by either training or experience.**

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

- None of the Ames Laboratory facilities, except for the Alpha Containment Facility, have documented safety analyses.
- Ames management has not evaluated which facilities fall within the scope of DOE 5481.1B and, thus, require documented safety analyses.
- Some laboratories at Ames, such as the one in which pyrophoric uranium metal is melted, would be expected to have hazards of a type and magnitude not routinely encountered and/or accepted by the general public and, consequently, would fall within the scope of DOE 5481.1B.
- See Concern AX.1-1.
- See Section 4.5.6.2, AX.7.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.2-1) (H2/C1) **Documented safety analyses have not been prepared for all Ames Laboratory facilities that fall within the scope of DOE 5481.1B.**

FINDINGS:

- The safety analysis documentation for the Alpha Containment Facility does not contain all of the information required by DOE 5481.1B, Chapter I, paragraph 3.a.(3), and Chapter II, paragraph 4.a. The document does not demonstrate compliance with applicable guides, codes, and standards, and it does not identify operational limitations.
- The technical analysis provided in the Alpha Containment Facility document is flawed:
  - Credit is taken for removal of radioactive particles by HEPA filters in the exhaust system, even though the filters are not tested in place and, in fact, the system design does not provide for such testing. (See Concern TS.5-1.)
  - Discussions of tornadoes and earthquakes do not contain sufficient technical detail to support the stated conclusions.
- The Alpha Containment Facility is not operational at this time; it is undergoing modification, and the glovebox in which work with radioisotopes is performed has been relocated temporarily to another room. The manager

of the Ames ES&H Group stated that the safety analysis document would be revised prior to resumption of operations, but he indicated that the changes would be few.

- The Alpha Containment Facility glovebox contains interior surface contamination and has single HEPA filters on the inlet and outlet ventilation connections. There is no documented safety analysis for the present configuration.

- See Concerns AX.1-1 and AX.8-1.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TS.2-2) (H2/C1) **Safety analysis documentation for the Alpha Containment Facility at Ames Laboratory does not fully comply with the requirements and guidance of DOE 5481.1B.**

FINDINGS:

- The Engineering Services staff has no assigned role in the preparation or review of maintenance or operating procedures for equipment and systems it designs.

- The Facilities Services Group prepares operating and maintenance procedures for systems it designs. Maintenance of such systems is performed by an organizational component of Facilities Services, which represents maintenance interests, but review of operating procedures by organizations such as ES&H is not routinely obtained prior to issuance.

- Ames has no formal requirement for review of procedures by all organizations whose interests might be affected.

- See Concern OP.3-1.

- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.2-3) (H2/C2) **Operating and maintenance procedures at Ames Laboratory are not routinely reviewed by technical support and other organizations that could provide important information.**

FINDINGS:

- Management personnel for Engineering Services and Facilities Services stated that Ames Laboratory does not have a policy or procedure governing the use of procedures.

- See Concerns OA.7-2 and OP.3-1.

- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.2-4) (H2/C1) **Contrary to the requirements of DOE 5480.19, Ames Laboratory does not have a formal policy or procedure governing the use of procedures.**

TS.3 FACILITIES MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that assure proper design, review, control, implementation, and documentation in a timely manner.

FINDINGS:

- Ames management has not systematically reviewed DOE 5480.4 or DOE 6430.1A for requirements and guidance related to codes and standards.
- Facilities Services Group personnel were unfamiliar with the content of DOE 5480.4.
- Facilities Services personnel were unaware of requirements for HEPA filter efficiency testing and effluent monitoring at the Alpha Containment Facility, and they were unfamiliar with the design guidance of ANSI N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities, and ANSI N13.7-1983, Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TS.3-1) (H2/C1) **Ames Laboratory has not systematically identified the codes and standards applicable to the design of its facilities and systems as required by DOE 5480.4 and DOE 6430.1A.**

FINDINGS:

- Although the Materials Preparation Center Analytical Group has detailed procedures for its analyses, the Facilities Services Group does not have written procedures for design and analysis.
- The Engineering Services Group has initiated a program to develop written design and analysis procedures, but these are not yet in place.
- See Concerns QV.1-6 and OA.7-2.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.3-2) (H2/C2) **Not all technical support organizations at Ames Laboratory have written procedures for their design and analysis activities.**

FINDINGS:

- Ames has no requirements or criteria for formal, documented, interdisciplinary review of designs or design changes.
- Design reviews are performed as decided by the cognizant engineer or manager. Reviews that are conducted are generally described as informal.

- Occurrence Report No. CH-AMES-AMES-1991-1002 [sic], "Failure of Speedbite Ferrule and Gland Nut System on a High (6000 Pounds) Pressure Line From a Gas Line Booster Pump," dated December 29, 1991, identified "inadequate engineering review" as the root cause. However, the corrective actions did not address improving the review system.

- See Concerns QV.7-2 and RP.1-2.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (TS.3-3) (H2/C2) **Ames Laboratory does not perform formal, technical, interdisciplinary reviews of designs and design changes.**

FINDINGS:

- Ames does not have a defined system for conducting operational readiness reviews before startup after a facility or system modification.

- Although all Ames Laboratory facilities are reportedly low hazard, as defined by DOE 5481.1B, Chapter II, malfunction or misoperation of some systems could have adverse health, safety, or environmental consequences.

- Ames has not evaluated the usefulness of a graded operational readiness review program.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (TS.3-4) (H3/C2) **Ames Laboratory has not developed a program to assess the need for operational readiness reviews or to conduct one if it is needed.**

TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

PERFORMANCE OBJECTIVE: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

FINDINGS:

- Technical support organizations at Ames Laboratory conduct equipment performance monitoring, but some important safety parameters, such as the efficiency of exhaust HEPA filters, are not being tested. (See Concern TS.5-1.)
- Ames has no formal program to monitor performance of research equipment and systems.
- See Concerns MA.7-1, AX.1-4, and AX.5-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (TS.4-1) (H2/C2) **The equipment performance testing and monitoring program at Ames Laboratory does not address all safety-related equipment.**

TS.5 ENVIRONMENTAL IMPACT

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

FINDINGS:

- The exhaust system at the Alpha Containment Facility does not have provisions for in-place HEPA filter efficiency testing in accordance with ASME N510-1989, Testing of Nuclear Air Treatment Systems, as required by DOE 6430.1A, Section 1550-2.5.5.
- Although exhaust system HEPA filters used for the Alpha Containment Facility are tested at the factory and at the Rocky Flats Plant, the lack of "as-installed" testing makes the efficiencies indeterminate.
- Other Ames facilities also use exhaust system HEPA filters. These filters, too, are not tested after installation, or periodically thereafter. (See Concern RP.6-1.)
- See Concerns AX.5-1 and A/CF-4.
- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.5-1) (H2/C1) **Ames Laboratory does not measure the as-installed efficiencies of exhaust system high-efficiency particulate air filters to verify their effectiveness as required by DOE 6430.1A.**

FINDINGS:

- The ventilation exhaust from the Alpha Containment Facility is continuously sampled while the facility is being operated, but the sampling system has not been evaluated against requirements of ANSI N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities, to ensure validity of the results.
- Ventilation exhausts from other Ames facilities in which radioactive and hazardous material are handled are not monitored. (See Concern AX.2-1.)
- The following concern was identified in the Ames self-assessment.

CONCERN: (TS.5-2) (H2/C2) **Not all ventilation exhaust streams from Ames Laboratory facilities that contain radioactive and hazardous materials are monitored.**

4.5.9 Packaging and Transportation

4.5.9.1 Overview

The appraisal of the Packaging and Transportation functional area addressed all 12 performance objectives. Interviews were conducted with individuals responsible for packaging hazardous and radioactive materials, including both programmatic materials and wastes, for Ames Laboratory and ISU and with Campus Warehouse shipping and receiving personnel. The Campus Warehouse and the Ames Laboratory Waste Handling Facility were visited, and procedures and shipping records were reviewed.

The packaging and transportation program for hazardous and radioactive materials at Ames lacks structure and formality. Resources applied to this program are limited; the two individuals who manage it have numerous other duties and have not been able to devote time to program development. Training programs and procedures for packaging and transportation activities are minimal, and the only two knowledgeable individuals in this area plan to retire within the next few months. Hazardous and radioactive material packaging and transportation activities at Ames are infrequent, consisting of only a few shipments and receipts per month.

Ames does not have a packaging and transportation QA program that includes all elements required by DOE 5700.6C. The DOE contractor scheduled to accept the Laboratory's radioactive and mixed waste is not permitted to do so at this time because of deficiencies in the training and QA programs at Ames. Hazardous wastes are currently being packaged and removed by ISU, which has obtained permits from Environmental Protection Agency and the State of Iowa. This arrangement appears to be a viable and cost-effective method for disposing of these wastes, but the Laboratory has not confirmed that the ISU program meets all DOE requirements.

Ames has no packaging and transportation audit program. Field Office appraisals of these activities by CH have been infrequent (conducted in 1983, 1986, and 1991). The two earlier appraisals were uncritical and had no recommendations, but the 1991 CH appraisal was thorough and effective in identifying program deficiencies. Ames does not have a program to ensure or measure compliance with State and Federal regulations applicable to packaging and transportation activities.

The Laboratory has an occurrence reporting program and a procedure that could be applied to packaging and transportation accidents. However, no such accidents have occurred in recent years.

Intrabuilding and onsite transfers of identified radioactive and hazardous materials involve, in many cases, transfer through connecting tunnels. In some cases, such as transfers between the Campus Warehouse and other site facilities, the transfers are made over streets and roads that are used by the public. In such cases, the materials are transported either in the original shipping packages or in packages approved by the Department of Transportation for offsite shipments. However, not all items that are potentially contaminated with radioactive materials are surveyed before being transported to the Campus Warehouse, and prerelease surveys at the warehouse have identified contaminated items that were not appropriately packaged.

The Ames self-assessment was thorough and effective in identifying packaging and transportation programmatic concerns. It was conducted using DOE/EH-0135, "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites," dated June 1990, for guidance. The self-assessment addressed all 12 Packaging and Transportation performance objectives. The Ames self-assessment identified four of the seven concerns identified by the S&H Subteam and partially identified two.

4.5.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of Department of Energy Orders, particularly DOE 5480.3, DOE 1540.1, DOE 1540.2, Federal and State regulations, and good industrial practices, in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- Preparation of packages containing radioactive and hazardous material for shipping is performed using a procedure that does not provide detailed guidance for packaging requirements; such guidance is incorporated by referring to 49 CFR 100-199, which includes several hundred pages of regulations and data.
- Checklists used in the shipment preparation process are detailed, but they primarily address shipping papers and packing labels.
- Ames does not have a transportation safety manual to provide detailed guidance.
- See Concerns OA.5-1, OP.3-1, and PT.2-1.
- See Section 4.5.2.2, QV.3.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (PT.1-1) (H2/C2) **Ames Laboratory does not have detailed procedures for all packaging and transportation activities involving hazardous and radioactive materials.**

FINDINGS:

- The staff currently responsible for the packaging and transportation program for hazardous and radioactive materials at Ames consists of two individuals who have many other duties. These individuals reportedly do not have time for program development.
- The two individuals responsible for the hazardous and radioactive materials packaging and transportation program currently are the only Ames employees experienced in managing such activities. They are scheduled to retire by June 30, 1992, and no qualified replacements have been identified.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PT.1-2) (H2/C2) **Ames Laboratory has not provided resources to ensure effective and continued expertise in the area of packaging and transportation of hazardous and radioactive materials.**

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

FINDINGS:

- The staff member primarily responsible for the packaging of radioactive and hazardous materials has a certificate of completion from the DOE Radioactive Materials Advanced Transportation course, but he has not received site-specific training for his duties at Ames.
- The Campus Warehouse storekeeper who handles shipments and receipts and the vehicle operator who provides transportation services between site facilities have attended a 1-day hazardous materials course for transportation workers conducted by the Westinghouse Hanford Company, but these personnel have received no other formal training in handling radioactive and hazardous material shipments and receipts.
- The vehicle operator who transports radioactive and hazardous materials between Ames facilities obtained a State of Iowa commercial driver's license at the direction of Ames management, but the operator has not been specifically trained to meet the applicable requirements of 49 CFR 391, 392, 393, and 396.
- Ames has not defined training requirements for staff members performing packaging and transportation activities.
- See Concern TC.1-1.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PT.2-1) (H2/C1) **Ames Laboratory does not have a training program to ensure that personnel engaged in packaging and transportation activities are trained, qualified, and certified as required by DOE 5480.3 and the 49 CFR series of regulations.**

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance requirements of the applicable Department of Energy Orders, especially DOE 5700.6B, and ASME NQA-1-1989 are met.

FINDINGS:

- Ames has neither a separate QA plan for the packaging and transportation of radioactive and hazardous materials nor a QA program that includes all elements required by DOE 5700.6C.
- The DOE site designated to receive Ames' radioactive and mixed wastes is not permitted to do so because of packaging QA and training deficiencies at the Laboratory, resulting in accumulation of such materials at Ames.

CONCERN: **See Concern QV.1-1.**

FINDINGS:

- Ames does not conduct internal audits of its packaging and transportation program as required by DOE 5480.3 and DOE 5482.1B.
- The only external audits or appraisals of the program that have been performed in recent years are those conducted by CH in 1983, 1986, and 1991.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PT.3-1) (H2/C1) **Ames Laboratory does not provide routine independent audits of its packaging and transportation activities as required by DOE 5480.3 and DOE 5482.1B.**

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All packaging and transportation operations involving hazardous materials should be conducted in compliance with the applicable Federal and State regulations, including those of the Department of Transportation, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Environmental Protection Agency.

FINDINGS:

- Ames does not have a program to monitor and ensure compliance with applicable State and Federal regulations.
- Hazardous and radioactive materials, except for hazardous wastes, are packaged for shipment by two individuals in the ES&H Group, but these activities are not conducted in accordance with detailed written procedures or with formal checks of packages against established requirements. There is no overview of these activities.
- Hazardous wastes are packaged and removed by ISU, which has obtained permits from the Environmental Protection Agency and the State of Iowa. The Laboratory has accepted these permits as evidence that shipments will meet all applicable requirements but has not independently verified that all DOE requirements will be met.
- Hazardous and mixed wastes are collected in Spedding Hall, room B-55, for monitoring and temporary storage. Room B-55 does not meet all requirements of 40 CFR 262.34 for a hazardous waste temporary storage facility. (See Finding WM/CF-8.)
- Contrary to the requirements of DOE 1540.2, Ames does not maintain compliance documentation for the Department of Transportation specification containers used by the Laboratory.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PT.4-1) (H2/C1) **Ames Laboratory does not fully comply with State and Federal regulations applicable to its packaging and transportation activities.**

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted practices.

FINDINGS:

- Ames does not have written procedures that ensure conformance with all applicable standards and accepted practices for packaging radioactive and hazardous materials.

CONCERN: See Concern PT.1-1.

PT.8 ONSITE TRANSFERS

PERFORMANCE OBJECTIVE: Onsite transfers of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted safety practices.

FINDINGS:

- Cases of incompatible liquids awaiting transfer to laboratory buildings were stored together in the southwest corner of the Campus Warehouse East Bay. These included caustics, acids, flammables/combustibles, and oxidizers.
- Cases containing incompatible materials were separated by distances ranging from a few inches to several feet, but there was no diking or other physical barriers.
- Ames has identified the lack of barriers and diking as a concern and is considering facility modifications to correct these deficiencies; however, interim control measures have not been effected.

CONCERN: **See Concern PP.5-1.**

PT.9 OFFSITE SHIPMENTS

PERFORMANCE OBJECTIVE: Offsite shipments of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable regulations, standards, and accepted practices.

FINDINGS:

- The forms filled out by persons wishing to make shipments include checklists for identifying hazardous materials. If such materials are present, notification of the ES&H Group is required. However, the only overview of the judgment of the person wishing to ship the material is that of the warehouse staff, Property and Procurement Group office staff, and purchasing agents, none of whom have specific training or definitive procedures for this function.

- The ES&H Group does not have a proactive program for overview of judgments that the material to be shipped is nonhazardous or not restricted for transportation purposes.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (PT.9-1) (H2/C2) **Ames Laboratory does not have overview by trained persons of judgments that materials shipped by site personnel are not hazardous.**

PT.11 APPRAISALS AND INTERNAL AUDITS

PERFORMANCE OBJECTIVE: Periodic packaging and transportation safety appraisals of contractors by the Field Office and independent internal packaging and transportation safety audits by each contractor, required by DOE 5480.3, are conducted in accordance with DOE 5482.1B.

FINDINGS:

- Ames does not perform routine periodic audits of the safety aspects of its packaging and transportation operations.
- See Concern QV.1-3.

CONCERN: **See Concern PT.3-1.**

PT.12 PACKAGING AND STORAGE PROCEDURES

PERFORMANCE OBJECTIVE: All packaging and storage procedures for hazardous material are in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

FINDINGS:

- Several radioactively contaminated pieces of equipment being stored in the Campus Warehouse at Ames had not been surveyed before being transferred to the warehouse; the contamination was detected by prerelease surveys performed at the warehouse.
- Transfers from site facilities to the Campus Warehouse involve travel on roads and streets that are used by the public, and the items had not been packaged for such transport.
- See Concerns RP.3-2 and RP.10-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (PT.12-1) (H2/C1) **Radioactively contaminated equipment has been transported between Ames Laboratory facilities without using the transportation controls and packaging required by DOE 5480.3.**

4.5.10 Site/Facility Safety Review

4.5.10.1 Overview

All six performance objectives in the Site/Facility Safety Review functional area were addressed during this appraisal. Also, because of the close similarity of the subjects, performance objectives EA.2 Experiment Categories and EA.3 Experiment Proposals from the Experimental Activities functional area were incorporated into the appraisal of the Site/Facility Safety Review functional area. Judgments were based on (1) discussions with the Laboratory Director and the planning group appointed to establish an independent safety review system at Ames; (2) review of the Laboratory Director's Interoffice Communication of January 11, 1992, regarding the Ames Laboratory Safety Review Committee (SRC); and (3) discussions with personnel in the Science and Technology Division on the subject of safety review of proposed experiments.

No independent safety review system currently functions at Ames in a manner that complies with the requirements of DOE 5482.1B, paragraph 9.d. The Laboratory Director initiated an effort to achieve compliance by issuing an Interoffice Communication (Tom Barton to Executive Council, Program Directors, and Group Leaders, "Ames Laboratory Safety Review Committee," dated January 11, 1992). The suggested course of action was deficient in that the proposed SRC would not have served as an advisory body to Ames management and could not qualify as "independent" because it would be chaired by the Deputy Director of the Laboratory, who has line management responsibility for Laboratory operations. Further discussions with the Laboratory Director and other members of the planning group demonstrated both their awareness of the deficiencies in the initial proposal and their willingness to change their strategy and constitute the SRC in such a way as to bring about compliance of the independent safety review system with the requirements of DOE 5482.1B.

A charter for the SRC has not yet been written. The current plan is to prepare a charter that includes all safety review topics mandated by DOE 5482.1B, paragraph 9.d.(2)(g). For Ames, the independent safety review of proposed experimental programs is the most significant item. The charter will also define the procedures by which the SRC will conduct its business.

Currently, Ames Laboratory performs no periodic comprehensive facility safety review and no triennial appraisal of the safety review system as stipulated by DOE 5482.1B. According to those planning the new Ames Laboratory independent safety review system, the plan will include these elements when it is implemented.

The ES&H Group collects information about safety-related experiences at other sites and makes it available for circulation to Ames personnel. However, no formal system exists to organize and circulate onsite and offsite safety-related experiences throughout the Laboratory.

The Site/Facility Safety Review section of the Ames self-assessment provides a comprehensive treatment of this subject. The section is structured in a way that facilitates comparison between concerns cited in this appraisal and those identified in the self-assessment. Of the three concerns cited in this appraisal functional area, two were fully identified and one was partially identified in the self-assessment. The self-assessment does not include proposed corrective actions.

4.5.10.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

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

FINDINGS:

- Although an Interoffice Communication was issued by the Laboratory Director (Tom Barton to Executive Council, Program Directors, and Group Leaders, dated January 11, 1992) to establish an Ames Laboratory Safety Review Committee (SRC), the resulting contractor independent review and appraisal system would not have complied with the requirements of DOE 5482.1B, paragraph 9.d.

- The SRC has not yet been established. As proposed by the Laboratory Director, the SRC would not act as an advisory body to Ames management, nor would it qualify as an independent committee because it would be chaired by the Deputy Director of the Laboratory, who has line management responsibility for Laboratory operations.

- The charter for the proposed SRC has not yet been written.

- The following concern was identified in the Ames self-assessment.

CONCERN: (FR.1-1) (H2/C1) **The Safety Review Committee proposed for Ames Laboratory would not fulfill the independent safety review requirements of DOE 5482.1B.**

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

FINDINGS:

- An independent internal appraisal system with a structure that satisfies the requirements of DOE 5482.1B, paragraph 9.d.(2)(g), is not in place at Ames Laboratory.
- Contrary to the requirements of DOE 5482.1B, paragraph 9.d.(2)(g)2, proposed experimental programs at Ames do not receive safety evaluations by reviewers who are independent of the program.
- See Concern FR.1-1.
- See Sections 4.5.10.2, FR.4, and 4.5.10.2, FR.5.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (FR.2-1) (H2/C1) **Contrary to DOE 5482.1B, an independent safety review system is not in place at Ames Laboratory.**

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management as specified in DOE 5480.5 and DOE 5480.6.

FINDINGS:

- Because no independent safety review system is in place at Ames to meet the requirements of DOE 5482.1B, paragraph 9.d, periodic comprehensive facility safety reviews have not been performed as required by DOE 5482.1B, paragraph 9.d.(2)(e).
- Discussions with Ames management indicated that no such review is currently scheduled.

CONCERN: **See Concern FR.2-1.**

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

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

FINDINGS:

- Because no independent safety review system is in place at Ames to meet the requirements of DOE 5482.1B, paragraph 9.d, triennial appraisals of the safety review system have not been performed as required by DOE 5482.1B, paragraph 9.d.(2)(d).
- Ames management indicated that no such appraisal is currently scheduled.

CONCERN: **See Concern FR.2-1.**

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

FINDINGS:

- The ES&H Group subscribes to the EG&G Idaho incident reporting system. Specific members of the ES&H Group review, screen, and circulate these reports; however, no formal system is in place to ensure that this information reaches all appropriate Laboratory personnel.
- An incident involving a potential radiation burn from an operating x-ray unit in the Metallurgy and Ceramics Program facility was documented in an Occurrence Report, but information on the incident was not shared with x-ray personnel assigned to other Ames facilities.
- See Concern MA.2-2.
- The following concern was identified in the Ames self-assessment.

CONCERN: (FR.6-1) (H2/C2) **Ames Laboratory does not have a system whereby safety-related lessons learned from onsite and offsite sources are organized and circulated to all personnel.**

4.5.11 Radiological Protection

4.5.11.1 Overview

The appraisal of radiological protection activities at Ames Laboratory was evaluated for 11 of the 12 performance objectives in the Radiological Protection functional area. RP.12 Records was not comprehensively evaluated due to time limitations. Interviews were conducted with radiation protection personnel and their management, researchers, and service personnel. No activities with radioactive materials were observed, but storage and work areas were inspected.

The program at Ames falls far short of the Secretary of Energy's goal of making DOE a pace-setter for radiological protection. In many cases, the Ames program does not comply with the most fundamental radiation exposure and contamination control requirements of DOE Orders.
Over the past several years, Ames has gradually reduced the number of operations that use radioactive materials. A substantial portion of the radionuclide inventory is stored as isotopes or waste. The next largest quantity is probably that present as contamination in buildings and on equipment. The smallest quantity is being used for research. One group is currently researching uranium purification methods for depleted uranium, and another occasionally uses up to 5 millicuries of phosphorus-32 and traces of tritium and carbon-14. There is also an analytical instrument (inductively coupled plasma) in a glovebox that has been used to analyze plutonium-containing solutions. This system is currently in storage, pending completion of facility modifications.

There are, however, a large number of x-ray diffraction radiation generating devices at Ames. Extremity injuries from similar units are the most common radiation injuries nationwide. The Ames units are used by both regular staff and graduate students. Administrative control of these units has recently been enhanced. In general, engineering controls prevent any possible exposure of the torso to an x-ray beam, except by deliberately bypassing interlocks. However, a large number of the devices rely solely on warning lights, training, and other administrative controls to keep fingers out of the beam because Ames believes these to be more effective controls. These devices may be operated while unattended in unlocked rooms.

The extremely small size of the radiation protection staff and collateral industrial hygiene and nuclear materials accountability duties severely limit the ability to implement even rudimentary radiation survey and air-sampling programs. Comprehensive inspection and appraisal activities are not conducted by the radiation protection staff. There is no independent organization with the expertise or charter to overview the program.

General Employee Training does not contain the elements required by DOE 5480.11 for occupational workers, as discussed in Section 4.5.5.2, TC.4. Ames has not overviewed the radiation technician training administered off site, as discussed in Section 4.5.5.2, TC.9.

Procedures have been established for only a few radiation protection functions, and these lack evidence of management review and approval. Radiation protection training for critical tasks such as operation of open-beam x-ray diffraction units has not been approved by the radiation protection

staff. Posting of radiological areas and labeling of radioactive material do not conform to DOE 5480.11.

Incidents involving contaminated items found outside of controlled areas, which would be designated as off-normal events at other DOE facilities, are so common at Ames that they are not reported to management or tracked. These items are labeled when they are found, but they are not moved and the area is not posted as required by DOE 5480.11.

Dosimeters used at Ames are exempt from accreditation under the DOE Laboratory Accreditation Program, pending an onsite assessment by CH. This assessment should have been conducted by June 1990 but has not yet been scheduled. During the Ames self-assessment, the need for reporting exposure results to workers was noted. Ames began distributing results prior to the start of the Tiger Team visit. The Laboratory's cumulative external radiation dose was less than 0.5 person-rem in 1991. Ames Laboratory has neither an in-vivo analysis program nor an effective air-sampling or air-monitoring program to quantify personnel exposure to airborne radioactivity. Air-sampling records required interpretation by the persons who performed the sampling. Even then, they did not include calculation of the derived air concentration or identification of the persons exposed.

Instruments used for monitoring personnel contamination are not calibrated to assure that they can detect contamination above accepted levels. Dose rate instruments are not calibrated with a traceable ion chamber. Instead, source-to-distance calculations are made. The Health Physics Program at Ames has not been appraised by CH since April 1989, before Ames was required to comply with DOE 5480.11. At that time, the program was rated as good.

The Ames self-assessment of the Radiological Protection functional area identified four and partially identified one of the 12 concerns identified in the Ames program. It did not address such obvious deficiencies as the absence of control over equipment that was contaminated by past activities, the inadequacies of the air-sampling program, or the potential consequences of not having an in-vivo analysis program. One of the two concerns against CH was partially addressed in the Chicago self-assessment. The other was not addressed.

4.5.11.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities.

FINDINGS:

- Ames provides no overview of some radiological operations such as the storage of radioactive material, decontamination of waste, and shipment of radioactive waste. This is a consequence of the fact that these activities are performed by Ames' only radiation protection organization.
- Radiation protection personnel at Ames engage in unacceptable practices such as storing large quantities of contaminated material without identifying the isotope or curie content of the contaminant.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (RP.1-1) (H2/C2) **Activities involving radioactive materials at the Ames Laboratory do not receive independent overview by radiation protection professionals.**

FINDINGS:

- Ames Laboratory has no formal requirement that procedures be in place for testing or operating radiation-generating devices.
- Although procedures have been recently established for most operations on radiation-generating devices, with a few exceptions they have not been approved by the radiation protection staff. In some cases, they have not been signed by the author or an individual with operating responsibility for the equipment.
- Ames Laboratory has not established a requirement that radiation protection personnel review modifications to equipment that handles radioactive material.
- Ames has no radiation work permit or radiation work system.
- Although the Ames self-assessment identified an absence of procedural controls, it also stated: "Existing protocols are adequate to provide effective radiological controls."
- The following concern was identified in the Ames self-assessment.

CONCERN: (RP.1-2) (H2/C1) **Radioactive material and radiation-generating devices at Ames Laboratory are not assured of procedural control and professional oversight as required by DOE 5482.1B.**

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

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

FINDINGS:

- Aside from the recent self-assessment, Ames has not performed internal audits of any portion of the Radiation Protection Program during the last 2 years.
- At the request of Ames, the Iowa Bureau of Radiological Health inspected the Laboratory in March 1990. The inspectors did not evaluate the program relative to DOE Orders and had only one area of concern.
- The need for independent appraisals of health physics at Ames was identified in a 1989 appraisal by CH.
- See Concern QV.1-1.
- The following concern was identified in the Ames self-assessment.

CONCERN: (RP.2-1) (H2/C1) **Ames Laboratory has no program to conduct internal audits of radiation protection as required by DOE 5482.1B.**

FINDINGS:

- Ames Laboratory has not established site-specific criteria for reporting and investigating radiological occurrences.
- A piece of equipment that had been used in an uncontrolled area for many years was found to read 1,200 disintegrations per minute (dpm) removable beta contamination, 120 dpm removable alpha contamination, and 900,000 dpm direct alpha-beta contamination in a difficult-to-access location. (DOE 5480.11 allows equipment with 200 dpm/100cm^2 removable alpha plus beta and 1,000 dpm/100cm^2 total alpha plus beta of thorium to be moved from a radiological area to a controlled area. The equipment was reportedly tagged as having fixed contamination.) This discovery was not treated as an off-normal occurrence, although it clearly meets the criteria established in DOE 5000.3A.
- The fact that radiologically contaminated duct work and equipment with radiological contamination exist outside of controlled areas has not been treated as reportable. (This equipment was, and remains, outside of any controlled area.)
- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.2-2) (H1/C1) CAT. II **Prolonged operation in violation of DOE 5480.11 at Ames Laboratory is not reported, investigated, or ameliorated under the incident reporting system as required by DOE 5000.3A.**

FINDINGS:

- The most recent health physics appraisal of Ames is dated June 1989, before compliance with DOE 5480.11 was mandatory. It identified three deficiencies in the radiation protection program at Ames. Two appear as concerns in this report, and the third was not evaluated in this appraisal.

- The following concern was partially identified in the CH self-assessment.

CONCERN: (RP.2-3) (H2.C1) **The Chicago Field Office has not enforced the Department of Energy's radiological protection requirements, including those set forth in DOE 5480.11, at Ames Laboratory.**

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

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

FINDINGS:

- Ames' 21 x-ray diffraction units are equipped with redundant fail-safe lights to indicate tube operation and shutter closure. However, many units have some access (e.g., for fingers) to the beam path without having to bypass interlocks. Training and administrative controls are relied on to prevent injury. ANSI N43.2, Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment, recommends a guard or interlock to prevent entry of any part of the body into the primary beam path.

- In one case, interlocks on the doors to the enclosure around an x-ray diffraction unit were disabled to prevent inadvertent trips that could result in excessive machine down time.

- Recently drafted procedures for interlock check and operation were in place for all units evaluated. Some, but not all, were signed by the person in charge of the unit. The radiation protection staff has formally approved only one interlock check procedure, although all are being used.

- Trainers were designated and training curricula were documented for each machine. Neither operating procedures nor curricula had approval signatures from the health and safety organization. In only a few cases are tests, or demonstrations of competence, documented as part of the training process. (See Concern RP.1-2.)

- An Unusual Occurrence (UOR No. AL 87 1203) occurred at Ames on December 6, 1989, when a researcher failed to notice the "shutter open" light on an x-ray unit and put his thumb into the beam.

- The 1990 inspection by the Iowa Bureau of Radiological Health expressed a concern that many x-ray generating devices were operated unattended in unlocked rooms, in violation of State of Iowa regulations. Although such operation makes it possible for casual visitors to put their hands into the beam, Ames has not implemented the State's recommendations, claiming this State regulation applies only to medical x-ray units.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP. 3-1) (H1/C2) CAT. II **Many of the x-ray diffraction units at Ames Laboratory rely on administrative controls rather than physical barriers to prevent dangerous extremity exposures.**

FINDINGS:

- Contaminated or potentially contaminated areas and materials at Ames exist outside of designated controlled areas. Examples include the following:

  - Duct work and piping above ceilings and in pipe chase areas of Wilhelm Hall are not posted or labeled in any way.

  - Although there are some items with fixed, or fixed and removable, contamination in uncontrolled research areas, there is no program to ensure that these items are surveyed before shipment to the warehouse or another uncontrolled area for storage or disposal. Equipment is surveyed prior to disposal. Although most contaminated items had less than 1000 dpm/cm^2, one piece of equipment had 900,000 dpm alpha-beta in one location and detectable removable contamination. The tag on this item reportedly indicated that it had been designated as "fixed contamination" and that it was not to be moved. (See Concern PT.12-1.)

- Dose rate calibrations are performed in the radwaste storage building using a cesium-137 source. (The dose rate approximately 1 meter from the exposed source is 20 rem per hour.) Posting of the area indicates that it is both a Controlled Area and a Radiological Area. It is not designated as a very high radiation area, although it is one during calibrations. Labels on radwaste containers within the warehouse rarely indicate the isotope present or the curie quantity.

- The need to define "controlled, radiation, and contamination areas" in accordance with DOE 5480.11 was identified in a June 1989 appraisal by CH.

- The following concern was identified in the Ames self-assessment.

CONCERN: (RP.3-2) (H1/C1) CAT. II

Posting of areas for radiation control and labeling of radioactive material at Ames Laboratory does not comply with the requirements of DOE 5480.11.

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

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

FINDINGS:

- Ames does not have a routing survey program; however, two laboratories are surveyed every month if isotopes are present. (See Concern RP.10-1.)
- Ames Laboratory has no ALARA program. (See Concern RP.11-1.)
- Posting of radiological areas does not comply with the requirements of DOE 5480.11.

CONCERN: **See Concerns RP.3-1 and RP.3-2.**

RP.5 EXTERNAL RADIATION DOSIMETRY

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

FINDINGS:

- Ames uses radiation dosimeters provided by a commercial service and has not sought or received accreditation under the DOE Laboratory Accreditation Program (DOELAP). An exemption was issued in June 1989 by EH-352, Headquarters, DOE, pending completion of an onsite assessment by CH. The letter recommends completion of the onsite assessment within 1 year.
- CH has not conducted any onsite assessment.
- Ames does not specify how radiation dosimeters must be worn. Some workers wear dosimeters on the torso, while others attach them to a pant pocket.
- See Concern QV.4-1.
- The following concern was not identified in the CH self-assessment.

CONCERN: (RP.5-1) (H3/C1) **The Chicago Field Office has not performed the onsite assessment required to validate the Ames Laboratory dosimetry program as required by DOE 5480.15.**

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

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

FINDINGS:

- The Ames Respiratory Protection Program does not comply with ANSI Z88.2 or OSHA standards. (See Sections 4.5.13.2, WS.3, and 4.5.12.2, PP.1.)

CONCERN: **See Concern PP. 3-2.**

FINDINGS:

- Ames has not established a program for in-place testing of HEPA filters. (See Concerns AX.5-1 and TS.5-1.)
- Writing on the side of the HEPA filter in the radwaste compactor exhaust system indicated that the filter had been tested in 1979. There is no instrumentation to measure pressure drop across the filter to indicate loading or breakthrough.
- The blower for the radwaste compactor ventilation system is located inside the radwaste building, with downstream duct work leading to the outside. In case of a filter failure, contaminated exhaust air would be at a pressure greater than that of the rest of the building and could leak into the work area.
- There are no specifications and no measurements to indicate adequate airflow into the radwaste drum around the compactor ram.
- Air sampling in the vicinity of the compactor has not been conducted to ensure that it is not a source of airborne contamination.
- Although the compactor has not been used for some time, it does not have an out-of-service tag. There are no plans to reevaluate the compactor prior to use.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.6-1) (H1/C2) **Ames Laboratory has not ensured that the radwaste compactor will not release contamination into the work area or outside the radwaste building.**

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- Ames Laboratory has no internal dosimetry program. The whole body counter was eliminated about 1978, when the reactor was decommissioned.
- Although airborne exposures to radionuclides are expected to be low, the Ames Laboratory has neither an in-vivo analysis program nor an effective air-sampling program to quantify internal radiation exposure. (See Section 4.5.13.2, RP.9, below.)
- Workers indicated that they have worked for years without protective clothing or respirators in areas where they are now required to have them.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.7-1) (H2/C1) **Contrary to DOE 5480.11, Ames Laboratory has neither established an in-vivo analysis program nor demonstrated that one is not required.**

RP.8 FIXED AND PORTABLE INSTRUMENTATION

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

FINDINGS:

- Radiation detection instruments used for personnel contamination monitoring are not calibrated.
- When dose rate instruments are calibrated, the as-found condition is not documented, thus allowing conditions such as instrument drift to persist undetected.
- Calibration methods have not been reexamined since the reactor was decommissioned in 1978. As a result, many radiation dose rate instruments are calibrated at 10 and 20 rem per hour, despite the fact that they are never used for measurements in this range.
- Dose ranges used have not been verified with an ion chamber that is traceable to the National Institute of Standards and Testing. Data from the original curie calibration of the cesium are decay corrected, and a calculation is made to adjust the source-to-detector distance for calibrating dose rate instruments.
- The laboratory counting system is not calibrated with standards that have the same isotopic composition or size as those being counted as recommended by the National Council on Radiation Protection and Measurements, Handbook 57, A Handbook of Radioactivity Measurements Procedures.
- See Concern QV.4-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.8-1) (H1/C1) **The calibration program for radiation-monitoring instruments at Ames Laboratory does not ensure the accuracy of radiological measurements as required by DOE 5480.11.**

RP.9 AIR MONITORING

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

FINDINGS:

- Air sampling was performed during removal of contaminated duct work during the past 7 months. Samples were counted for alpha and beta contamination, but a planned gamma analysis has not yet been conducted. No derived air concentrations have been calculated. The data contain errors such as misdating of data sheets and transposition of sample results taken inside and outside of a containment enclosure.

- Currently, no single document contains the necessary information for the above samples (i.e., sample date, time, sample number, location, flow rate, counting time, name of the person performing the sampling, and results). Information about which workers were exposed to the air being sampled or whether they wore respiratory protection was also unavailable.

- Calibration of the alpha-counting equipment does not take into account attenuation of alpha particles by the filter paper sampling media or absorption of alpha particles by the sample (which in some cases appeared as a dark residue on the filter paper).

- The laboratory counting system is not calibrated with standards that have the same isotopic composition or size as those being counted as recommended by the National Council on Radiation Protection and Measurements, Handbook 57, A Handbook of Radioactivity Measurements Procedures.

- Because neither the identity of the workers on the job nor their exposure time was recorded, personnel exposures could not be assigned.

- Criteria and schedules have not been established for routine air sampling or monitoring at Ames.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.9-1) (H1/C1) **Ames Laboratory does not have an effective air-sampling program to quantify personnel exposure to airborne radioactivity as required by DOE 5480.11.**

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

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

FINDINGS:

- Ames has no system of radiation work procedures or similar permits to control radiation work. (See Concern RP.1-2.)
- Although two laboratories are surveyed monthly for contamination, other potentially contaminated areas, such as the radioactive waste storage area, are not routinely surveyed.
- No survey is required (and no instrument is provided) for workers leaving the radioactive waste storage area. A letter dated February 8, 1992, established the rationale for this practice: (1) the area contains low-specific-activity waste; (2) the waste is wrapped in plastic; (3) much of the waste is below the limits established in DOE 5480.11, Attachment 2; (4) a survey dated January 22, 1992, indicated the floors were clean; (5) contamination on the floor is fixed; and (6) a contamination incident has not been detected at the facility for 20 years.
- Workers in one laboratory with a potential for removable contamination asked questions indicating that they had not been trained to use appropriate contamination survey techniques. (See Concern TC.1-1.)
- Other areas, such as the warehouse areas where contaminated material is stored, do not require (or have instruments for) personnel survey.
- Laboratory coats and work clothes used by maintenance personnel are not even spot-checked for radioactive contamination before being sent to an offsite commercial laundry. This clothing may be worn in designated controlled areas or uncontrolled areas that contain contaminated items.
- Contamination survey instruments used for personnel monitoring are not calibrated; therefore, the Laboratory is not assured that they will detect contamination levels above the release limits of DOE 5480.11.
- Records of surveys of material released for disposal as clean waste were found to be deficient. (See Section 3.5.7, Finding RAD/CF-E.)
- The following concern was identified in the Ames self-assessment.

CONCERN: (RP.10-1) (H1/C1) CAT. II **Ames Laboratory has not established a program to ensure control of radioactive contamination as required by DOE 5480.11.**

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

FINDINGS:

- The Ames Laboratory Safety Policy addresses the ALARA philosophy but fails to assign responsibility for establishing an ALARA program or for assuring that exposures are ALARA.
- Ames has not established ALARA goals in the area of radiation protection.
- See Concern OA.3-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (RP.11-1) (H3/C1) **Ames Laboratory has no documented as-low-as-reasonably-achievable program for radiation protection as required by DOE 5480.11.**

4.5.12 Personnel Protection

4.5.12.1 Overview

The appraisal of personnel protection activities at Ames Laboratory was evaluated for all five performance objectives in the Personnel Protection functional area. Interviews were conducted with ES&H Group personnel, researchers, and service personnel. The results of extensive inspections performed in conjunction with the appraisal of worker safety were also used in developing the concerns in this section of the report.

The Occupational Safety and Industrial Hygiene Programs are in the early stages of development. They lack staff, procedures, routine surveillance, and enforcement to comply with the DOE Orders and Occupational Safety and Health Administration (OSHA) requirements and to ensure that Ames personnel are afforded a safe and healthy workplace. A recent positive step has been the hiring of a trained industrial hygienist to serve as Chemical Safety Officer.

The current Ames Laboratory Safety Manual was approved February 7, 1992. It does not establish Laboratory-wide procedures and programs in critical safety areas such as lockout/tagout and has not been enforced. The Confined Spaces Entry Program is newly developed and has not yet been implemented. There is no planned continuing education program for the health and safety staff. Health and safety personnel do not have the authority to stop work. Walkthrough inspections are not conducted as required by DOE 5480.10, and internal audits are not performed as required by DOE 5482.1B.

Prior to the Tiger Team Assessment, the Laboratory had shut down the Class IV lasers Laboratory-wide until the doors to laboratories where they were housed could be interlocked. The previous practice had been to lock the laboratory door from the inside when such a laser beam was in use. This practice was unacceptable to the Laboratory because it could interfere with emergency egress.

Procedures have been established for only a few industrial hygiene functions, and these lack evidence of management review and approval. In addition, Ames has not established criteria either to define when sampling or monitoring is required or to determine acceptable hood airflows.

Deficiencies were observed in several of the programs designed to protect life and health. Some are documented in the Worker Safety section of this report, whereas others are discussed here. The Respiratory Protection Program does not meet required standards. Monitoring of local ventilation systems is incomplete and technically flawed. Asbestos control practices do not comply with OSHA requirements. Incompatible chemicals are often stored together, and labels affixed by Ames do not conform to OSHA requirements.

The Ames self-assessment identified or partially identified many of the concerns related to personnel protection and reflects a good understanding of the personnel protection needs of the Laboratory. Addressing the needs identified by the Laboratory as well as those covered in this appraisal will result in a safer workplace and a more compliant program.

4.5.12.2 Findings and Concerns

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

- Ames has developed a safety manual that requires line managers or Safety Coordinators to develop and implement their own safety and health procedures, including a specific lockout/tagout program for their work areas. This results in the following: confusion regarding the purpose of lockouts and tagouts; inadequate information explaining the purpose of the tag; and the use of both combination and keyed padlocks as lockout devices. (See Concern OP.4-1.)
- Contrary to the requirements of the Ames Laboratory Safety Manual, flammable liquids were stored in electrically unapproved refrigerators.
- Contrary to the requirements of the Ames Laboratory Safety Manual, waste flammable liquids are stored in glass containers.
- Contrary to the requirements of the Ames Laboratory Safety Manual, incompatible materials are stored in close proximity to one another. (See Concern PP.5-1.)
- See Sections 4.5.9.2, PT.8; 4.5.13.2, WS.3; and 4.5.13.2, WS.4.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (PP.1-1) (H1/C1) **Management at Ames Laboratory does not ensure the consistent implementation and enforcement of documented internal safety and health rules in accordance with DOE 5480.10.**

FINDINGS:

- Although Group Leaders and Safety Coordinators have stop-work authority, ES&H personnel do not.
- The stop-work authority of the Laboratory Director is delegated to the ES&H Manager.
- Many ES&H personnel are under the impression that only the Laboratory Director has stop-work authority.
- An ES&H staff member observing an imminent danger situation may go to the ES&H manager to have worked stopped, but even this approach is not institutionalized because the ES&H Manager has only delegated authority, not ex officio authority, to stop work.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (PP.1-2) (H2/C2) **Technical staff assigned to the Environment, Safety, and Health Group at Ames Laboratory do not have any form of direct stop-work authority.**

FINDINGS:

- Ames management has not developed or implemented Individual Development Plans for safety and health personnel.
- No plan or documented program of continuing education has been developed to assist safety and industrial hygiene professionals and technical personnel in their efforts to maintain technical competence and professional vitality. (See Concern TC.1-1.)
- The following concern was not identified in the Ames self-assessment.

CONCERN: (PP.1-3) (H2/C2) **Ames Laboratory has not established a program for continuing education and professional development for personnel assigned to the Environment, Safety, and Health Group.**

FINDINGS:

- An internal audit program to evaluate the effectiveness of the ES&H program is not in place at Ames.
- See Concern QV.1-1.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PP.1-4) (H2/C1) **Ames Laboratory has no program to perform internal audits of personnel protection functions as required by DOE 5482.1B.**

FINDINGS:

- The employee performance appraisal system does not include documented goals and objectives designed to reduce the number of occupational accidents, injuries, and illnesses at Ames. (See Section 4.5.15.2, MS.1.)
- See Concern OA.3-1.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (PP.1-5) (H2/C2) **Ames Laboratory has no program to establish personnel protection goals and objectives.**

PP.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

FINDINGS:

- Ames has not fully implemented or enforced procedures for handling carcinogens, toxic materials, and reproductive hazards.
- Ames has not established standards for procedures governing the receipt, handling, storing, and use of hazardous material or equipment.
- The Ames Laboratory Safety Manual contains inaccuracies. For example, it indicates that acetylene cylinders may be stored on their sides and that in some cases compressed air may be used to clean clothing.
- Thorough walkthrough inspections by the safety and industrial hygiene staff are not routinely conducted. (See Concern PP.3-1.)
- A formal written program that tracks actions to eliminate safety and health hazards in the workplace has not been established.
- See Concerns QV.1-1 and QV.7-2.
- The below concern was identified in the Ames self-assessment.

CONCERN: (PP.2-1) (H1/C2) **Management has not developed comprehensive and technically correct operating procedures that provide direction and guidance for the recognition, evaluation, and control of occupational safety and health hazards at Ames Laboratory.**

FINDINGS:

- Ames has not established procedures for industrial hygiene measurements or approval activities (e.g., respirator fit testing, air-sampling protocol, chain of custody records for industrial hygiene samples, measurement of airflow through hoods, HEPA filter efficiency checks, and approval of confined spaces entry permits).
- Criteria are not established for face velocity in chemical fume hoods. Further, the frequency of monitoring is not dependent on the hazard.
- See Concern QV.7-2.
- The following concern was identified in the Ames self-assessment.

CONCERN: (PP.2-2) (H2/C2) **Ames Laboratory has no program to establish criteria and procedures for essential health protection activities.**

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

FINDINGS:

- Thorough walkthrough inspections by safety and industrial hygiene personnel are not routinely conducted.
- Ames does not have a confined spaces entry program that complies with ANSI 117.1-1989, American National Standards Safety Requirements for Confined Spaces, or draft 29 CFR 1910.146, Confined Spaces. (See Concern WS.3-3.)
- Ames has not established policies requiring statistically valid sampling strategies to determine the extent of employee exposure to airborne contaminants.
- HEPA filters are used to control contaminants in effluents and in specially designed vacuum cleaners; however, they have no pressure gauges to indicate HEPA condition, and no recent tests have been conducted to indicate their effectiveness. When HEPA testing is performed, formal procedures are not used, ANSI 510 criteria are not followed, and a challenge aerosol of unknown particle size is used.
- Industrial hygiene calibration procedures are incomplete, do not specify the calibration records to be generated, and are unsigned. Many of these procedures do not conform to manufacturers' recommendations. (See Concern QV.4-1.)
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (PP.3-1) (H1/C1) **Evaluation and control of chemical, physical, and other environmental stresses at Ames Laboratory do not conform to the requirements of DOE 5483.1A, DOE 5480.10, and DOE 5480.4.**

FINDINGS:

- Ames does not conduct surveillance of work areas where respirators are worn. For example, a powered-air-purifying respirator is reportedly used for welding, but records of welding exposures are not available.
- Neither supervisors nor workers have been routinely instructed by competent persons in the selection, use, and maintenance of respiratory protection devices. Supervisors receive no instruction unless they are respirator users. (See Concerns TC.1-1 and TC.10-1.)
- Single-use disposable respirators are used more than once and, in some cases, are used for protection against organic solvents or radioactive particulates.

- The respiratory protection program does not identify the individual responsible for the selection, maintenance, and tracking of respiratory protective equipment, nor does it provide for periodic program review and update.

- Annual audits of the respiratory protection program have not been done as required by ANSI Z88.2, Practices for Respiratory Protection.

- SCBAs are available for emergency use; however, in some areas provisions are not made for standby personnel with suitable rescue equipment.

- Written procedures have not been prepared to cover the safe use of respirators in dangerous atmospheres that might be encountered during normal operations or emergencies.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (PP.3-2) (H1/C1) **The respiratory protection program at Ames Laboratory does not conform to ANSI Z88.2, Practices for Respiratory Protection, as required by DOE 5480.4.**

FINDINGS:

- Chemical fume hood airflow velocities in Ames facilities are checked annually; however, the instrument used has not been calibrated since 1985. The manufacturer recommends annual calibration.

- Some perchloric acid fume hoods may not provide laminar airflow at the face of the hood because the face velocity exceeds 300 feet per minute.

- Ames has not developed a documented procedure for measuring chemical fume hood performance.

- There is no documented minimum airflow velocity for chemical fume hoods; however, an average face velocity of 100 feet per minute was reportedly acceptable.

- Laboratory fume hoods containing hazardous materials are routinely shut off for energy conservation purposes.

- Laboratory fume hoods do not have audible alarms to warn users that an airflow has been interrupted.

- Current chemical fume hood ventilation surveys do not assure that sufficient uniform laminar control velocities are maintained. For example, the data collection form indicates that three measurements are made: A fume hood having only 50 feet per minute in the center, 50 feet per minute on one side, and 200 feet per minute on the other side is deemed acceptable by Ames because the readings are averaged.

- Other local ventilation systems such as spray booths, the waste compactor, and various pieces of shop equipment are not measured to assure adequate contaminant control.

- There are appropriate airflow and use criteria established for hoods in laboratories rented from ISU. However, Ames personnel working in rented space were unaware of the meaning of the color codes used to indicate the degree of protection afforded by each hood.

- See Concern PP.4-1.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (PP.3-3) (H1/C2) **Local ventilation systems at Ames Laboratory are not effectively used to protect workers, are not quantitatively evaluated, and their limitations are not communicated to personnel.**

FINDINGS:

- Samples of insulation of unknown composition are evaluated by a laboratory technician who has not been trained to identify tremolite, anthophyllite, and actinolite.

- Two supervisors and three workers have received offsite training in asbestos work; however, the industrial hygienist who conducts asbestos air sampling does not have current training, and the engineer in charge of the program has not received any asbestos training.

- The following concern was identified in the Ames self-assessment.

CONCERN: (PP.3-4) (H1/C1) **Asbestos practices at Ames Laboratory do not comply with the requirements of 29 CFR 1926.58, Asbestos, Tremolite, Anthophyllite, and Actinolite.**

PP.4 SURVEILLANCE OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

FINDINGS:

- A program has not been established to conduct routine monitoring of the workplace for air contaminants, noise, or other agents that may cause adverse health effects.
- Some incidents (e.g., mercury spills) are not monitored.
- A workplace safety inspection program has not been established. (See Section 4.5.12.2, PP.3.)
- Ames Laboratory has not effectively implemented the requirements of 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories. (See Section 4.5.13.2, WS.3.)
- The following concern was identified in the Ames self-assessment.

CONCERN: (PP.4-1) (H1/C1) CAT. II **Ames Laboratory has not established a monitoring program that meets the requirements of DOE 5480.10.**

PP.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs, of sufficient quality to comply with all Department of Energy prescribed occupational safety and health standards, should be available.

FINDINGS:

- Sacks of gallium oxide are stored in a box labeled ammonium hydroxide.
- The contents of large tanks in the basement of the radwaste storage facility are not labeled.
- Radioactive materials in the radwaste storage facility generally do not have labels indicating what radionuclide is present, its quantity, or the radiation level. (See Concern RP.3-1.)
- Contaminated asbestos in the radwaste storage facility is not labeled.
- Some drums of chemicals in the radwaste storage facilities have partially defaced labels.

CONCERN: **See Concerns WS.3-1, WS.3-2, and WS.4-4.**

FINDINGS:

- Ames has distributed guidance on avoiding storage of incompatible chemicals; however, the guidance is not directly applicable to laboratory situations. Neither the distributed guidance nor the manufacturers' MSDSs are followed in some locations.
- In many cases, incompatible chemicals are stored together in laboratory facilities. Note the following examples:
  - In one laboratory, magnesium perchlorate was stored in the same cabinet as glycerin.
  - Nitric acid, a strong oxidizer, is frequently stored with acetic acid, an organic acid.
- See Section 4.5.9.2, PT.9.
- The following concern was partially addressed in the Ames self-assessment.

CONCERN: (PP.5-1) (H1/C1) **Incompatible chemicals are stored together in violation of the** Ames Laboratory Safety Manual.

4.5.13 Worker Safety and Health (OSHA) Compliance

4.5.13.1 Overview

A comprehensive, OSHA-type safety and health appraisal covering general industry and construction standards was conducted at Ames Laboratory to determine compliance with existing OSHA regulations as adopted by DOE. Evaluation criteria were based, in part, on OSHA general industry and construction standards, 29 CFR 1910 and 29 CFR 1926, respectively. Noncompliances and hazards were documented and discussed with management at the end of each day. Multiple noncompliances of the same standard in any given room or laboratory were only noted once on the inspection report form (see Appendix F). All performance objectives for the Worker Safety functional area were evaluated, except for WS.1 Management of Health and Safety Concerns and WS.2 Surveillance of Health and Safety Concerns. Findings in these areas are incorporated into the Personnel Protection section of this report. Performance objectives related to WS.5 Compliance with Occupational Safety and Health Standards for the Construction Industry were not addressed because there were no ongoing construction projects that fell within the scope of this appraisal. Section WS.6 Personnel Communication Program has been incorporated under WS.3 Compliance with Occupational Health Standards for General Industry.

The appraisal was directed at specific facilities owned or rented by the Department of Energy. Facilities satisfying this criterion include maintenance shops, materials storage areas, and laboratories. A less comprehensive sample of offices and other low-hazard areas was also inspected.

Altogether, 155 noncompliance issues were identified. All 155 of these issues were considered serious, and none were classified as other than serious. The high percentage of serious noncompliance issues may be misleading because the appraisal team expended most of its effort in identifying this type of hazard. Table WS-1 provides a summary of the buildings that were inspected, the number of noncompliance issues noted, and the OSHA noncompliance classification of each. Appendix F is a tabulation, by location, of all noncompliances, along with the OSHA standards and the classification applicable to each.

Collectively, the findings indicate serious noncompliances relative to electrical standards, hazard communication, chemical hygiene, machine-guarding, hazardous waste operations and emergency response, lockout/tagout procedures, identification of and procedures for entry into confined spaces, storage of combustibles and flammable liquids, spray-finishing operations, and hazardous materials.

The Ames self-assessment has fully addressed five concerns (machine-guarding procedures, electrical standards, hazardous waste operations and emergency response, lockout/tagout, and chemical hygiene) and partially addressed two concerns (hazardous materials and hazard communication) identified by the S&H Subteam. The remaining three concerns (confined spaces, flammable and combustible liquids, and spray-finishing operations) were not addressed by the Ames self-assessment. Noncompliances related to the chemical hygiene program and storage of flammable liquids resulted in a Category II concern.

TABLE WS-1
BUILDINGS INSPECTED AND
NONCOMPLIANCE INFORMATION

Legend:
S = Serious
OTS = Other than Serious
W = Willful
I = Imminent Danger

Location	Number of Noncompliances S	OTS	W	I
AIR-CONDITIONING SHOP	4	0	0	0
CARPENTER SHOP	7	0	0	0
GILMAN HALL	5	0	0	0
METALS DEVELOPMENT	96	0	0	0
PAINT SHOP	12	0	0	0
SHEET METAL SHOP	2	0	0	0
SPEDDING HALL	25	0	0	0
WAREHOUSE	1	0	0	0
WILHELM HALL	3	0	0	0
TOTAL	155	0	0	0
Percentage	100.00	0.00	0.00	0.00

Total Noncompliances: 155

Although Ames is beginning to develop a proactive attitude toward the development and implementation of an effective compliance safety and health program, the safety and health program does not reflect an understanding of or adherence to current safety and health requirements as adopted by the Department of Energy. Finally, the appraisal indicates that no one at Ames Laboratory is adequately trained to recognize and inspect for safety and health noncompliances within their work areas.

4.5.13.2 Findings and Concerns

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with Department of Energy prescribed standards for the evaluation and control of occupational health hazards.

NOTE: Noncompliance with this performance objective is documented utilizing the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- Ames personnel do not consistently follow the procedures outlined in their Chemical Hygiene Plan, dated February 1, 1992. For example, storage of incompatible chemicals is noted in many research laboratories; quantities of combustible, flammable, corrosive, and toxic chemicals are not minimized to amounts needed for daily operations; and chemical storage does not comply with the requirements outlined in Section IV, Fire Safety, of the Ames Laboratory Safety Manual.

- Inoperable laboratory fume hoods were noted in several locations. In the Metals Development Building, room 220, open flasks of mercury are stored within a chemical fume hood that does not have an alarm or other warning device to signal hood malfunction. In Gilman Hall, room 2231-1, a malfunctioning chemical fume hood is used to transfer hazardous wastes and chemical carcinogens.

- Employee training related to the physical and health hazards of chemicals is not comprehensive. This is evident by the fact that incompatible chemicals are stored in close proximity to one another.

- Employee training related to emergency actions and procedures is not effective.

- The Chemical Hygiene Plan, which meets the requirements of 29 CFR 1910.1450, has not been effectively implemented throughout the Ames complex.

- See Sections 4.5.9.2, PT.8, and 4.5.7.2, EP.7.

CONCERN: **See Concern PP.4-1.**

FINDINGS:

- A comprehensive respiratory protection program has not been developed or implemented at Ames.

- Not all employees who use respirators have been fitted or trained in the use of respirators. For example, in Wilhelm Hall, room 320, laboratory personnel are provided with single-use disposable respirators, but have not been fitted or trained in their use.

- A reliable tracking or accountability system is not in place for respiratory protective equipment at Ames.

CONCERN: **See Concern PP.3-2.**

FINDINGS:

- There are no written hazard communication programs specific to each worksite (i.e., building) at Ames Laboratory.

- The generic Ames Laboratory Site Hazard Communication Program does not completely address the following major program elements:

  - Labels and other forms of warning (e.g., designation of person(s) responsible for ensuring consistent labeling of in-plant containers, description of written alternatives to labeling of in-plant containers, and procedures to review and update label information when necessary).

  - Training (e.g., designation of person(s) responsible for conducting training, format of the program to be used, procedures to train new employees at the time of their initial assignment and to train employees when a new hazard is introduced into the workplace, and procedures to train employees of new hazards they may be exposed to when working on or near another employer's work area). (See Concerns TC.1-1, TC.4-1, and QV.1-1.)

  - Material Safety Data Sheets (e.g., the designation of person(s) responsible for obtaining, reviewing, and maintaining MSDSs; how such sheets are to be maintained; and procedures to follow when the MSDS is not received at the time of shipment).

- Ames has no written hazard determination procedures to evaluate the hazards associated with chemicals and materials synthesized at the Laboratory.

- In some cases, container labeling used at Ames is deficient. For example, in Spedding Hall, room 135, a Dewar flask of liquid nitrogen has no health hazard warning; in room 160-D, bulk chemicals are repackaged for laboratory personnel and labeled with only the identity of the material; in the Paint and Air-Conditioning Building, room 109, the ADF System Parts Washer was not labeled as to its contents or provided with a health hazard warning.

- Hazards associated with nonroutine tasks, such as work on ventilation duct work, HEPA filtration systems, and work within or around dust collectors or other confined spaces, are not addressed in the Ames Laboratory Safety Manual.

- Not all workers employed at Ames have received worksite-specific hazard communication training. (See Concern TC.1-1.)

- Even when available, manufacturers' MSDSs are not consistently distributed.

- In-house generated MSDSs are deficient. In many cases, they do not address the physical hazards of the material, including the potential for fire, explosion, and reactivity. Also, neither the OSHA permissible exposure limit, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), nor any other exposure limit is routinely included on these sheets. The name, address, and telephone number of the party responsible for preparing the MSDS is missing.

- See Section 4.5.12.2, PP.5.

- The following concern was partially identified in the Ames self-assessment.

CONCERN: (WS.3-1) (H1/C1) **Ames Laboratory does not comply with all requirements of 29 CFR 1910.1200, Hazard Communication.**

FINDINGS:

- Confined spaces are not uniformly identified with proper warning signs.

- A complete inventory identifying confined spaces has not been compiled. For example, in the Metals Development Building, room 150, the maintenance and servicing pit located beneath the Loewy Hydropress is not identified as a confined space requiring special precautions before entry.

- A comprehensive and effective confined space entry program addressing electrical and mechanical hazards has not been developed.

- See Section 4.5.12.2, PP.3.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (WS.3-2) (H1/C1) **Control of and entry into confined spaces at Ames Laboratory do not comply with Section 5(a)(1), General Duty Clause, Occupational Safety and Health Act of 1970.**

FINDINGS:

- Ames personnel who are, or may be, required to act as first responders in the event of a chemical spill have not received required training.

- On February 17, 1992, two workers who had not completed training in accordance with 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, donned SCBAs and entered Wilhelm Hall, room 320, where a bottle of nitric acid had exploded, and remediated the spill.

- See Concerns TC.1-1 and QV.1-1.

- The following concern was identified in the Ames self-assessment.

CONCERN: (WS.3-3) (H1/C1) **Ames Laboratory does not meet the training requirements of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.**

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and should be in compliance with Department of Energy prescribed occupational safety standards.

FINDINGS:

- Guarding used for mechanical power transmission apparatus is not effective. For example, in the Metals Development Building, room 148, the power transmission shaft for the Hog Grinder is not completely enclosed; in room 150, air-compressor belts and pulleys for the accumulator tank are not completely guarded.

- Guarding for rotating parts, ingoing nip points, and points of operation guarding is deficient in many locations. For example, in the Metals Development Building, room 150, the Baldwin 300-ton press has inadequate point-of-operation guarding in that the press can be operated without the barrier shield in place; the Waterbury Farrel and Stanat Westbury rolling mills are not provided with point-of-operation guarding; the Loma and small-wire drawing machines have unguarded pinch points between the ram and the bolster block; and in room 257, the Walker-Turner drill press has no chuck guarding.

- Guarding of woodworking machinery is not correct in several instances. For example, in the Maintenance Shop Building carpenter shop, the cutting head of the Rockwell planer is not completely guarded; the Delta vertical belt sander does not have the lower portion of the sanding belt and ingoing nip point enclosed; the unused portion of the Rockwell bandsaw blade is not completely enclosed; and the De Walt radial arm saw does not return to the start position when released.

- Abrasive wheel machinery is not maintained in safe operating condition. In the Paint and Air-Conditioning Building, the tongue guard for the Black & Decker pedestal grinder in the air-conditioning shop is not properly adjusted to within 1/4 inch of the abrasive wheel; in the Metals Development Building, room 161, a pedestal grinder is not equipped with a tongue guard.

- The following concern was identified in the Ames self-assessment.

CONCERN: (WS.4-1) (H1/C1) **Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart O, Machinery and Machine Guarding.**

FINDINGS:

- Flexible cords are used as permanent wiring in numerous locations. For example, in the Metals Development Building, room 199, a refrigeration unit is wired directly into the building electrical system using flexible cord; in room 120, the controller for the Hevi-Duty Furnace uses flexible cord as permanent wiring; in the Paint and Air-Conditioning Building,

room 101, the Fostoria infrared system in the paint shop is wired into the building electrical system using flexible cord.

- In many cases, openings in electrical fixtures are not effectively closed. In the Metals Development Building, room 120, the on/off breaker box for the Hevi-Duty Furnace has an opening, and in room 193, wall receptacles are provided with poorly fitted faceplates that are produced in-house.

- Grounding of electrical equipment is deficient in a number of locations. In Gilman Hall, room 2204-1, a refrigerator does not have a continuous path to ground; in the Metals Development Building, room 177, an outlet located in the north wall has an open ground; and in room 192, the Eureka vacuum cleaner does not have a continuous path to ground.

- Not all electrical outlets located within 6 feet of wet locations (sinks) are provided with ground fault circuit interrupters (GFCI). For example, in the Metals Development Building, the Fossil Energy Conference Room, an outlet within 6 feet of the sink is not GFCI protected; in room 131, two outlets within 6 feet of the sink on the east wall are not GFCI protected; and in Wilhelm Hall, room 160, an outlet within 6 feet of the sink on the west wall is not GFCI protected.

- Numerous electrical attachment plugs are not of deadfront construction.

- Individuals who work with or around electrical equipment have not received training in electrical safety-related work practices.

- Electrical power cords for portable hand tools, flexible cord sets (extension cords), and small motors have damaged insulation. In the Metals Development Building, room 131, power cords for the compressor motor and a Black & Decker 1/4-inch drill have damaged insulation.

- The following concern was identified in the Ames self-assessment.

CONCERN: (WS.4-2) (H1/C1) **Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart S, Electrical.**

FINDINGS:

- Tagout devices do not warn against hazardous conditions in the event that the machine or equipment is energized.

- Servicing and maintenance lockout/tagout devices are used for purposes other than controlling energy. In Spedding Hall, room 329, the Bostitch stapler is locked out using servicing and maintenance tags and locks because of improper guarding.

- In some cases, string with less than 50 pounds of tensile strength is used to attach tagout devices.

- Lockout devices are not standardized within the facility. For instance, in the Metals Development Building, combination padlocks and Master key padlocks are used to lock out equipment.

- See Concern OP.4-1.

- The following concern was identified in the Ames self-assessment.

CONCERN: (WS.4-3) (H1/C1) **Ames Laboratory does not comply with all requirements of 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout).**

FINDINGS:

- Flammable liquids are stored in refrigerators that have not been approved for flammable liquid storage. For instance, in Wilhelm Hall, room 334, flammable chemicals are stored in an unapproved refrigerator. A similar condition existed in Gilman Hall, room 2204-1.

- Flammable liquids and oxidizers are stored in close proximity to one another. In Spedding Hall, room 160-D, large quantities of flammable liquids such as ethyl alcohol, acetone, glacial acetic acid, and small propane cylinders are stored with compressed oxygen cylinders and perchloric acid.

- In the Paint and Air-Conditioning Shop Building (paint shop, room 102), 145 gallons of Class I flammable liquid was stored outside of an indoor storage room.

- Indoor flammable storage rooms, such as in the paint shop, room 103, and Spedding Hall, room 160-D, do not have emergency drains, 4-inch sills, or 4-inch ramps to prevent the flow of flammable liquids from the room, and doors are sometimes propped open.

- The door to the indoor flammable storage area in Spedding Hall, room 160-D, is not an approved fire door and was propped open.

- See Concerns FP.1-1 and PP.5-1.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (WS.4-4) (H1/C1) CAT. II **Storage of flammable liquids at Ames Laboratory does not comply with all requirements of 29 CFR 1910, Flammable and Combustible Liquids.**

FINDINGS:

- The quantity of flammable liquids kept in the vicinity of spray operations exceeded the minimum required for the operation. In the Paint and Air-Conditioning Building (paint shop, room 102), more than 145 gallons of flammable liquid is stored in the spray area.

- The spray booth in the Paint and Air-Conditioning Building, room 102, equipped with dry type overspray collectors, does not have an automatic fire suppression system located on the downstream side of the filter bank. The spray booth in Spedding Hall, room 330, is not equipped with any type of automatic fire suppression system.

- Unapproved electrical appliances are present in areas where flammable liquids are sprayed. The lighting within the spray booth in Spedding Hall, room 330, is not explosion proof. A vacuum cleaner located in the spray area in room 102 of the paint shop is not electrically safe for use near flammable liquids.

- Combustible material is not removed from the spray booth at the termination of spraying operations. Paper is used to catch overspray in the spray booth located in Spedding Hall, room 330, and is not removed when spraying operations are concluded. The spray table is constructed of plywood.

- The following concern was not identified in the Ames self-assessment.

CONCERN: (WS.4-5) (H1/C1) **At Ames Laboratory, spray-finishing operations involving the use of flammable liquids do not comply with all requirements of 29 CFR 1910.107, Spray Finishing Using Flammable and Combustible Materials.**

FINDINGS:

- In the Paint and Air-Conditioning Shop Building and the Campus Warehouse overflow building, compressed gas cylinders are stored without their valve outlet caps in place.

- In Spedding Hall, room 160-D, cylinders of compressed oxygen were stored within 20 feet of flammable gases and liquids.

- In Gilman Hall, room 2231-1, highly toxic compressed gases such as arsenic pentaflouride are stored indoors in an unventilated cabinet.

- The following concern was partially addressed in the Ames self-assessment.

CONCERN: (WS.4-6) (H1/C1) **Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart H, Hazardous Materials.**

4.5.14 Fire Protection

4.5.14.1 Overview

The appraisal for the Fire Protection functional area at Ames Laboratory addressed all seven performance objectives. Concerns were identified for six performance objectives. The appraisal was accomplished through (1) interviewing personnel associated with the Ames Fire Protection Program, the Safety Coordinators, and building custodians, and (2) reviewing appropriate documents (e.g., Ames Laboratory Safety Manual, the Ames Emergency Plan, and associated documents) against the provisions of the DOE 5480 series of Orders.

The Ames Fire Protection Program is staffed by one individual who performs this function as an added duty; he is also the full-time Manager of the ES&H Group. This individual has an Associate's degree in Fire Science and is very knowledgeable in the areas of fire protection, HAZMAT operations, and radiological protection.

The Ames Fire Protection Program is in the early stages of development and does not yet comply with the provisions of DOE 5480.7. Specifically, the program lacks resources to conduct fire prevention surveys; to evaluate and correct all floor-to-roof openings and shafts; and to ensure that fire dampers are installed in all heating, ventilation, and air-conditioning ducts and that flammable liquids and combustible products are controlled throughout all buildings at Ames. The lack of sprinklers and automatic fire detection systems is another serious problem. Finally, Ames does not have a documented life safety program.

The Ames Laboratory self-assessment is a well-written document that addresses all five concerns identified by the S&H Subteam. The most fundamental of these concerns is the fact that the Ames Fire Protection Program does not comply with DOE 5480.7. The Laboratory lacks qualified personnel to perform routine inspections, repairs, and testing of automatic sprinkler systems and fire alarms as required by the NFPA standards. Ames has not developed a fire hazard analysis, safety analysis report, or fire risk analysis that could support the development of an effective Fire Protection Program, and NFPA 101, Life Safety Code, has not been addressed in the Ames Laboratory Safety Manual. Finally, the Fire Protection Program is the responsibility of the Manager, ES&H, who directs the program as an "additional duty," without staff support.

4.5.14.2 Findings and Concerns

FP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Fire protection organization and administration should ensure the effective implementation and control of the fire protection program.

FINDINGS:

- Three organizations are principally involved in the Ames Fire Protection Program. The primary responsibility for fire protection is assigned to the Manager of the ES&H Group, who performs this function on a part-time basis. The other two organizations are the Plumbing and Electrical Sections of the Facilities Services Group. The Fire Protection Program is a fragmented operation in which it is possible for many items to "slip between the cracks." The only person in the ES&H Group with training in fire protection is the Manager, ES&H, who has an Associate's degree in Fire Science.

- Minor construction modifications to existing buildings are sometimes accomplished without a detailed fire and safety review.

- Weekly visual inspections are conducted by Plant Protection personnel who do not meet the qualifications established by NFPA to perform this function.

- The Fire Protection Program does not have sufficient resources to ensure compliance with established DOE Orders, NFPA codes, and the Ames Laboratory Safety Manual.

- The following concern was identified in the Ames self-assessment.

CONCERN: (FP.1-1) (H1/C1) **The Ames Laboratory Fire Protection Program does not have the necessary resources to implement the provisions of DOE 5480.7 and thereby to comply with the provisions of standards established by the National Fire Protection Association.**

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- The Ames Laboratory Safety Manual does not have a section concerning NFPA 101, Life Safety Code, and this information is not contained in any other Ames document.
- None of the three main buildings at Ames (Spedding Hall, Metals Development Building, and Wilhelm Hall) are fully protected with automatic sprinklers.
- Inspections are not being performed in accordance with DOE 5480.7 and NFPA 101.
- The following concern was identified in the Ames self-assessment.

CONCERN: (FP.2-1) (H1/C1) **Ames Laboratory does not have a documented program to ensure that NFPA 101, Life Safety Code, is strictly enforced as required by DOE 5480.7.**

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

FINDINGS:

- Ames does not have safety analysis documentation identifying all known hazards, operations information, or HAZMAT storage locations.
- The connecting tunnels (e.g., between Spedding Hall and the Metals Development Building) used for passage between buildings have Class B, UL-listed double doors; however, 1/4- to 1/2-inch openings are often observed between these doors.
- Storage rooms for toxic chemicals do not have elevated sills to prevent liquids from flowing out of the room.
- Ames does not have fire dampers installed in all heating, ventilation, and air-conditioning ducts.
- Ames has not conducted a fire hazard analysis.
- Water used for firefighting could potentially carry solvents, HAZMAT liquids, or polychlorinated biphenyls into the ISU sewage system.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (FP.3-1) (H2/C1) **Ames Laboratory has not developed a fire hazard analysis for all facilities owned by the Department of Energy as required by DOE 5480.7.**

FP.4 IMPAIRMENT OF OPERATIONS

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

FINDINGS:

- The main operating facilities at Ames (Spedding Hall, Wilhelm Hall, and the Metals Development Building) are not fully protected with automatic sprinklers. The lack of sprinklers in Ames facilities could cause losses in excess of $1,000,000 and loss of use for 3 to 6 months.

CONCERN: **See Concern FP.5-1.**

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6.f., should not result in an unacceptable property loss.

FINDINGS:

- The three main buildings at Ames are not fully equipped with automatic sprinklers and fire alarms.
- The maintenance and repair facilities (e.g., paint and air-conditioning shops) are not fully sprinklered in high-exposure areas.
- Halon systems are installed in rented locations (e.g., Physics Department).
- The estimated potential loss due to a fire or explosion is $1,000,000 per floor in the three main buildings at Ames.
- See Section 4.5.14.2, FP.4.
- The following concern was identified in the Ames self-assessment.

CONCERN: (FP.5-1) (H1/C1) **The main buildings at Ames Laboratory are not fully protected with fire-suppression sprinklers, and as a result, fire damage may exceed the monetary limits established by DOE 5480.7.**

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

FINDINGS:

- Modifications to site buildings can be made without review by fire protection personnel.
- Maintenance and testing of fire protection systems are not in accordance with NFPA standards.
- A documented procedure to retain fire-loss records has not been developed as required by DOE 5483.1.
- Buildings at Ames have numerous vertical and horizontal penetrations through fire barriers that are not properly sealed.
- Ames has not conducted fire surveys, audits, or evaluations as required by DOE 5480.1B and DOE 5480.7.
- Automatic sprinklers, fire detectors, and smoke detectors are inspected monthly by untrained maintenance personnel.
- The following concern was identified in the Ames self-assessment.

CONCERN: (FP.7-1) (H2/C1) **The Fire Protection Program at Ames Laboratory does not provide for effective fire safety surveys, audits, testing, and maintenance of fire protection equipment as required by DOE 5480.7 and DOE 5482.1B.**

4.5.15 Medical Services

4.5.15.1 Overview

The Occupational Medicine Department at Ames Laboratory was appraised against all five performance objectives for the Medical Services functional area. Concerns were identified for four of the five performance objectives. Draft DOE 5480.8A was used to provide added detail and criteria for the appraisal. Its requirements do not differ significantly from those of its predecessor, DOE 5480.8. The appraisal included a walkthrough inspection and interviews with various personnel who interact with the Occupational Medicine Department.

Personnel interviewed included the entire medical staff, plus the Associate Director of Operations for the Laboratory, the Director of Student Health, the Director of Environmental Health Services at ISU, the Ames Personnel Officer, the Employee Assistance Programmer, and the ISU Health Education Coordinator. Medical documents reviewed included medical procedures, standing orders, selected charts, and pertinent administrative directives.

The Ames Occupational Medicine Department is small and is currently experiencing a turnover in personnel. During the appraisal, the medical physician's assistant resigned and the part-time Medical Director assumed full-time responsibilities. The rest of the staff consists of one nurse, one medical coordinator, and one medical assistant. The Medical Department staff at Ames is too small to meet the specific personnel requirements set forth in draft DOE 5480.8A, and modification of these criteria is not justified without ancillary staffing that does not currently exist. In addition to serving Ames Laboratory personnel, the Medical Department is responsible for the occupational medicine requirements of ISU employees. Staff members are multi-talented and work together harmoniously; they are clinically skilled and task oriented.

The medical facilities at Ames have recently been enlarged, which ensures much better patient confidentiality as well as better patient flow. However, storage space is inadequate and day-to-day supplies cannot be arranged in an orderly manner. A completely new dispensary is scheduled for completion in FY 94. The department operates on a single shift, and work is scheduled efficiently. Medical activities during 1991 included approximately 1500 physicals, 1000 patient visits, and various Wellness Program activities. A recently drafted QA document for the Medical Department also serves as a medical procedures manual.

A formalized self-assessment program does not exist within the Medical Department. Further, during the appraisal it was observed that a wellness program has not been documented and formalized. A substance abuse program to conduct drug screening, even on a for-cause basis, has not been established. Medical records are not protected against fire. There is no interaction with safety and industrial hygiene personnel to track employee exposures to hazardous conditions or to ensure that all eligible employees receive required physicals in a timely manner. In addition, the emergency preparedness exercise conducted during the Tiger Team Assessment identified several deficiencies. Finally, the Medical Director is not afforded the opportunity to participate in efforts to contain medical costs, and an effective absentee control program has not been developed for Ames employees.

The Medical Services section of the Ames self-assessment facilitates easy comparison between the concerns cited in this appraisal and those presented in the Ames document. Of the five concerns in this appraisal functional area, one was identified, one was partially identified, and three were not identified in the Ames self-assessment. No corrective actions were proposed, however, in the self-assessment.

4.5.15.2 Findings and Concerns

MS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation and control of the medical services program.

FINDINGS:

- Based on the size of the current population served, the Medical Department is short one nurse of the number required by draft DOE 5480.8A.
- Periodic emergency drills and exercises have not been conducted at sufficient frequency to assure complete and effective response. (See Concern EP.4-1.)
- Some medical personnel were not properly identified during the emergency exercise conducted as part of the Tiger Team Assessment.
- The following concern was identified in the Ames self-assessment.

CONCERN: (MS.1-1) (H2/C1) **At Ames Laboratory, staffing levels for professional personnel in the Medical Department do not comply with the requirements of draft DOE 5480.8A and its predecessor, DOE 5480.8.**

FINDINGS:

- Specific goals and objectives are not evident for minimizing occupational exposures, injuries, and illnesses. (See Concern OA. 3-1.)
- Preventive medicine and accident prevention programs are not in place at Ames and therefore do not appropriately compensate for staffing deficiencies.
- The Medical Department does not interact with safety and industrial hygiene personnel to track employee exposures to hazardous conditions or to ensure that all eligible employees receive required physicals in a timely manner.
- The Medical Director is not afforded the opportunity to participate in efforts to contain medical costs.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MS.1-2) (H2/C2) **Ames Laboratory management has neither provided the Occupational Medicine Department with appropriate information nor allowed for sufficient interaction with other departments to facilitate the establishment and optimization of personnel and material resources as required by draft DOE 5480.8A.**

MS.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support of the medical services for the facility and site.

FINDINGS:
- Vital medical records are not being kept in fire-resistant, protected storage as required by DOE 5500.7A.

CONCERN: **See Concern EP.1-1.**

FINDINGS:
- The Medical Department does not have an internal self-assessment program. (See Concerns OA.2-2 and PP.1-4.)
- Procedures for the Medical Department have recently been developed, but they have not been formally implemented.
- Ames has not established a formal system for reporting medical activities to Ames management.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MS.2-1) (H3/C1) **The Occupational Medicine Department at Ames Laboratory lacks the programmatic elements necessary to assure that medical services are being uniformly and efficiently delivered in accordance with draft DOE 5480.8A and its predecessor, DOE 5480.8.**

MS.3 MEDICAL TREATMENT

PERFORMANCE OBJECTIVE: Medical treatment should be available and provided by qualified, competent staff, and adequate facilities should be available.

FINDINGS:

- Ames personnel files do not identify all potential hazards to which personnel may be exposed. (See Concerns OA.1-1 and PP.4-1.)
- A reliable method for identifying job transfers in and out of potentially hazardous environments has not been developed for use by the Medical Department.
- The Medical Department does not have timely access to the data necessary for determining worker locations or for estimating the potential exposure of workers to hazards or hazardous materials.
- The following concern was not identified in the Ames self-assessment.

CONCERN: (MS.3-1) (H2/C1) **The Medical Department does not have the capability to track employees who work in jobs involving specific hazards or hazardous materials and, therefore, cannot ensure that employees are receiving the medical surveillances required by draft DOE 5480.8A and its predecessor, DOE 5480.8.**

MS.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of the medical hazards that may be encountered in their work environment and of the medical services that are available.

FINDINGS:

- Although elements of a wellness program are in place at the Ames Laboratory, no formal and comprehensive wellness program exists. (See Concerns WS.3-1 and WS.3-2.)
- Medically based drug and chemical abuse programs are not in place at Ames.
- See Concern OA.8-1.
- The following concern was partially identified in the Ames self-assessment.

CONCERN: (MS.5-1) (H2/C2) **Documented wellness and chemical dependency programs do not exist at Ames Laboratory as required by draft 5480.8A.**

4.6 NOTEWORTHY PRACTICES

There were no noteworthy practices identified by the Safety and Health Subteam.

4.7 SYSTEM FOR CATEGORIZING CONCERNS

Each concern contained in this report has been characterized using the following three sets of criteria.

A. **Category I:** Addresses a situation for which a "clear and present" danger exists to workers or members of the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. If a clear and present danger exists, the Assistant Secretary for Environment, Safety and Health, or his/her designee, is to be informed immediately so that consideration may be given to exercising the Secretary's facility shutdown authority or directing other immediate mitigation measures.

Category II: Addresses a significant risk or substantial noncompliance with DOE Orders but does not involve a situation for which a clear and present danger exists to workers or members of the public. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report or the routine development of an action plan. Again, consideration should be given to whether compensatory measures, mitigation, or facility shutdown are warranted under the circumstances.

Category III: Addresses significant noncompliance with DOE Orders, or the need for improvement in the margin of safety, but is not of sufficient urgency to require immediate attention.

B. **Hazard Level 1:** Has the potential for causing a severe occupational injury, illness, or fatality, or the loss of the facility.

Hazard Level 2: Has the potential for causing minor occupational injury or illness or major property damage, or as the potential for resulting in, or contributing to, unnecessary exposure to radiation or toxic substances.

Hazard Level 3: Has little potential for threatening safety, health, or property.

C. **Compliance Level 1:** Does not comply with DOE Orders, prescribed policies or standards, or documented accepted practices. The latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements.

Compliance Level 2: Does not comply with DOE references, standards or guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Compliance Level 3: Has little or no compliance considerations. These concerns are based on professional judgment in pursuit of excellence in design or practice, i.e., these are improvements for their own sake and are not deficiency driven.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.1 Categorization of Concerns

Concerns Number	Potential Hazard Level (H)	Compliance Level (C)
OA.1-1	2	1
OA.2-1	2	1
OA.2-2	2	1
OA.3-1	2	1
OA.4-1	3	2
OA.5-1	2	1
OA.6-1	2	1
OA.7-1	2	2
OA.7-2	2	1
OA.7-3	2	1
OA.8-1	2	2
QV.1-1	2	1
QV.1-2	2	1
QV.1-3	2	1
QV.2-1	2	1
QV.2-2	2	1
QV.4-1	2	1
QV.5-1	2	1
QV.6-1	2	1
*QV.7-1	1	1
QV.7-2	1	1
OP.1-1	2	1
OP.1-2	3	2
OP.2-1	2	1
OP.3-1	2	1
OP.4-1	2	2
MA.1-1	3	1
MA.2-1	3	1
MA.2-2	3	1
MA.2-3	2	2
MA.3-1	1	1
MA.4-1	2	1
MA.5-1	2	1
MA.6-1	3	1
MA.7-1	3	2
MA.8-1	3	1
TC.1-1	2	1
TC.1-2	3	1
TC.4-1	2	1
TC.7-1	3	2
TC.9-1	2	1
TC.10-1	2	1
AX.1-1	2	1
AX.1-2	2	2
AX.1-3	2	1
AX.1-4	2	2
AX.2-1	2	1
AX.5-1	2	2
AX.6-1	2	1
AX.8-1	2	2

* Designates a Category II Concern

Concerns Number	Potential Hazard Level (H)	Compliance Level (C)
*EP.1-1	1	1
EP.4-1	1	1
EP.4-2	1	1
EP.5-1	2	1
EP.6-1	1	1
EP.7-1	1	1
TS.1-1	2	2
TS.1-2	2	2
TS.1-3	2	1
TS.2-1	2	1
TS.2-2	2	1
TS.2-3	2	2
TS.2-4	2	1
TS.3-1	2	1
TS.3-2	2	2
TS.3-3	2	2
TS.3-4	3	2
TS.4-1	2	2
TS.5-1	2	1
TS.5-2	2	2
PT.1-1	2	2
PT.1-2	2	2
PT.2-1	2	1
PT.3-1	2	1
PT.4-1	2	1

Concerns Number	Potential Hazard Level (H)	Compliance Level (C)
PT.9-1	2	2
PT.12-1	2	1
FR.1-1	2	1
FR.2-1	2	1
FR.6-1	2	2
RP.1-1	2	2
RP.1-2	2	1
RP.2-1	2	1
*RP.2-2	2	1
RP.2-3	2	1
*RP.3-1	1	2
*RP.3-2	1	1
RP.5-1	3	1
RP.5-2	3	1
RP.6-1	1	2
RP.7-1	2	1
RP.8-1	1	1
RP.9-1	1	1
*RP.10-1	1	1
RP.11-1	3	1
PP.1-1	1	1
PP.1-2	2	2
PP.1-3	2	2
PP.1-4	2	1
PP.1-5	2	2

* Designates a Category II Concern

Concerns Number	Potential Hazard Level (H)	Compliance Level (C)
PP.2-1	1	2
PP.2-2	2	2
PP.3-1	1	1
PP.3-2	1	1
PP.3-3	1	2
PP.3-4	1	1
*PP.4-1	1	1
PP.5-1	1	1
PP.5-2	1	1
WS.3-1	1	1
WS.3-2	1	1
WS.3-3	1	1
WS.4-1	1	1
WS.4-2	1	1

Concerns Number	Potential Hazard Level (H)	Compliance Level (C)
WS.4-3	1	1
*WS.4-4	1	1
WS.4-5	1	1
WS.4-6	1	1
FP.1-1	1	1
FP.2-1	1	1
FP.3-1	2	1
FP.5-1	1	1
FP.7-1	2	1
MS.1-1	2	1
MS.1-2	2	2
MS.2-1	3	1
MS.3-1	2	1
MS.5-1	2	2

* Designates a Category II Concern

4.8.2 Tabulation of Concerns

4.5.1 Organization and Administration

CONCERN: (OA.1-1) (H2/C1) Line safety authorities and responsibilities at Ames Laboratory are not documented, defined, delegated, and understood as required by DOE 5480.19.

CONCERN: (OA.2-1) (H2/C1) The Environment, Safety, and Health Group at Ames Laboratory is not independent as defined in DOE 5480.1B.

CONCERN: (OA.2-2) (H2/C1) Ames Laboratory does not have an approved, institutionalized plan and program for performing ongoing self-assessments as required by Secretary of Energy Notices and letters and by DOE 5480.19.

CONCERN: (OA.3-1) (H2/C1) Ames Laboratory has not historically demonstrated a commitment to safety as required by DOE 5480.19.

CONCERN: (OA.4-1) (H3/C2) Iowa State University has not provided regular and consistent oversight of Ames Laboratory in a manner that ensures compliance with the safety and health components of the Department of Energy/Iowa State University contract.

CONCERN: (OA.5-1) (H2/C1) The line safety program required by DOE 5480.19, SEN-6A, SEN-6B, SEN-6C, and SEN-6D is not well defined and institutionalized at Ames Laboratory.

CONCERN: (OA.6-1) (H2/C1) Safety accountability in personnel performance evaluations at Ames Laboratory is not consistently defined and evaluated as required by DOE 5480.19.

CONCERN: (OA.7-1) (H2/C2) Ames Laboratory has not established a process to assure that all controlled copies of safety documents are maintained current, and controls are not in place to ensure that outdated, uncontrolled copies do not become working documents.

CONCERN: (OA.7-2) (H2/C1) Ames Laboratory does not have a formal procedures control program as required by DOE 5480.19.

CONCERN: (OA.7-3) (H2/C1) Management has not systematically reviewed all operations and activities at Ames Laboratory to ensure that procedures exist for all activities as required by DOE 5480.19.

CONCERN: (OA.8-1) (H2/C2) The fitness-for-duty program at Ames Laboratory is informal and does not provide for continued training to help identify substance abusers; has not identified jobs, tasks, or positions for which routine substance abuse testing is required; and has not provided for substance abuse testing for cause.

4.5.2 Quality Verification

CONCERN: (QV.1-1) (H2/C1) The Ames Laboratory Quality Assurance Program does not include all elements of DOE 5700.6C and ASME NQA-1-1989.

CONCERN: (QV.1-2) (H2/C1) The Chicago Field Office does not provide effective oversight of quality assurance activities at Ames Laboratory as required by DOE 5700.6C and ASME NQA-1-1989.

CONCERN: (QV.1-3) (H2/C1) Ames Laboratory does not have a control or approval process for engineering drawings that complies with DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.

CONCERN: (QV.2-1) (H2/C1) Ames Laboratory does not provide for the control or verification of purchased material, equipment, and services or for the selection and control of suppliers as required in DOE 5700.6C and ASME NQA-1-1989.

CONCERN: (QV.2-2) (H2/C1) Ames Laboratory has not implemented formal programs to identify and control safety-related commercial and counterfeit or suspect parts as required by DOE 5700.6C and ASME NQA-1-1989.

CONCERN: (QV.4-1) (H2/C1) Contrary to the requirements of DOE 5700.6C and ASME NQA-1-1989, a formal calibration program for measurement and test equipment is not in place at Ames Laboratory.

CONCERN: (QV.5-1) (H2/C1) Ames Laboratory has not developed or implemented a formal program for the identification and control of hardware and materials as required by DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.

CONCERN: (QV.6-1) (H2/C1) Ames Laboratory does not have written inspection procedures to provide documentation and evaluation of inspection results as required by DOE 5700.6C and ASME NQA-1-1989.

CONCERN: (QV.7-1) (H1/C1) CAT. II Controls and procedures are not in place to ensure that structural welding performed at Ames Laboratory complies with the requirements of DOE 6430.1A, DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989.

CONCERN: (QV.7-2) (H1/C1) Contrary to the requirements of DOE 5700.6C, DOE 5480.19, and ASME NQA-1-1989, controls have not been implemented at Ames Laboratory to prevent machinery and chemical equipment operators from performing tasks without appropriate training or procedures.

4.5.3 Operations

CONCERN: (OP.1-1) (H2/C1) Technical operations management at Ames Laboratory has not established a system of administrative controls as required by DOE 5480.19.

CONCERN: (OP.1-2) (H3/C2) Technical operations personnel do not receive safety performance statistics reports for Ames Laboratory.

CONCERN: (OP.2-1) (H2/C1) Contrary to DOE 5480.19, Ames Laboratory management does not maintain authorized user lists for all equipment.

CONCERN: (OP.3-1) (H2/C1) Contrary to the requirements of DOE 5480.19, formal guidance has not been provided for the preparation of operating procedures at Ames Laboratory.

CONCERN: (OP.4-1) (H2/C2) Multiple lockout/tagout procedures are in effect in different parts of the technical operations organization at Ames Laboratory.

4.5.4 Maintenance

CONCERN: (MA.1-1) (H3/C1) Contrary to DOE 4330.4A, formal administrative controls for the maintenance organization are not implemented at Ames Laboratory.

CONCERN: (MA.2-1) (H3/C1) At Ames Laboratory, requirements for formal certification of satisfactory completion of work for maintenance activities do not comply with DOE 4330.4A.

CONCERN: (MA.2-2) (H3/C1) Facility and industry experiences are not being distributed to maintenance personnel at Ames Laboratory by means of a formal lessons-learned program that complies with DOE 4330.4A.

CONCERN: (MA.2-3) (H2/C2) Most maintenance supervisory personnel at Ames Laboratory are not formally certified to direct maintenance work activities.

CONCERN: (MA.3-1) (H1/C1) Not all lifting, hoisting, and rigging equipment at Ames Laboratory is being inspected as required by the Department of Energy Hoisting and Rigging Manual, dated May 1980, nor are personnel performing inspections of this equipment formally trained or qualified.

CONCERN: (MA.4-1) (H2/C1) The planning, scheduling, and control of maintenance activities at Ames Laboratory are not always documented in a formal manner that complies with DOE 4330.4A.

CONCERN: (MA.5-1) (H2/C1) Maintenance managers at Ames Laboratory have not implemented a formal program to assess facility area conditions in accordance with DOE 4330.4A.

CONCERN: (MA.6-1) (H3/C1) Preventive maintenance activities at Ames Laboratory are not formalized in accordance with DOE 4330.4A.

CONCERN: (MA.7-1) (H3/C2) Ames Laboratory does not have a formal predictive maintenance program to address relevant trends, parameters, properties, and performance characteristics.

CONCERN: (MA.8-1) (H3/C1) Ames Laboratory has established neither formal procedures for recording maintenance activities that comply with DOE 4330.4A nor a records retention program that meets the requirements of DOE 1324.2A.

4.5.5 Training and Certification

CONCERN: (TC.1-1) (H2/C1) The training program at Ames Laboratory is not yet formalized and fully functional as required by DOE 5480.19.

CONCERN: (TC.1-2) (H3/C1) Training records at Ames Laboratory are not auditable on a sitewide basis as required by DOE 5480.19.

CONCERN: (TC.4-1) (H2/C1) General Employee Training currently does not include all general hazards that could be encountered at Ames Laboratory as required by Department of Energy Orders.

CONCERN: (TC.7-1) (H3/C2) Training facilities, equipment, and materials at Ames Laboratory do not provide all necessary support for required training activities.

CONCERN: (TC.9-1) (H2/C1) There is no documentation to assure that training for radiation protection personnel meets the needs of the Ames Laboratory or the requirements of DOE 5480.11.

CONCERN: (TC.10-1) (H2/C1) Ames Laboratory has not developed a training program for managers, supervisors, and instructors to improve their management skills and instruction techniques and to improve their line safety capabilities as required by DOE 5480.19.

4.5.6 Auxiliary Systems

CONCERN: (AX.1-1) (H2/C1) Auxiliary systems at Ames Laboratory are not consistently addressed or clearly defined in safety analysis documentation as required by DOE 5481.1B.

CONCERN: (AX.1-2) (H2/C2) Updated drawings and other formal documentation for auxiliary systems at Ames Laboratory are not consistently generated or retained.

CONCERN: (AX.1-3) (H2/C1) The Chicago Field Office does not provide independent oversight and formal direction in the area of auxiliary systems at Ames Laboratory to assure compliance with DOE 5400.1.

CONCERN: (AX.1-4) (H2/C2) Formal trending programs are not in place for auxiliary systems at Ames Laboratory.

CONCERN: (AX.2-1) (H2/C1) Ames Laboratory does not have a formal program to measure and record data for effluent pathways in accordance DOE 5400.1 and ANSI N42.18-1974, American National Standard Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents.

CONCERN: (AX.5-1) (H2/C2) Ames Laboratory does not have a formal program to assure that ventilation systems are properly balanced and operated.

CONCERN: (AX.6-1) (H2/C1) Ames Laboratory does not have a formal program to establish training, operation, and surveillance requirements for maintaining emergency power equipment as required by NFPA 110, Standard for Emergency and Standby Power Systems.

CONCERN: (AX.8-1) (H2/C2) Ames Laboratory does not have a formal program to define minimum engineering safety features and monitoring devices required for the safe operation of auxiliary systems.

4.5.7 Emergency Preparedness

CONCERN: (EP.1-1) (H1/C1) CAT. II Ames Laboratory has not developed an effective Emergency Preparedness Program as required by DOE 5500.1B, DOE 5500.2B, DOE 5500.3A, and DOE 5500.10.

CONCERN: (EP.4-1) (H1/C1) The exercise and drill program at Ames Laboratory does not comply with the requirements of DOE 5500.3A and DOE 5500.10 with respect to preparations, training, and communications for drills and exercising.

CONCERN: (EP.4-2) (H1/C1) Ames Laboratory is not in compliance in the development, conduct, and training of emergency response teams to cope with the effects of a toxic chemical emergency operation as required by DOE 5500.3A, DOE 5500.2B, and DOE 5000.3A.

CONCERN: (EP.5-1) (H2/C1) The Emergency Operations Center and emergency response teams at Ames Laboratory do not have the resources to conduct their emergency response activities in accordance with requirements of DOE 5500.2B and DOE 5500.3A.

CONCERN: (EP.6-1) (H1/C1) Emergency Assessment and Notification Systems at Ames Laboratory are not documented in written procedures and are not in compliance with DOE 5500.2B and DOE 5500.3A.

CONCERN: (EP.7-1) (H1/C1) Personnel protection at Ames Laboratory has not been documented and is not in compliance with DOE 5500.3A and DOE 5480.10.

4.5.8 Technical Support

CONCERN: (TS.1-1) (H2/C2) Ames Laboratory has no formal mechanism to ensure that technical support organizations are aware of the safety impact of designs for and modifications to programmatic systems or equipment.

CONCERN: (TS.1-2) (H2/C2) At Ames Laboratory, all authorities and responsibilities of organizations that provide technical support, and their interactions with other organizations, are not documented.

CONCERN: (TS.1-3) (H2/C1) Contrary to DOE 5480.19 and DOE 5700.6C, engineering design activities at Ames Laboratory may be performed by supplemental personnel who are not qualified either by training or experience.

CONCERN: (TS.2-1) (H2/C1) Documented safety analyses have not been prepared for all Ames Laboratory facilities that fall within the scope of DOE 5481.1B.

CONCERN: (TS.2-2) (H2/C1) Safety analysis documentation for the Alpha Containment Facility at Ames Laboratory does not fully comply with the requirements and guidance of DOE 5481.1B.

CONCERN: (TS.2-3) (H2/C2) Operating and maintenance procedures at Ames Laboratory are not routinely reviewed by technical support and other organizations that could provide important information.

CONCERN: (TS.2-4) (H2/C1) Contrary to the requirements of DOE 5480.19, Ames Laboratory does not have a formal policy or procedure governing the use of procedures.

CONCERN: (TS.3-1) (H2/C1) Ames Laboratory has not systematically identified the codes and standards applicable to the design of its facilities and systems as required by DOE 5480.4 and DOE 6430.1A.

CONCERN: (TS.3-2) (H2/C2) Not all technical support organizations at Ames Laboratory have written procedures for their design and analysis activities.

CONCERN: (TS.3-3) (H2/C2) Ames Laboratory does not perform formal, technical, interdisciplinary reviews of designs and design changes.

CONCERN: (TS.3-4) (H3/C2) Ames Laboratory has not developed a program to assess the need for operational readiness reviews or to conduct one if it is needed.

CONCERN: (TS.4-1) (H2/C2) The equipment performance testing and monitoring program at Ames Laboratory does not address all safety-related equipment.

CONCERN: (TS.5-1) (H2/C1) Ames Laboratory does not measure the as-installed efficiencies of exhaust system high-efficiency particulate air filters to verify their effectiveness as required by DOE 6430.1A.

CONCERN: (TS.5-2) (H2/C2) Not all ventilation exhaust streams from Ames Laboratory facilities that contain radioactive and hazardous materials are monitored.

4.5.9 Packing and Transportation

CONCERN: (PT.1-1) (H2/C2) Ames Laboratory does not have detailed procedures for all packaging and transportation activities involving hazardous and radioactive materials.

CONCERN: (PT.1-2) (H2/C2) Ames Laboratory has not provided resources to ensure effective and continued expertise in the area of packaging and transportation of hazardous and radioactive materials.

CONCERN: (PT.2-1) (H2/C1) Ames Laboratory does not have a training program to ensure that personnel engaged in packaging and transportation activities are trained, qualified, and certified as required by DOE 5480.3 and the 49 CFR series of regulations.

CONCERN: (PT.3-1) (H2/C1) Ames Laboratory does not provide routine independent audits of its packaging and transportation activities as required by DOE 5480.3 and DOE 5482.1B.

CONCERN: (PT.4-1) (H2/C1) Ames Laboratory does not fully comply with State and Federal regulations applicable to its packaging and transportation activities.

CONCERN: (PT.9-1) (H2/C2) Ames Laboratory does not have overview by trained persons of judgments that materials shipped by site personnel are not hazardous.

CONCERN: (PT.12-1) (H2/C1) Radioactively contaminated equipment has been transported between Ames Laboratory facilities without using the transportation controls and packaging required by DOE 5480.3.

4.5.10 Site/Facility Safety Review

CONCERN: (FR.1-1) (H2/C1) The Safety Review Committee proposed for Ames Laboratory would not fulfill the independent safety review requirements of DOE 5482.1B.

CONCERN: (FR.2-1) (H2/C1) Contrary to DOE 5482.1B, an independent safety review system is not in place at Ames Laboratory.

CONCERN: (FR.6-1) (H2/C2) Ames Laboratory does not have a system whereby safety-related lessons learned from onsite and offsite sources are organized and circulated to all personnel.

4.5.11 Radiological Protection

CONCERN: (RP.1-1) (H2/C2) Activities involving radioactive materials at the Ames Laboratory do not receive independent overview by radiation protection professionals.

CONCERN: (RP.1-2) (H2/C1) Radioactive material and radiation-generating devices at Ames Laboratory are not assured of procedural control and professional oversight as required by DOE 5482.1B.

CONCERN: (RP.2-1) (H2/C1) Ames Laboratory has no program to conduct internal audits of radiation protection as required by DOE 5482.1B.

CONCERN: (RP.2-2) (H1/C1) CAT. II Prolonged operation in violation of DOE 5480.11 at Ames Laboratory is not reported, investigated, or ameliorated under the incident reporting system as required by DOE 5000.3A.

CONCERN: (RP.2-3) (H2/C1) The Chicago Field Office has not enforced Department of Energy's radiological protection requirements, including those set forth in DOE 5480.11, at Ames Laboratory.

CONCERN: (RP. 3-1) (H1/C2) CAT. II Many of the x-ray diffraction units at Ames Laboratory rely on administrative controls rather than physical barriers to prevent dangerous extremity exposures.

CONCERN: (RP.3-2) (H1/C1) CAT. II Posting of areas for radiation control and labeling of radioactive material at Ames Laboratory does not comply with the requirements of DOE 5480.11.

CONCERN: (RP.5-1) (H3/C1) The Chicago Field Office has not performed the onsite assessment required to validate the Ames Laboratory dosimetry program as required by DOE 5480.15.

CONCERN: (RP.6-1) (H1/C2) Ames Laboratory has not ensured that the radwaste compactor will not release contamination into the work area or outside the radwaste building.

CONCERN: (RP.7-1) (H2/C1) Contrary to DOE 5480.11, Ames Laboratory has neither established an in-vivo analysis program nor demonstrated that one is required.

CONCERN: (RP.8-1) (H1/C1) The calibration program for radiation-monitoring instruments at Ames Laboratory does not ensure the accuracy of radiological measurements as required by DOE 5480.11.

CONCERN: (RP.9-1) (H1/C1) Ames Laboratory does not have an effective air-sampling program to quantify personnel exposure to airborne radioactivity as required by DOE 5480.11.

CONCERN: (RP.10-1) (H1/C1) CAT. II Ames Laboratory has not established a program to ensure control of radioactive contamination as required by DOE 5480.11.

CONCERN: (RP.11-1) (H3/C1) Ames Laboratory has no documented as-low-as-reasonably-achievable program for radiation protection as required by DOE 5480.11.

4.5.12 Personnel Protection

CONCERN: (PP.1-1) (H1/C1) Management at Ames Laboratory does not ensure the consistent implementation and enforcement of documented internal safety and health rules in accordance with DOE 5480.10.

CONCERN: (PP.1-2) (H2/C2) Technical staff assigned to the Environment, Safety, and Health Group at Ames Laboratory do not have any form of direct stop-work authority.

CONCERN: (PP.1-3) (H2/C2) Ames Laboratory has not established a program for continuing education and professional development for personnel assigned to the Environment, Safety, and Health Group.

CONCERN: (PP.1-4) (H2/C1) Ames Laboratory has no program to perform internal audits of personnel protection functions as required by DOE 5482.1B.

CONCERN: (PP.1-5) (H2/C2) Ames Laboratory has no program to establish personnel protection goals and objectives.

CONCERN: (PP.2-1) (H1/C2) Management has not developed comprehensive and technically correct operating procedures that provide direction and guidance for the recognition, evaluation, and control of occupational safety and health hazards at Ames Laboratory.

CONCERN: (PP.2-2) (H2/C2) Ames Laboratory has no program to establish criteria and procedures for essential health protection activities.

CONCERN: (PP.3-1) (H1/C1) Evaluation and control of chemical, physical, and other environmental stresses at Ames Laboratory do not conform to the requirements of DOE 5483.1A, DOE 5480.10 and DOE 5480.4.

CONCERN: (PP.3-2) (H1/C1) The respiratory protection program at Ames Laboratory does not conform to ANSI Z88.2, Practices for Respiratory Protection, as required by DOE 5480.4.

CONCERN: (PP.3-3) (H1/C2) Local ventilation systems at Ames Laboratory are not effectively used to protect workers, are not quantitatively evaluated, and their limitations are not communicated to personnel.

CONCERN: (PP.3-4) (H1/C1) Asbestos practices at Ames Laboratory do not comply with the requirements of 29 CFR 1926.58, Asbestos, Tremolite, Anthophyllite, and Actinolite.

CONCERN: (PP.4-1) (H1/C1) CAT. II Ames Laboratory has not established a monitoring program that meets the requirements of DOE 5480.10.

CONCERN: (PP.5-1) (H1/C1) Incompatible chemicals are stored together in violation of the Ames Laboratory Safety Manual.

4.5.13 Worker Safety and Health Compliance

CONCERN: (WS.3-1) (H1/C1) Ames Laboratory does not comply with all requirements of 29 CFR 1910.1200, Hazard Communication.

CONCERN: (WS.3-2) (H1/C1) Control of and entry into confined spaces at Ames Laboratory do not comply with Section 5(a)(1), General Duty Clause, Occupational Safety and Health Act of 1970.

CONCERN: (WS.3-3) (H1/C1) Ames Laboratory does not meet the training requirements of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.

CONCERN: (WS.4-1) (H1/C1) Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart O, Machinery and Machine Guarding.

CONCERN: (WS.4-2) (H1/C1) Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart S, Electrical.

CONCERN: (WS.4-3) (H1/C1) Ames Laboratory does not comply with all requirements of 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout).

CONCERN: (WS.4-4) (H1/C1) CAT. II Storage of flammable liquids at Ames Laboratory does not comply with all requirements of 29 CFR 1910.106, Flammable and Combustible Liquids.

CONCERN: (WS.4-5) (H1/C1) At Ames Laboratory, spray-finishing operations involving the use of flammable liquids do not comply with all requirements of 29 CFR 1910.107, Spray Finishing Using Flammable and Combustible Materials.

CONCERN: (WS.4-6) (H1/C1) Ames Laboratory does not comply with all requirements of 29 CFR 1910, Subpart H, Hazardous Materials.

4.5.14 Fire Protection

CONCERN: (FP.1-1) (H1/C1) The Ames Laboratory Fire Protection Program does not have the necessary resources to implement the provisions of DOE 5480.7 and thereby to comply with the provisions of standards established by the National Fire Protection Association.

CONCERN: (FP.2-1) (H1/C1) Ames Laboratory does not have a documented program to ensure that NFPA 101, Life Safety Code, is strictly enforced as required by DOE 5480.7.

CONCERN: (FP.3-1) (H2/C1) Ames Laboratory has not developed a fire hazard analysis for all facilities owned by the Department of Energy as required by DOE 5480.7.

CONCERN: (FP.5-1) (H1/C1) The main buildings at Ames Laboratory are not fully protected with fire-suppression sprinklers, and as a result, fire damage may exceed the monetary limits established by DOE 5480.7.

CONCERN: (FP.7-1) (H2/C1) The Fire Protection Program at Ames Laboratory does not provide for effective fire safety surveys, audits, testing, and maintenance of fire protection equipment as required by DOE 5480.7 and DOE 5482.1B.

4.5.15 Medical Services

CONCERN: (MS.1-1) (H2/C1) At Ames Laboratory, staffing levels for professional personnel in the Medical Department do not comply with the requirements of draft DOE 5480.8A and its predecessor, DOE 5480.8.

CONCERN: (MS.1-2) (H2/C2) Ames Laboratory management has neither provided the Occupational Medicine Department with appropriate information nor allowed for sufficient interaction with other departments to facilitate the establishment and optimization of personnel and material resources as required by draft DOE 5480.8A.

CONCERN: (MS.2-1) (H3/C1) The Occupational Medicine Department at Ames Laboratory lacks the programmatic elements necessary to assure that medical services are being uniformly and efficiently delivered in accordance with draft DOE 5480.8A and its predecessor, DOE 5480.8.

CONCERN: (MS.3-1) (H2/C1) The Medical Department does not have the capability to track employees who work in jobs involving specific hazards or hazardous materials and, therefore, cannot ensure that employees are receiving the medical surveillances required by draft DOE 5480.8A and its predecessor, DOE 5480.8.

CONCERN: (MS.5-1) (H2/C2) Documented wellness and chemical dependency programs do not exist at Ames Laboratory as required by draft 5480.8A.

4.9 SUBTEAM COMPOSITION AND AREAS OF RESPONSIBILITY

Area of Responsibility	Name/Organization
EH Senior Manager	Oliver D. T. Lynch, Jr. Office of Performance Assessment Department of Energy
Subteam Leader	Douglass S. Abramson Office of Performance Assessment Department of Energy
Organization and Administration, Training and Certification, and Security/Safety Interface	Lorin C Brinkerhoff Private Consultant
Quality Verification	J. Lawrence McCabe Office of Performance Assessment Department of Energy
Operations, Experimental Activities, and Site/Facility Safety Review	Leon H. Meyer The LHM Corporation
Maintenance and Auxiliary Systems	Michael D. Kinney WASTREN, Inc.
Technical Support and Packaging and Transportation	J. Kenneth Anderson Private Consultant
Worker Safety and Health (OSHA) Compliance and Personnel Protection	Jack J. Janda Comprehensive Environmental Health Services, Inc. David M. Drury Private Consultant
Fire Protection and Emergency Preparedness	George P. Bailey Advanced Systems Technology, Inc.
Radiological Protection and Personnel Protection	Linda F. Munson Evergreen Innovations, Inc.
Medical Services	Laurent P. LaRoche, M.D. Private Consultant

Report Support, Observers, and Liaison

Coordinator	Lydia G. Guerra M.H. Chew and Associates
Technical Editor	Darla Treat Courtney Program Management, Inc.
OSHA 1B Specialist	Tobias E. Drury Private Consultant

5.0

MANAGEMENT ASSESSMENT

5.0 MANAGEMENT ASSESSMENT

5.1 PURPOSE

The Management Subteam conducted a management and organization assessment of environment, safety, and health (ES&H) activities performed by Department of Energy (DOE) and Iowa State University (ISU) personnel at the Ames Laboratory (Ames). The objectives of the assessment were: (1) to evaluate the effectiveness of management systems and practices in terms of ensuring environmental compliance and the safety and health of workers and the general public; and (2) to identify root causes for any persistent or repetitive ES&H findings and concerns.

5.2 SCOPE

The scope of the assessment, from an ES&H perspective, included the following: (1) management commitment and leadership; (2) organizational structure and management configuration for clear lines of oversight and accountability; (3) planning and budgeting; (4) human resource management, including training and staffing; (5) management systems, including performance monitoring and assessment, and self-assessment; (6) conduct of operations; and (7) public and institutional interactions.

Interviews were held with managers, supervisors, and staff personnel representing a wide variety of program interests. Interviewees included personnel from DOE Headquarters Office of Energy Research (ER), DOE Chicago Field Office (CH), ISU, and Ames.

The Subteam examined a number of key management areas including DOE policies and directive systems, self-assessment systems, internal and external communications, and individual performance appraisal systems. Documents reviewed included DOE Orders; Secretary of Energy Notices (SENs); Ames Management Directives; program budget and planning guidance; the DOE contract with Iowa State University; policies; administrative procedures; implementation plans; program/project management plans; management agreements; standard operating procedures; ER, CH, and Ames self-assessment activities; audit and appraisal reports; incident reports; job descriptions; and mission and function statements.

5.3 APPROACH

The Management Subteam conducted its assessment in accordance with the Tiger Team Guidance Manual, dated February 1990. The Management Subteam also relied upon the draft document, Environment, Safety, and Health Management Performance Objectives and Criteria for Tiger Team Assessments, dated August 15, 1991. These performance objectives and criteria were one element used to evaluate findings gathered in the course of the review.

The Management Subteam interacted extensively with the Environmental Subteam and the Safety and Health Subteam to ensure the causal factors identified by all three subteams were considered in the identification and evaluation of root causes.

The Management Subteam assessment was conducted between February 10, 1992, and March 5, 1992. A list of those individuals contacted by the Management

Subteam is provided in Appendix D-2, and a list of the documents reviewed by the subteam is outlined in Appendix E-2. A list of the subteam members is provided in Section 5.7; biographical sketches of the subteam members are provided in Appendix A-4.

The subteam initially developed an understanding of the roles, responsibilities, and authorities of DOE and Ames through a subteam organizational meeting conducted on February 4, 1992. This meeting included discussions on the ER, CH, and Ames organizations and missions as well as the ER, CH, and Ames self-assessment activities. Once the Subteam arrived onsite on February 10, 1992, additional briefings were conducted concerning the status of ES&H activities at CH and at Ames, and appropriate points of contact were identified with whom subteam members could meet to more specifically discuss performance objectives. The subteam then conducted interviews and developed an understanding of perceptions of DOE Headquarters, CH, and Ames personnel concerning ES&H activities at Ames, ES&H policies and goals, and the adequacy of supporting documentation. These interviews were supplemented by a detailed review of supporting documentation describing such topics as the organization, roles, responsibilities, policies, plans, budgets, procedures, and performance criteria for the organizational elements performing ES&H functions and operational programs at Ames.

To further support the Subteam's assessment while onsite, daily debriefings and consultations were held with the Environmental Subteam and the Safety and Health Subteam. The objective of these interactions was to examine potential management and organizational issues that might be common to the findings of all subteams. The Management Subteam identified individuals to serve as points of contact with the Environmental Subteam and the Safety and Health Subteam. These points of contact attended the daily debriefings of each of the other subteams. Preliminary data and conclusions were developed, checked, and validated through document review, through reviews of preliminary observations and draft findings (i.e., Factual Accuracy Review), and through discussions with DOE and Ames managers and supervisors.

5.4 MANAGEMENT ASSESSMENT SUMMARY

Ames is a DOE owned research laboratory operated by ISU for DOE. It is a single-program laboratory dedicated to basic and applied research in physical, mathematical, and engineering sciences. The research facility is located on the ISU campus and also provides scientific and professional training to pre- and post-graduate students. From 1947 until the present, two of every three ISU graduates in the physical sciences have been Ames' graduate students. Many of Ames' principal investigators (approximately 75 percent) hold collateral appointments as faculty members in departments that correspond with their scientific disciplines. Ames personnel typically publish numerous scientific journal articles, technical reports and have received national recognition for their scientific achievements. Ames employs approximately 630 personnel, which includes ISU graduate students and has a current budget slightly over $25 million. Primary funding and program guidance are provided by the office of Basic Energy Sciences, ER, through CH.

The Ames management style reflects the collegial atmosphere and informality common to many university environments. In contrast, the achievement of excellence in ES&H requires a higher degree of formality, including written procedures, record keeping, and clearly documented and assigned roles,

responsibilities, and authorities not usually associated with a pedagogical culture.

Recently, Ames management has initiated the first steps to develop a greater level of formality in implementing the ES&H initiatives defined by the Secretary of Energy. Ames has conducted a baseline self-assessment and has started to initiate some preliminary ES&H management processes. Due to the recent start, many of these efforts are incomplete, not well communicated, not well understood, and not formally accepted at all levels within the Ames organization. Other programs, such as the Safety Coordinator Program, have been in existence for some time, but have not attained uniform definition and application.

The Ames Director has a vision for meeting the Secretary of Energy's mandate to implement DOE's ES&H requirements while concurrently maintaining Ames' excellence in research, but has not formally articulated this through strategic and subordinate implementation planning that integrates ES&H and programmatic goals and objectives. The most recent sitewide strategic planning type document, the FY 1992 - 1997 Ames Institutional Plan, has not placed strategic importance on ES&H or provided the basis for a planning process that integrates ES&H and programmatic objectives into the Ames mission. The Institutional Plan has not been further applied to subordinate ES&H implementation planning for systematic identification and forecasting to identify the necessary resources, budgets, and schedules for achieving ES&H objectives.

Fundamental Ames ES&H management systems, such as training, resource allocation, quality assurance, and corrective action management either do not exist or are in such early stages of development and implementation that they cannot provide Ames management with timely, accurate, objective, and reliable information it needs to determine the status of ES&H compliance. Therefore, it is difficult to make well balanced decisions and to act decisively to correct identified deficiencies and prevent their recurrence.

Effective human resource management programs need to be developed to ensure that sufficiently motivated, trained, and qualified staff are available to perform Ames' ES&H responsibilities. Ames does not have a systematic planning process to identify and prioritize long term ES&H human resource needs. Moreover, Ames currently cannot provide effective ES&H or conduct of operations training.

Comprehensive, formal line management oversight and independent oversight of Ames' ES&H activities is not being conducted. Ames line management does not conduct routine formal walk through inspections, or surveillances. Independent functional facility or management appraisals have not been conducted recently, and none are scheduled. No formal system exists to translate DOE Orders and other directive materials into site-specific operating procedures.

The Ames Public Information Program has developed a good neighbor reputation based on frequent contact with local information and press groups, development of a speakers bureau, and involvement with local community government. Ames maintains an appropriately scaled media relations program that provides responsive information to the local and national media based on the type of research programs being conducted at Ames. There are some indications that

public affairs should be more closely involved during the early stages of program or project developments to identify potential public reaction or concerns.

Relations with ES&H Federal, State of Iowa, and local regulatory bodies are generally supportive of Ames facilities. Some of these organizations have expressed some concerns regarding responsiveness to their requirements. However, relationships are open and responsive, and regulatory bodies are gaining a greater appreciation for Ames' role and responsibilities for ES&H management.

Employees of Ames feel a sense of pride with the accomplishments of the Laboratory, even though ES&H ownership has not permeated the organization or extended to ISU. There is also an indication that employees are beginning to recognize the importance of ES&H to themselves and to the well being of Ames. However, improved communications and strengthened mid-level management will be necessary to insure ES&H programs contain to gain further prominence. This is especially important in the training area and education of graduate students who participate in a large portion of Ames work. There is evidence that Ames management has recognized the need to improve employee awareness and to alleviate the fear that ES&H jeopardizes jobs.

Primary funding and program guidance are provided by ER through CH. Recent attention to ES&H issues within ER is reflected by the designation of ES&H professionals within the Basic Energy Sciences Program Office, the development of a Self-Assessment Plan, revisions to the institutional planning process that raise the prominence of ES&H concerns, and the creation of the Office of Assessment and Support. Notwithstanding these actions, the Management Subteam has identified deficiencies in ER's performance of its ES&H oversight responsibilities.

ER has not consistently provided the guidance or oversight necessary to ensure ES&H activities at Ames are conducted in accordance with DOE ES&H requirements. Specific ES&H guidance and direction has not been provided to Ames through the planning and budgeting process. Also, an institutionalized Self-Assessment program and a Corrective Action Management System are not fully in place at ER, although elements are in process.

The Management Subteam identified the efforts of Dr. Tom Barton, Director of Ames Laboratory, to develop and add to the ISU curriculum a graduate level course entitled "Environment, Safety and Health in the Chemical Laboratory" as a noteworthy practice. The course will be a requirement for all incoming graduate students in Chemistry and will be open to undergraduate students as a prerequisite to research. The goal of the course is to provide ES&H information and to instill the proper attitude toward ES&H in students at the beginning of their research training.

The following root causes were identified for the deficiencies noted in the Tiger Team report:

- Laboratory management and staff are not sufficiently knowledgeable of ES&H requirements to develop and implement a comprehensive and integrated ES&H program.

- Oversight of ES&H activities at Ames has not been effective in ensuring that the DOE ES&H requirements have been properly interpreted, uniformly applied, and accurately communicated to Ames.

- The management principles and practices at Ames have not been effective in achieving the objectives embodied in the DOE ES&H initiatives.

The positive actions taken to date do not as yet constitute a comprehensive, integrated ES&H program as required by the Secretary of Energy. ER, CH, and Ames must augment and intensify their initial efforts to attain DOE's ES&H goals and objectives. In addition, due to the complexity of the remedial actions to be taken by Ames, it will be some time before Ames achieves full compliance with DOE ES&H requirements. Provided the Ames Director follows through with his vision and plans as expressed to Ames employees and to the Management Subteam, and CH provides the direction and resources for change, Ames can successfully achieve the Secretary of Energy's ES&H management goals.

5.5 MANAGEMENT FINDINGS

MF-1 ER Oversight

Finding

The Department of Energy Office of Energy Research program line management does not, as yet, provide the guidance or oversight necessary to ensure that environmental, safety, and health activities at Ames are conducted in accordance with Department of Energy environmental, safety, and health requirements.

Discussion

The Secretary of Energy has made it clear that preserving our environment, and protecting employee and public health and safety, are primary DOE responsibilities. He has stated in that connection that " . . . senior DOE field and headquarters officials will be expected to ensure that their contractors comply with operational, environmental, safety, and health . . . standards established by law, regulation or Departmental policy, while at the same time ensuring that they meet their production or research mission."

The major activities at Ames are sponsored by the Office of Basic Energy Sciences (BES) in the Office of Energy Research (ER). BES has taken recent steps to improve their ability to provide effective line management oversight of Ames' ES&H activities. A Self-Assessment Plan has been prepared, elements of an institutionalized self-assessment process are in operation, a workshop on Conduct of Operations was conducted, and four ES&H professionals (two Occupational Safety and Health Specialists, one Environmental Specialist, and one Radiation Effects Specialist, all of whom have duties which include Ames) have been added to the staff to do site inspections, training, and monitoring of the status of corrective actions at BES sites.

ER relies on BES for line management oversight of Ames, and on the ER Office of Assessment and Support (OAS) to carry out its responsibilities for independent oversight of Ames. OAS is chartered to provide ES&H guidance and

support services to line program managers, and to conduct assessments of ES&H performance status. While that office has conducted a number of workshops and seminars (e.g., covering self-assessment) and has published a Self-Assessment Program Plan, it has not as yet conducted any self-assessments, and its corrective action management system (i.e., tracking, trending, root cause analysis, closure verification) is not operational. Although OAS performed an assessment in 1991 of the occurrence reporting process at CH and at selected CH contractor sites including Ames, it has not performed any management appraisals of CH or Ames.

BES provides CH and Ames with only general guidance or direction as to how it expects those organizations to achieve both ES&H and programmatic excellence at the same time and within constrained staffing and monetary resources. BES includes the following statement in Contract Work Authorization approvals:

> "In the conduct of research with the funds provided, ESH/QA are to be given high priority and no funds are to be used in a manner contrary to the Departments's ESH/QA policies."

While such a statement expresses support for ES&H and requires priority setting first by Ames and then by CH, it cannot be viewed as specific guidance or direction to CH or to Ames on BES's ES&H versus programmatic priorities, and provides little basis for effective ES&H planning. BES does not utilize the Work Authorization System to provide specific guidance, and it does not utilize other portions of the budget process (i.e., an ES&H "cross-cut" in the BES budget; see MF-7). Some guidance is provided at program and institutional reviews, during site visits, and through telephonic conferences. However, such guidance is generally reactive and issue or event driven.

Recent revisions, and others that are planned, to the ER Institutional Planning process to place greater emphasis on ES&H performance should, when implemented, produce Annual Institutional Onsite Reviews and Annual Institutional Summary Appraisals which offer more specific ES&H guidance and motivation to the contractor, and provide useful information to DOE line managers for decisionmaking.

MF-2 Contractual Matters

Finding

The prime contract between the Department of Energy and Iowa State University for Science and Technology does not fully embody terms and conditions which reflect Department of Energy priorities for environmental, safety, and health performance. Furthermore, subcontractual documents, and agreements for rental of space do not adequately address environmental, safety, and health responsibilities.

Discussion

Prime Contract No. W-7405-ENG-82 between DOE and the Iowa State University for Science and Technology (ISU) for the management and operation of Ames was rewritten effective January 1, 1989. It contains several clauses relating to ES&H, and a requirement in the General Responsibilities of the Parties clause for the contractor to " . . . implement all relevant safety and environmental standards established by DOE." Although the contract has been modified

frequently since 1989 (to revise funding and to add a number of new or revised clauses such as Technology Transfer and Drug Free Workplace), the contract has not been modified to include all appropriate ES&H-related clauses. For example, Federal Acquisition Regulation, FAR 52.223-3, Hazardous Material Identification and Material Safety Data, is to be included, according to FAR 23.303, when the contract " . . . will involve exposure to hazardous materials in any manner, e.g., performance of work, use, handling . . . packaging, transportation, storage, inspection, disposal." It is recognized that FAR 52.223-7, Notice of Radioactive Materials, is a recent addition to the FAR; however, the Ames contract has been modified since its issuance. While neither clause is mandatory under Department of Energy Aquisition Regulations (DEAR) provisions, their inclusion in the Ames contract would evidence a more proactive posture toward ES&H concerns. The contract has not been modified to reflect DOE's current emphasis on ES&H objectives relative to programmatic objectives. The Statement of Work clause and the contract taken in its entirety continue to read, as it has since contract inception many years ago, as if programmatic matters are to be emphasized over all other matters.

In the absence of DOE Headquarters action to promulgate a contract clause covering general environmental compliance, CH has taken the proactive step of drafting its own clause, Environmental Protection, and has included it in the Princeton Plasma Physics Laboratory contract (effective October 1, 1991), the Argonne National Laboratory contract (effective September 1, 1988), and the Fermilab contract (effective January 1, 1992). CH chose not to include the clause in the Ames contract, either at the time of the January 1989 rewrite or in subsequent modifications.

Under DEAR 970.7104-21, Ames is required to include in appropriate subcontracts the Safety and Health clause contained in the prime contract. An examination of the standard terms and conditions in use by Ames for fixed-price and cost reimbursement subcontracts indicated that the clause is not being flowed down to these subcontracts (it is only included in fixed-price architect-engineer subcontracts). While there may be no requirement that the Safety and Health clause be included in offsite subcontracts, these standard terms and conditions make no distinction between their use in offsite or onsite subcontracts and apparently may be used for either. It may be noted that a Contractor Purchasing System Review, conducted by CH in August 1991, failed to address this concern. Generally, subcontract terms and conditions do not reflect sufficient concern with ES&H matters.

Long-standing agreements between DOE and ISU for the rental of ISU space for contract activities do not address ES&H concerns and responsibilities, and there are no memoranda of understanding between DOE and ISU covering this subject. As a result, it is unclear as to what ES&H standards (i.e., DOE, other Federal, State of Iowa, local) are applicable to each of the various rented spaces, how compliance will be determined and maintained, how to allocate responsibility between the parties for the use of only a portion of a space, and who is to bear the cost of compliance.

At the end of January, 1992, CH formally requested ISU to advise as to ES&H standards applicable to rented spaces and the status of ISU's compliance with these standards. It also asked for an action plan if compliance has not been achieved. The same request evidenced an intent to address this issue with vigor, even to the point of considering termination of activities in spaces with unacceptable deficiencies.

Self-Assessment

This finding was partially identified in the CH Self-Assessment Report. Only the issue relating to the use of rental space was identified. This finding was fully identified in the Ames Self-Assessment Report. (The portion of the finding relating to the special CH Environmental Protection clause was not applicable to Ames.)

MF-3 CH ES&H Roles, Responsibilities, and Authorities

Finding

The Department of Energy Chicago Field Office has not formally defined its internal organizational roles regarding Ames.

Discussion

The Assistant Manager for Laboratory Management (AMLM) provides line management ES&H oversight of Ames. CH recognized a lack of available resources to provide ES&H line management oversight of Ames and is considering a plan to address this situation. As presently envisioned, AMLM would obtain resources to perform ES&H line management oversight in the following priority sequence:

- Utilize ES&H resources under the Assistant Manager for Laboratory Management (AMLM) (which is the organization within which the Laboratory Management Officer/Contracting Officer (LMO/CO) resides);
- Utilize ES&H resources from the AMLM Area Offices, principally the Brookhaven and Argonne Area Offices; and
- Utilize ES&H resources from other CH Assistant Manager organizations, including the independent ES&H staff within the Environment, Safety and Health Division (ESHD).

This approach seems to reflect a logical way to effectively utilize and optimize a limited set of ES&H resources. This approach has neither been formally incorporated into the CH organization structure or the mission or function statements, nor have Memoranda of Understanding between the involved organizations been executed, such that the process to obtain support for AMLM is clearly set forth and potential conflicts of interest are mitigated to the maximum extent possible (see MF-4).

Self-Assessment

This finding was fully identified in the CH Self-Assessment Report.

MF-4 CH Oversight

Finding

The Department of Energy Chicago Field Office does not provide the scope or frequency of environmental, safety, and health oversight necessary to ensure that an effective environmental, safety, and health program exists at Ames.

Discussion

Although Ames is by far the smallest of the CH Management and Operating contractor facilities in terms of size and funding, it is no less important that effective oversight of ES&H activities be maintained at Ames. CH management's historic approach has been fragmented, and relied more on informal working relationships than it did on organizational structure. Two years ago, CH recognized this and instituted a management change which placed Ames directly within the line management structure of the Assistant Manager for Laboratory Management (AMLM). The reorganization stopped short of assigning Ames to an existing CH Area Office, or of establishing a separate Area Office for Ames. It focused overall line management responsibility, including ES&H oversight, in the Ames Laboratory Management Officer/Contracting Officer (LMO/CO).

In carrying out that responsibility, the LMO/CO, who has no staff, must draw upon staff in other CH organizations as well as staff in AMLM for ES&H support and independent oversight. ES&H support may be obtained from the CH Area Offices, all of which are a part of AMLM, or from the CH Environment, Safety and Health Division (ESHD). Independent oversight is provided by ESHD, which performs multidisciplined appraisals of Ames' ES&H functional activities.

That, in basic terms, is the system: it is not complete, and it has not been working effectively.

- There are no memoranda of understanding with the relevant CH matrix to delineate the process by which the AMLM obtains needed support and oversight effort (see MF-3).

- While ESHD has been performing most of the Ames functional appraisals required by DOE Orders (generally on an every other year basis) and the appraisal reports have been furnished to the line organization, there is no evidence that this information has been used to form the basis for ongoing assessment or decisionmaking regarding the status of ES&H at Ames. If the information had been so used, it is likely that ES&H concerns at Ames (such as the Laboratory's failure to conduct functional appraisals for the past 2 years, and the absence of a QA program) would have been addressed at an earlier date.

- CH provides minimal quality assurance (QA) guidance to Ames; only one QA audit has been performed at Ames in the past several years (see QV.1-4).

- There has been a minimum of ES&H support focused on Ames and provided to the AMLM. Whether this is the result of a failure to request it, or inability to obtain it due to competing priorities, is unclear. It is clear that until recently there has been minimal CH line management inspections or surveillances at Ames, and "CH presence" meant the periodic ESHD appraisals.

- Transmittal by CH to Ames of ES&H directives is not generally timely, and site-specific guidance is not always provided. CH Directive 1321.1B, Chicago Operations Office Directives System, has no mechanism for assuring timely response by the contractor

regarding impact and implementation. As a result, common interpretations and understandings of such impacts and implementation by Ames are not assured.

- The use of ES&H professionals from ESHD to provide support to the AMLM has the potential for compromising the independence of the ESHD appraisals of Ames. However, according to CH, efforts are made to assure that individuals involved in performing such support activities are not involved in the independent appraisals of those activities.

A plan under active consideration by CH would place additional ES&H staff at CH under the AMLM, and that staff, together with ES&H staff from the CH Area Offices, would be available to provide support to the LMO/CO. This would have the advantage of increasing the CH line management presence at Ames and at the same time relieving ESHD of the task of providing support, allowing it to confine its activities to independent oversight. This plan has not as yet been documented.

Self-Assessment

This finding was fully identified in the CH Self-Assessment Report.

MF-5 CH Work For Others

Finding

The Department of Energy Chicago Field Office process for review of Ames non-Department of Energy funded work proposals prior to their submittal to the sponsor does not assure that environmental, safety, and health concerns are addressed.

Discussion

Review of ES&H concerns is necessary at the earliest practicable stage of any work contemplated, whether that work is DOE funded or otherwise.

DOE 4300.2A defines the responsibilities of Heads of Field Elements with respect to non-DOE funded work, commonly referred to as Work For Others (WFO). At CH, these responsibilities, with respect to Ames proposals, reside with the Assistant Manager for Laboratory Management (AMLM), and in particular, the Ames Laboratory Management Officer/Contracting Officer (LMO/CO). Change 2 to DOE 4300.2A (including a new Attachment 3) makes explicit these responsibilities with regard to ES&H and requires that CH assure compliance with the "Minimum Standards" detailed in Attachment 3.

Attachment 3 requires that CH make a " . . . determination that the National Environmental Policy Act and other environmental, safety, and health requirements have been adequately considered in proposed project planning . . . " before it approves a proposal for non-DOE funded work.

Unlike the situation at the CH Area Offices, where WFO proposals generally receive ES&H review prior to submittal to the funding parties, WFO proposals submitted by Ames do not receive a review by CH ES&H professionals unless the LMO/CO, who receives the proposals from Ames, determines that such a review is

necessary or desirable. This is not in conformance with requirements of Attachment 3 to DOE 4300.2A.

Although the volume and frequency of WFO proposals from Ames has not been large, it is clear that the absence of ES&H review at Ames (see MF-19), and the failure of CH to require its own review, have potentially exposed DOE to unreviewed ES&H risks. Furthermore, in the absence of such review, DOE is placed in the possible position of learning for the first time, after the proposal has been approved and funded, that ES&H concerns (e.g., permit requirements, fire safety) greatly increase the cost of the work or substantially affect the commencement or duration of the work. In such an event, DOE would face an awkward renegotiation with the funding party.

The general subject of WFO has been discussed at CH in recent months and a working group was established to draft a CH Order.

Self-Assessment

This finding was not identified in the CH Self-Assessment Report.

MF-6 Corporate Support - Iowa State University

Finding

Iowa State University does not actively participate in the management and oversight of Ames, including environmental, safety, and health issues, to assure compliance under its contract with the Department of Energy.

Discussion

The contract for management and operation of the Ames is between DOE and ISU. Under the provisions of the contract, ISU has named the Director of Ames to administer its contract responsibilities. Although Ames applies the provisions of ISU's personnel policies and practices, Ames has traditionally operated much the same as a tenant on the ISU campus with a high degree of independence and autonomy. Historically, ISU has contributed little, if any, involvement in the overall management of Ames to assure that the scope of work is being managed effectively and efficiently. Moreover, until recently, ISU has not exercised any oversight responsibilities to ensure compliance with other provisions of the contract including the application of DOE Orders; Directives; and applicable laws and regulations associated with environment, safety, and health (see OA.4-1). It appears that ISU has only recently become aware of some of the ES&H problems and concerns which have existed at Ames for an extended period of time. ISU has not demonstrated any strong sense of ownership for the operation of Ames or an acceptance of responsibility for many of the longstanding ES&H problems and concerns.

Although plans have been finalized to reorganize the reporting relationships of the Director of Ames within the ISU system, they have not been formally announced. In the future, the Director of Ames will report directly to the Director of the Institute for Physical Research and Technology as opposed to an administrative reporting relationship to the ISU President as contemplated in the existing contract. Although these plans have been approved in principle, they do not, as yet, delineate the nature of the proposed reporting

relationship including prominence, specific roles, responsibilities, and authorities.

ISU recently appointed an interim committee to oversee Ames' preparations for the Tiger Team Reviews. Although the Provost has expressed an intent to continue this committee after the review has been completed to oversee ES&H activities of Ames (as well as matters beyond those associated with environment, safety, and health), this proposal has not yet been institutionalized. These expressions of intent lack specificity with respect to the final composition of the permanent Oversight Committee as well as its roles, responsibilities, and authorities. However, it appears that the Oversight Committee will serve in an advisory capacity to the Office of the Provost.

It should be noted that the interim committee has provided guidance to Ames including a Chemical Hygiene Plan, as well as other guidance on fume hoods and hazardous wastes. ISU has assumed responsibility for all fume hood certifications in space leased by Ames from ISU.

Several senior members of Ames also hold collateral appointments as ISU faculty with non-Ames responsibilities for teaching assignments and ISU research programs. Many of these individuals as well as other Ames employees appear to attach great importance and value to their continued association with ISU. Therefore, a published ISU policy which supports the Director of Ames strong commitment to comply with all applicable ES&H requirements could serve as a powerful motivator or incentive to alter the longstanding culture of Ames which traditionally had attached more importance to the accomplishment of scientific objectives than compliance with ES&H requirements (see MF-7).

There are additional concerns about the respective responsibilities and authorities of ISU and Ames with respect to the application of ES&H policies to ISU-owned laboratories and facilities which are jointly occupied or utilized by Ames and non-Ames personnel and programs. However, those issues will be addressed separately in other areas of the report (see MF-15 and MF-16).

Self-Assessment

This finding was fully identified in the CH and Ames Self-Assessment Reports.

MF-7 Ames Planning Process

Finding

Ames does not have a comprehensive strategic planning process which addresses all environmental, safety, and health and programmatic activities on an integrated and prioritized basis.

Discussion

The Secretary of Energy Notice (SEN)-11-89, "Setting the New DOE Course," directed the establishment of " . . . a coordinated planning, programming, and budget capability that can integrate horizontally across the entire range of DOE programs." SEN-25-90, "Strategic Planning Initiative," provided implementing policy for SEN-11-89.

Ames does not have a comprehensive strategic planning process which fully integrates ES&H activities with programmatic or mission requirements (see findings WM/CF-9 and NEPA/CF-3). Ames management has not provided formal policy guidance or requirements for the development of such a system to ensure that ES&H requirements are fully considered and identified in all strategic plans. Consequently, requirements have not been fully identified and those that have been included have not been accorded equal consideration with operational programs. The Ames Laboratory Institutional Plan, FY 1992 - FY 1997, dated January 1992, and related documents do not identify overall ES&H goals or objectives. The mission statement in this plan does not include ES&H as an integral part of the research and development program planning process. While the Institutional Plan recognizes that Ames must come into compliance with DOE ES&H requirements, and the plan recognizes the need for additional ES&H staff, it does not integrate ES&H needs with program requirements. The ES&H initiatives do not address all activities, ES&H and program, on an integrated and prioritized basis. Ames Work Authorization Statement (WAS) documents have not included explicit identification of ES&H activities or risk trade-offs necessary to simultaneously achieve programmatic and ES&H objectives.

Ames annual planning is performed in a fragmented, compartmentalized manner and does not incorporate ES&H requirements from a sitewide perspective. While it is understood that Ames is including ES&H requirements in the 1994 budget, the extent of this effort is unclear.

Historically, Ames has not included ES&H requirements in its WAS or other budget documents. In budget preparations for fiscal years (FY) prior to 1993, as well as in FY 1993, ES&H activities were not formally considered and integrated with descriptions of program activities during development of the technical scope of work documentation. It is understood that integration of ES&H requirements have been discussed and considered at budget planning meetings during the budget review process. The extent of these considerations cannot be evaluated since they have not been specifically identified and documented.

There has been no apparent reorientation of budget preparation to require scientists originating the WAS documents to emphasize ES&H needs along with the technical scoping of budget proposals. It is apparent that this reorientation has not formally occurred at any level in the budget approval chain.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-8 Ames ES&H Roles, Responsibilities, and Authorities

Finding

Ames has not clearly defined, formally documented, or communicated the environmental, health, and safety roles, responsibilities, and authorities as they relate to independent review organizations, line organizations, and interfaces between organizations.

Discussion

DOE requires that environmental, safety, and health related responsibilities and authorities be clearly defined, communicated, and understood. Moreover, the organizational structure should assure that oversight organizations are independent from support or line organizations. The current organizational alignment at Ames does not totally provide that level of independence. In other cases, some of the line or staff organizations do not appear to have incorporated their ES&H roles into their operations, which may have resulted from a lack of understanding of their ES&H responsibilities. In addition, important interfaces between organizations have not been well defined. Formal documentation is lacking in all of these cases, more specifically the Environment, Safety and Health Group (ES&HG); the Ames Laboratory Quality Assurance (QA) Committee; the Ames Laboratory Safety Review Committee (SRC); the Ames' system of Safety Coordinators and Safety Representatives which are used by line organizations to improve ES&H; the interface between the line organizations; and interface between the line organizations and staff which has not been well defined or documented (see OA.1-1).

Environment, Safety and Health Group

The Associate Director for Operations (ADO) has responsibility for Engineering Services, Facilities Services, Scientific Computer Services, Occupational Medicine, and the ES&HG.

The roles, responsibilities, and authorities of the Ames ES&HG represent a mixture of independent oversight functions and line functions creating a potential conflict of interest leading to lack of independence in some instances. The ES&HG is responsible for performing safety reviews and performing appraisals of all Ames activities. However, the ES&HG also serves as a support group to line management which creates a potential conflict of interest. Some staff members consider Safety Coordinators and Safety Representatives as an extension of the ES&H staff while their actual duties involve assisting line management in executing their ES&H responsibilities. In addition, since the ADO has responsibilities for activities that the ES&HG reviews for compliance, the ES&HG's reviews of the ADO's activities do not meet the requirements of DOE Orders (see OA.2-1).

Ames Laboratory Quality Assurance Program

Ames has elements of a Quality Assurance program in some organizations, and they do recognize the need for a more effective QA program. Presently, the formal QA organization consists of the Ames Laboratory Quality Assurance Committee comprised of individuals from several organizations and 23 representatives (one from each line organization). The QA Committee is responsible to, and chaired by, the Associate Director for Administrative Services which could present a conflict of interest depending on the contents of the functional statement/charter when it is issued. For example, if this committee is subsequently assigned any responsibility for independent oversight it may present a conflict of interest. The QA Committee members have limited experience, but all of them have been through a short training course.

Ames Laboratory Safety Review Committee

The responsibilities of the newly formed SRC have not been fully established, and management is examining the structure before a final charter is written. There are some specific areas that do not meet all of the requirements of DOE 5482.1B. The reporting level in management is consistent with DOE requirements. As presently conceived, however, the Committee will be chaired by a manager in the line which could present a potential conflict of interest. Management is reexamining the following areas prior to issuing a charter: who should chair the committee, quorum, committee member independence, expertise, and voting authority (see FR.1-1 and FR.2-1).

Line Managers' ES&H Responsibilities

While responsibility and authority for ES&H are clearly assigned to the line organizations at Ames, it is not clear that all line managers fully understand their ES&H responsibilities (see OA.5-1). It appears that there is a wide variation in how line managers utilize Safety Coordinators and Safety Representatives to implement their line management ES&H responsibility. It also appears that some of the responsibilities that line managers assign to Safety Coordinators and Safety Representatives are all-inclusive to the extent that line managers are relying on Safety Coordinators and Safety Representatives to perform responsibilities that should not be delegated. The potential implications are that line managers either are not assuming ES&H responsibilities themselves or they do not fully understand the incorporation of ES&H responsibilities in day-to-day activities. The assignment of responsibilities to the Safety Coordinators and Safety Representatives is so comprehensive, in some instances, that it appears line managers may be essentially abdicating their ES&H responsibilities.

In addition, there is no clearly defined guidance for interface between program lines, and between staff and program lines. This results in little ES&H information flowing horizontally and leads to unclear roles and responsibilities of both line and staff elements.

Self-Assessment

This finding was partially identified in the Ames Self-Assessment Report. For example, the implication that line managers may be relying too heavily on Safety Coordinators and Safety Representatives was not identified.

MF-9 Ames Stop-Work and Restart Authority

Finding

Roles, responsibilities, and authorities for stop-work and restart have not been assigned to all key organizations, and there is not a uniform understanding of stop-work and restart.

Discussion

The Ames Laboratory Safety Manual established the responsibilities and authorities for stop-work/restart. The objectives of Ames in using the Ames Laboratory Safety Manual as a vehicle to assign roles, responsibilities, and authorities for stop-work and restart was to make sure all Ames personnel

would clearly understand who is authorized to take action. It should be noted, however, that only the Environment, Safety and Health Group (ES&HG) Leader from the ES&H Group has been delegated authority to stop-work. None of the other safety experts in the ES&H Group have been given this authority. In addition, if ES&H is not involved in stop-work, there is no requirement that it be involved in the review of restart plans. Therefore, the ES&H Group is not effectively used in either stop-work or review of restart actions even though involvement in such events is a normal assignment for internal safety review organizations (see PP.1-2).

A sampling of Safety Coordinators and Safety Representatives in the program line organization demonstrated that the majority of them were neither familiar with the latest version of the Ames Laboratory Safety Manual (January 27, 1992) nor could they demonstrate a common understanding of what stop-work and restart means. These Safety Coordinators and Safety Representatives are not only key to the Ames safety program, some of them have been delegated the authority to stop-work. In addition to the lack of understanding of stop-work/restart by safety personnel in the line organizations, staff personnel from other organizations also do not clearly understand their roles, responsibilities, and authorities involving stop-work.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-10 Ames Human Resource Planning Process

Finding

The Ames human resource planning process is not derived from a top-down strategic or mission planning process and does not systematically examine environmental, safety, and health requirements on a sitewide basis.

Discussion

Integration of programmatic and ES&H objectives is a principal element in the Secretary's 1989 Ten Point Initiative and is also addressed in SEN-25-90. In order to achieve this integration, it is imperative that Ames have staff who are knowledgeable, qualified, and trained in the ES&H disciplines necessary to support the mission of Ames. This suggests that human resource planning must be conducted in an integrated fashion on a sitewide basis; must logically flow from a sitewide, if not ISU-wide, strategic or mission planning process; and must be based on an evaluation of ES&H risks and vulnerabilities.

The human resource planning process must comprehensively identify those staffing requirements necessary to support achievement of programmatic and ES&H objectives. This process must include identification of specialized training which is critical for performance of the functions required of staff. Finally, the human resource planning process must be conducted so as to enable senior management to identify trade-off decisions regarding staff and budget needs and to prioritize staff acquisitions in situations of either manpower or budgetary limitations. Specifically, these trade-off decisions should include evaluations of the risks and benefits to the mission of Ames (i.e., programmatic and ES&H) associated with obtaining staff members with expertise

in non-ES&H disciplines as opposed to adding staff with backgrounds in ES&H related disciplines.

As noted in MF-7, Ames, as a general proposition, conducts two types of planning processes: annual development of an Ames Laboratory Institutional Plan and annual development of a Work Authorization Statement (WAS).

The FY 1992-1997 Institutional Plan does address programmatic initiatives and acknowledges the importance of ES&H activities (Section VI of the Institutional Plan). However, this document does not demonstrate a clear integration of programmatic and ES&H missions. Section VII of the Institutional Plan, which addresses human resources, identifies additional personnel requirements for what are called "Program Alternatives and New Initiatives." However, the requirements do not include quantification of additional human resources necessary to support ES&H initiatives. Section VI of the Institutional Plan notes that increased budgets for ES&H " . . . will be required to provide the additional professional and support staff demanded by a properly designed program for the Ames site." What is lacking is a degree of specificity in terms of outlining ES&H human resource requirements that is comparable to the evaluation of outyear programmatic human resource needs. As a result, it is not apparent that this document systematically identifies the ES&H staffing needs necessary to ensure comprehensive implementation of ES&H requirements and to support achievement of programmatic objectives.

Annual development of the WAS has not historically included explicit identification of ES&H requirements or activities. In the 1993 WAS, human resource estimates for ES&H activities were not formally integrated with program activities during development of technical scope of work documentation. In addition, there has not typically been sitewide examination of the overall adequacy of ES&H resource estimates, provided by individual research organizations, to support ES&H initiatives. An example of this would be the absence of integration of resource requirements for training needs identified by the various research organizations. It is noted, however, that Ames has recognized this deficiency and it taking a necessary first step in that the Environment, Safety and Health Group has requested the line organizations to estimate their outyear ES&H resource requirements as part of the 1994 WAS process. However, the balance of the process for ensuring that ES&H human resource estimates are integrated with programmatic resource estimates has yet to be defined.

In the absence of a top-down strategic planning process (see MF-7), Ames has, until recently, been conducting human resource planning without an explicit set of risk-based priorities to use as guidance. The result is that at lower levels of the Ames organization, the human resource planning process tends to take various forms, lacks integration across organizational units, and is often times not thoroughly documented. A byproduct of this approach is that human resource estimates developed by the Environment, Safety and Health Group often "lag behind" the programmatic side and, therefore, the filling of ES&H-elated requisitions tends to be driven by what the programmatic side will "bear" or allow.

It is not apparent that there is optimum utilization of existing human resources through a process of assigning and reassigning resources to areas of highest priority. In the ES&H Group there are 8 ES&H professionals and 12

Plant Protection staff. There has been a recent request by the Environment, Safety and Health Group (ES&HG) to augment the Plant Protection organization by 2 additional staff. These individuals patrol the Ames facilities, furnish property protection services, and provide a fire watch capability. It is recognized that this request for the two additional Plant Protection staff was noted as low priority in contrast to other future needs identified by the ES&HG. It is not evident that the existing Plant Protection resources are more critical to the achievement of the overall objectives of the ES&H Group than additional resources with expertise in such areas as the Resource Conservation and Recovery Act, the National Environmental Policy Act, and waste management would be.

In summary, the Ames human resource planning process does not assure integration of ES&H activities with achievement of programmatic objectives. Ames has not explicitly identified the resource requirements associated with comprehensive implementation of its ES&H and Self-Assessment programs and has not evaluated the ES&H human resource requirements against the programmatic objectives which they would support.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-11 Ames ES&H Training

Finding

Ames does not have an effective environmental, safety, and health training program.

Discussion

An effective training program must ensure that personnel at all levels of Ames are qualified and, if required, certified to carry out assigned duties and responsibilities. An effective training program must be based on clearly defined goals and should be conducted with formality, documentation, validation, and record keeping reflective of its central role in ensuring that only qualified staff are assigned to ES&H activities. An effective training program should prepare staff for career progression and provide for succession planning.

The training program at Ames can best be characterized as informal and fragmented. There is not in place at Ames a sitewide program for implementing and ensuring uniformity in the conduct of training activities (see TC.1-1). General employee training activities are not conducted in such areas as emergency preparedness (see EP.3-1 and TC.4-1), and general employee training activities are not periodically updated in such areas as substance abuse (see OA.8-1). In addition, there is not a formal process to evaluate the overall effectiveness of training and certification programs. While efforts have been and are being directed at enhancing the knowledge base of Safety Coordinators and Safety Representatives in the performance of their assigned duties, there has not been a comparable level of effort being directed at augmenting the competence of line management personnel in ES&H matters (see OA.5-1, MA.2-3, and TC.10-1).

In the last 6 months, Ames has hired a Safety Training Coordinator to institute, organize, and implement a sitewide training program. If conceptualized properly, this function should serve as a mechanism to integrate and to ensure uniformity among Ames training activities. This function is also examining management of records which identify and certify completion of training activities, and there are plans to develop an Ames Laboratory Training Records System. Currently, training records are not consistent in form and are not centralized (see TC.1-2).

One area where the fragmentation of training activities occurs is in the training of Safety Coordinators and Safety Representatives. As perceived by Ames management, these individuals are essential to line management in performing its ES&H oversight responsibility function, and, as such, are critical to effecting a cultural change with respect to ES&H. However, the backgrounds and experience levels of the individuals selected as Safety Coordinators and Safety Representatives vary widely and the particular roles and responsibilities assigned to the Safety Coordinators tend to be substantial, including the ability to stop-work (see OA.5-1, OP.1-2, and PP.1-1). This would suggest, if not reinforce, the importance of a comprehensive and uniform training program for the Safety Coordinators and Safety Representatives (see MF-9). It would appear that the level of instruction necessary to train a Safety Coordinator to execute these responsibilities would be significant.

This situation is compounded by the fact that Safety Coordinators are required to train staff within their own organizations to the specifications identified in the Ames Laboratory Safety Manual. It is not apparent that the Safety Coordinators have been instructed in how to conduct this training.

A further example of the fragmentation associated with training activities concerns the formulation of what are described as "Unit Operations Manuals." These manuals were initially developed by the Metallurgy and Ceramics Program in recognition of the need to incorporate more formality into the performance of research and development activities. The manuals reviewed suggest a systematic approach was taken in developing the documentation (including training activities) for an individual operation. However, a review of these manuals and equivalent manuals from other parts of Ames suggests that, to date, there has been no effort to systematically identify training requirements common to multiple unit operations within a Directorate (see OP.3-1). Ames recognizes this deficiency and does plan to implement a top down, structured approach to future development of these or equivalent manuals.

Many findings and concerns in this report indicate a pervasive lack of effective sitewide training and certification. Specific references include findings identified by the Environmental Subteam in the areas of NEPA Compliance (see finding NEPA/BMPF-6), Quality Assurance (see finding QA/CF-6), and Waste Management (see finding WM/CF-4) as well as concerns identified by the Safety and Health Subteam in the areas of Quality Verification (see QV.7-1 and QV.7-2), Maintenance (see MA.1-2), Training and Certification (see TC.8-1 and TC.9-1), Auxiliary Systems (see AX.6-1), Technical Support (see TS.3-1), Packaging and Transportation (see PT.2-1), Personnel Protection (see PP.1-2 and PP.3-5), and Worker Safety and Health Compliance (see WS.3-1, WS.3-2, and WS.3-4).

Self-Assessment

This finding was fully identified in Ames Self-Assessment Report.

MF-12 Ames Personnel Management System

Finding

The Ames personnel management system does not establish clear expectations for employee environmental, safety, and health performance.

Discussion

The performance of individual staff members is the cornerstone of achieving ES&H excellence. Definitive and individual ES&H goals, objectives, and performance measures for all Ames staff are crucial to effecting the type of cultural change which is necessary at Ames.

The Ames' performance expectation and performance appraisal process is contained in two separate documents. The Position Description Questionnaire (PDQ) outlines an individual's job description and the Ames Laboratory/Institute for Physical Research and Technology (IPRT) Performance Appraisal delineates the annual performance review.

With regard to personnel, Ames has four categories of staff (i.e., faculty shared by ISU and Ames, exempt permanent staff, non-exempt permanent staff, and graduate students). Of these, only the exempt and non-exempt permanent staff have fully developed Position Description Questionnaires. Of those staff having fully developed Position Description Questionnaires, only staff with ES&H responsibilities (e.g., Safety Coordinators, Safety Representatives, ES&H Group staff) have Position Description Questionnaires which include job elements reflective of ES&H requirements (see OA.1-1 and MS.3-1). As Ames administratively operates under the ISU "Office Procedure Guide," its ability to develop job descriptions for all staff, which reflect ES&H elements, is governed by the policies and procedures outlined in this document (Section 4 - Faculty and Professional Staff) which do not enable unilateral modification of the Position Description Questionnaires. Accordingly, Ames is currently revising job descriptions in a staged fashion by including ES&H elements in PDQs for existing staff members who are receiving promotions (and would require a modified PDQ to address the reclassification) and for newly hired staff members (for whom Ames would have developed a PDQ prior to advertising for the position). While the application of the ISU policy may have an inhibiting effect on the process of defining ES&H requirements in PDQs, such a staged approach to modification of PDQs does not represent a strong commitment to ES&H.

Ames has also recently initiated a process of developing job descriptions for Program Directors (who are within the Science and Technology Directorate). The model being followed includes four major responsibilities for the Program Director. These include providing leadership and direction for a major research program, serving as a Principal Investigator for research project(s), developing new research thrusts, and a fourth responsibility characterized as "Responsible for environmental, health, and safety practices and policies for the program." This last responsibility is further defined in terms of four activities. These activities include having the line responsibility for

ensuring that all activities in the line program are in compliance with DOE Orders, appointing Program Safety Coordinators and delineating their responsibilities, exercising as necessary the authority to shut down operations, and reviewing all proposals for new experiments.

With regard to employee performance appraisals, all Ames professional staff (i.e., shared faculty, exempt permanent, non-exempt permanent) are required to receive annual performance appraisals. The structure of the performance appraisal document focuses on three aspects or factors of performance: quality of contribution, quantity of contribution, and responsiveness to other position requirements. As currently configured, there is no explicit requirement for or identification of ES&H as a performance appraisal element (see OA.6-1). It is noted that for those individuals who have ES&H responsibilities (approximately 25 percent), the performance appraisal documentation does address the extent to which their ES&H responsibilities were fulfilled. For the balance of the staff (approximately 75 percent), performance appraisal documentation does not address ES&H elements. Ames recognizes this shortcoming of the process and intends to incorporate a separate a job factor into the performance appraisal process to address ES&H issues.

Ames has implemented two programs to motivate enhanced ES&H performance. One program is an ES&H Hot Line which has been established to receive confidential phone calls regarding ES&H issues. The program is essentially a component of the "Ames Laboratory Policy for Reporting Unsafe Conditions," which is detailed in Chapter VI, Section B of the Ames Laboratory Safety Manual. The second program is the "Find A Fault " contest which encourages staff to suggest ES&H improvements. Since this program's inception in November 1991, there have been 27 $100 savings bonds furnished.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-13 Ames Corrective Action Systems

Finding

Ames does not have a comprehensive, integrated Corrective Action Management System to ensure that environmental, safety, and health deficiencies which have been identified are managed and effectively tracked to closure.

Discussion

The Secretary of Energy has continually emphasized the importance of a comprehensive Corrective Action Management System to ensure that known ES&H deficiencies are dealt with promptly and responsibly by all elements of the Department including contractors. It is equally important that all such deficiencies and the associated corrective actions be communicated to all elements of the organization to ensure they are fully considered and applied to other operational activities and incorporated into planning activities for new or expanded programs. Nevertheless, Ames has not yet developed sitewide policies or procedures which clearly establish responsibilities and authorities for initiating and managing a Corrective Action Program. Similarly, the basic framework for an effective Corrective Action Management

System, such as a central data base of all known and reported deficiencies; specific remedial actions to be taken; a means of scheduling, prioritizing, and allocating resources for corrective actions; coordination, trending analysis, tracking, and status reporting; and a formal validation prior to closure, does not currently exist.

Ames currently has some elements of a Corrective Action Management System. However, the system or process is primarily limited to followup actions associated with Occurrence Reports and incidents or observations reported by the Plant Protection staff. Other ES&H deficiencies, such as those identified by operating or staff officials during surveillances or walk through inspections, are generally not reported to a central location such as the Environment, Safety and Health Group (ES&HG) for the compilation of trending data and lessons learned (see MF-17). There is no formal means of determining whether a problem or a deficiency which is discovered in one area of Ames might also be a common problem to other operational elements. Limited root cause analysis is performed for incidents included in Occurrence Reports, and Ames has recently performed a root cause analysis on findings identified in their Self-Assessment Report. However, these efforts appear to have been largely ad hoc, and the requirements, as well as the capability to perform root cause analysis and initiate appropriate remedial actions, have not been formalized.

Until recently, Ames has not made any formal or concerted effort to obtain lessons learned information from other CH laboratories and contractor or DOE installations. The recent efforts have been primarily limited to the review of Tiger Team reports.

Due to the absence of such a system, it will be virtually impossible for Ames and DOE to determine the current status of all required remedial actions at any point in time or to focus additional attention or emphasis and redirect resources as necessary. Similarly, until such a system is completed, there will not be an effective means of developing and communicating trending information, root cause factors, and lessons learned throughout the Ames organizational structure. Finally, and perhaps more importantly, if such a disciplined approach is not developed and consistently applied, it seems likely that the corrective actions which will be initiated in response to the deficiencies identified by the Tiger Team and the internal Ames Self-Assessment Report will potentially be of a temporary nature with a high probability of reoccurrence with the passage of time.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-14 Ames Directive Management System

Finding

The Ames Directive Management System has not been effective in ensuring that Department of Energy Orders and Directives related to environmental, safety, and health issues have been uniformly and consistently applied by all appropriate operational and staff elements of Ames.

Discussion

An ineffective system or methodology for the identification, implementation, and distribution of DOE Orders, Directives, laws, and regulations has contributed, in a large part, to a failure on the part of Ames to fully comply with all applicable ES&H policies, regulations, and standards as required by the provisions of the DOE contract.

The current method of reviewing and translating applicable DOE policies, regulations, and other related guidance into site specific procedures to ensure that they are uniformly and consistently applied by all appropriate operational and staff elements of the Ames organization has not proven to be effective. Several of the key operating officials and staff members only recently received copies of the applicable ES&H Orders and Directives issued by DOE. Therefore, many of those individuals were not fully familiar with DOE requirements and in a few cases had not yet had an opportunity to review the documents prior to the arrival of the Tiger Team.

It should be noted that applicable DOE Orders and Directives are not specifically cited in the contract between DOE and Ames. At the request of the Ames Director, CH recently provided a list of all specific Orders and Directives applicable to the contract operations. Apparently Ames has been on the standard contractor distribution list for DOE Orders and Directives, but no mechanism had been established to identify those which were to be implemented by Ames. It is understood that copies of all such Orders and Directives will also be sent to ISU in the future.

Some organizational elements of Ames have independently attempted to determine which specific DOE Orders and Directives are applicable to their particular organization by reviewing the index to the DOE Order system and through discussions with their counterparts in the Field Office. Although this is commendable, there is a notable absence of a sitewide effort to ensure a uniform interpretation and consistent application of many of these policies and procedures which are common to most of the operational and staff organizations and which define specific responsibilities for implementation and enforcement (see PP.1-1). For example, the Engineering Services Group recently obtained copies of DOE guidelines and criteria for design and design control which also provide a basis for important ES&H considerations during the formative stages of a project. They have subsequently developed a procedure to apply these criteria and guidelines to their own internal operations. However, those internal procedures are not mandatory for application by other organizational units of Ames. Therefore, it is not unusual for them to fabricate equipment or components on the basis of an informal design or specification developed by the requesting organization. Consequently, the items being fabricated are not subjected to the rigor of a disciplined design review to assure that the completed product will not produce an unexpected safety hazard when it is placed into an operational status (see TS.1-1).

Similarly, the Maintenance Group has internal procedures for the installation or modification of electrical systems to assure compliance with applicable codes and standards. However, since these internal procedures are not binding on other Ames organizations, it is not uncommon for a research group to independently perform modifications to high voltage power supply systems which were subsequently found to be in violation of applicable codes and standards.

In the absence of a sitewide policy and procedure which clearly precludes any such modifications by unauthorized personnel, there are few, if any, repercussions for taking such an action even though the potential risks from a safety point of view are substantial.

Policy decisions are frequently communicated verbally or by memorandum. Although such an expedient is often necessary and justifiable, the current control mechanisms do not provide a positive assurance that all such determinations and decisions will be appropriately captured in subsequent issues or revisions to existing policies or procedures.

The existing system or methodology for the control and issuance of Ames policies and procedures does not include provisions for a central authoritative review of proposed Level 3 or 4 procedures prepared by the individual operating or staff organizations. Therefore, there is no formal means of ensuring that the Level 1 and 2 umbrella policies and procedures of Ames and DOE have been properly interpreted and translated into operating procedures and that they do not contain any inconsistencies with similar procedures prepared by other organizations. Since there have been no formal Ames' guidelines for the preparation and issuance of policies and procedures, there is a significant lack of uniformity in format and content among those that have been issued including a delineation of review and approval authorities (see OP.3-1). The Ames Safety Manual was issued as a controlled document. However, similar control procedures are generally not applied to other internal policies and procedures to assure that employees have a complete set of the most recent instructions (see OA.7-1 and OA.7-2). Apparently, selected policies have been reviewed by the Executive Council. However, this appears to have been an informal process since there is no record of their conclusions or recommendations. The charter for the recently appointed Safety Review Committee includes a provision for a policy review subcommittee to review selected policies and procedures related to ES&H. However, the charter lacks specificity with respect to the responsibilities and authorities of this subcommittee (see MF-8).

The longstanding absence of a well structured and effective system to translate and apply the provisions of applicable DOE and Ames policies and procedures into site-specific procedures and guidance has resulted in a lack of formality and rigor in the conduct of day-to-day operations. Even more importantly, many individuals and organizations within Ames are working hard to establish the foundation for a comprehensive ES&H program including self-assessment without a full understanding or appreciation of the total spectrum of DOE requirements and criteria.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-15 Ames Policies and Procedures

Discussion

The Ames Laboratory Safety Manual does not fully reflect site specific procedures required to implement applicable Department of Energy Orders, Directives, and related laws and regulations.

Discussion

The current Ames Laboratory Safety Manual is represented to " . . . contain the policies and procedures necessary to implement the ES&H policy of Ames Laboratory." Although the Safety Manual contains references to DOE Orders and Directives, it does not generally provide a translation of those Orders into site specific procedures in order to ensure that they will be properly interpreted and uniformly applied by all individuals or organizations within Ames. Additionally, if this manual is to be viewed as the single authoritative source for Ames' ES&H policies and procedures, there are several important omissions. For example, the Safety Coordinator system is viewed by many individuals as a key element in the implementation and execution of Ames' overall ES&H program. However, the Safety Manual does not specifically state the roles, responsibilities, and authorities of the Safety Coordinators other than stop-work authority, and it does not provide procedural guidance for the Safety Coordinators or operating officials. Similarly, the Safety Manual does not adequately address important environmental requirements including waste disposal and waste minimization policies.

Numerous lower level procedures have been generated by individual operating and staff organizations to implement the policies reflected in the Safety Manual. However, these procedures are not further reviewed by a central control organization such as ES&HG to ensure that the policies reflected in the Safety Manual as well as the referenced DOE Orders and Directives have been properly interpreted and applied. This practice has often led to a non-uniform application of ES&H policy requirements in various organizational elements of Ames (see MF-16)

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-16 Ames Formality of Operations

Finding

Ames has not developed a comprehensive plan or program to apply the provisions of Department of Energy policies and guidelines necessary to achieve the prescribed levels of formality and rigor in the conduct of Ames operations.

Discussion

The Under Secretary of DOE issued instructions in November 1989 which required all contractor organizations to develop a program or a process to apply the guidelines developed by the Institute of Nuclear Power Operations (INPO) to improve or strengthen the formality of their operations. These instructions were later incorporated into DOE 5480.19 which was issued July 9, 1990. However, Ames has not yet developed a program to apply the applicable provisions of these Directives. Although Ames is not involved in the operation of nuclear facilities or large scale production operations, the principles embodied in the Conduct of Operations guidelines apply equally well to a research laboratory.

A few organizations within Ames have independently sought to apply some of the principles of the policies and guidelines to their internal operations such as

the development of Unit Operations Manuals by the Metallurgy and Ceramics organization. However, these efforts have neither been totally effective to date nor have they been applied to other elements of Ames due to the absence of planning and policy guidance from Ames management which clearly communicates the expectations of management and the scope of the changes required to comply with the new requirements. The necessary first steps of such planning and policy guidance should, as a minimum, provide for a determination of the applicability of each guideline, where and how each of the guidelines are currently being applied in existing policies and procedures, and the identification of any deviations or exceptions. This determination should include the full range of operations in all sectors of Ames including research activities and facility operations. Related control, support, or management systems such as design, design review, configuration control, maintenance, lock-out/tag-out, training, certification, etc., must also be examined for potential application of the Conduct of Operations guidelines (see OP.1-1).

The formal instructions from DOE encourage the use of a graded approach to the application of these principles by each organizational element of the Department. Such an approach requires careful and thoughtful central planning and direction to ensure that a consistent methodology is formulated and uniformly applied across all organizational and programmatic lines. Planning within Ames is only in the early formative stages with no specific target dates or milestones for completion or implementation.

The Quality Assurance program is a vitally important element in assuring that the applicable provisions of the formality of operations criteria are rigorously and consistently applied by designated Ames organizations. However, the Quality Assurance program is only in the formative stages of development and is not yet capable of providing the necessary companion support required for an across-the-board application of DOE requirements.

At the present, time many of the management and operational activities of Ames can best be characterized as unstructured and informal. In spite of this characterization, it should be noted that their research efforts have produced remarkably good and widely accepted results.

There is a notable absence of the features of a strong command and control system and formality of operations which will be required to implement and apply the mandatory provisions of DOE policies, procedures, and standards related to ES&H on a continuing and sustained basis. A disciplined approach must be developed and uniformly applied if it is Ames expects to achieve and maintain the level of ES&H compliance and excellence expected by the Secretary of Energy.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-17 Ames Oversight

Finding

Ames does not have a comprehensive, formal program of line management oversight or independent oversight of its environmental, safety, and health activities.

Discussion

A fundamental element of effective ES&H performance is a vigorous, ongoing, comprehensive program of oversight. Such a program, through line surveillances, walkthroughs, and inspections, and through periodic independent appraisals of ES&H activities (facility and functional) and reviews of proposed new or modified programs, experiments, processes and procedures, provides management with assurance that ES&H activities are consistent with applicable requirements and that timely, complete, and accurate information is available for decisionmaking. Ames does not as yet have such a program.

There is no formal requirement for line managers to conduct walkthroughs, surveillances or inspections of their workplaces (see PP.2-1; and findings TCM/CF-4, RAD/CF-1, A/CF-2, and SW/CF-4), although these occur from time to time. However, they are performed with differing regularity; they are not generally well-documented; followup practices are informal, often relying on the personal initiative or the memory of the individual who observed the deficiency; and there is no requirement that information obtained from one organization be analyzed, or trended, or shared with other organizations (see OA.5-1 and PP.3-1). There is evidence that some Safety Coordinators and Safety Representatives conduct inspections, but whether this is common and whether such inspections are devoted mainly to housekeeping varies throughout Ames (see MF-18).

Ames is not performing independent appraisals of ongoing ES&H activities as required by DOE Orders. There are no internal appraisals of safety functional disciplines or environmental areas (e.g., fire protection, radiological protection; see FR. 2-1, FR.4-1, PT.3-1; and findings RAD/CF-2, and A/CF-5). None have been done in the past 2 years and there is no written schedule for such appraisals. There have been no triennial reviews of the independent review and appraisal system (see FR.5-1), and none are scheduled.

There is a potential compromise of objectivity in connection with the independent review and appraisal system in that the organization responsible for independent oversight, the Environment, Safety and Health Group, is charged with overseeing organizational units reporting to the same Associate Director to whom it also reports; there are several reorganization plans and "models" being considered by Ames management which, if implemented, would eliminate this concern.

There is no single or combination of Ames standing committees which provide the required independent oversight. Ames management recently established a Safety Review Committee (SRC). Its "charge" is to " . . . review the facility and experiments with regard to safety." However, the stated "purpose" of the SRC is to ensure ES&H consideration in "new experiments." If the intent is to limit the SRC solely to review of new experiments, then it is an inappropriate limitation of scope. There is some indication, however, that the SRC will

take a broader look at ES&H concerns, such as policy review. The establishing memorandum does not constitute a formal charter for the SRC, and, therefore, does not contain details as to roles and responsibilities; it also does not contain procedures which would identify the full scope of review (e.g., which ES&H documents would be reviewed, and whether it will review incidents, accidents, corrective actions and activities of onsite vendors and subcontractors). Accordingly, it is premature to evaluate the effectiveness of the SRC as a provider of independent ES&H oversight. It is noted that the Ames is reconsidering the composition of the SRC in light of comments by the Tiger Team relating to the compromise of independence in having the Ames Deputy Director, a line manager, serve as the Chairperson of the SRC.

The volume of onsite subcontractors at any given time at Ames is not great. However, their presence has a direct impact on, and is in turn impacted by, ES&H concerns, and a significant increase in onsite construction activities is anticipated in the near future. Ames' oversight of onsite subcontractors is not adequate in frequency or scope to ensure that these activities comply with site ES&H requirements. There is currently no staff qualified to conduct Occupational Safety and Health Act inspections at the site; there are no formal mechanisms to ensure that subcontractor employees understand site ES&H requirements or to ensure that they have received the necessary ES&H training and/or certification.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-18 Ames Safety Coordinator Program

Finding

The Safety Coordinator program at Ames is not fully effective as an element of line management environmental, safety, and health oversight due to deficiencies in training; definition of roles, responsibilities, and authorities; and formality of operations.

Discussion

The Safety Coordinator program is a key element of the line management of ES&H at Ames. There is a Safety Coordinator in every Program Division, and a Safety Representative in virtually every Group.

The Safety Coordinator program has been in effect at Ames for almost ten years. Its established goals include:

- Promoting line responsibility for ES&H within the programs;
- Recognizing ES&H as an integral part of all operations; and
- Providing interaction points between program and the Environment, Safety and Health Group (ES&HG).

Ames management can be proud of the wide acceptance of this program. However, there are several aspects which limit the effectiveness of individual Safety Coordinators and Safety Representatives and, therefore, limit the overall

effectiveness of the program. Interviews with a sampling of Safety Coordinators and Safety Representatives revealed that they do not have a consistent understanding of the full nature and range of their responsibilities or of their authority to carry out these responsibilities. For example, some do inspections and some do not; some inspections are merely housekeeping and some are more substantive (see PP.1-1). Many of them felt that they do not receive sufficient guidance from management, and most of them consider that they have not been trained to effectively perform their duties (see MF-11 and OA.5-1).

There is no formal process for determining how the Safety Coordinator or Safety Representative is selected or removed, or how their time should be allocated between ES&H and collateral duties. Estimates of time devoted to ES&H ranged from 5 percent up to 20 percent for periods not associated with the Tiger Team Assessment (see OP.1-2). Although there is a process for evaluating the performance of the individual Safety Coordinators and Safety Representatives as a part of the annual employee performance evaluation system, there is no process for evaluating the effectiveness of the Safety Coordinator program as a whole, and there is no evidence that such an evaluation has ever occurred.

In the absence of a sitewide written policy covering the program (at present, the Safety Manual does not address Safety Coordinators except in connection with stop-work authority), the details, the responsibilities and authorities, the importance, and ultimately, the effectiveness of the program, will vary greatly from one organization to another depending on the willingness of individual Program Directors and Group Leaders to dedicate time and resources to ES&H activities (see MF-15).

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

MF-19 Ames Work For Others

Finding

Ames does not have a formal process for ensuring that environmental, safety, and health requirements and concerns are fully considered in their submission of proposals for non-Department of Energy funded work.

Discussion

Ames performs work for non-DOE organizations which is commonly referred to as Work For Others (WFO) or reimbursable programs. These programs utilize Ames' unique expertise and facilities, and support DOE agreements with other Federal agencies and non-Federal organizations. They also are consistent with DOE's technology transfer mission. The principal sponsors of these programs are the Department of Defense and the Department of Transportation. For FY 1992, the funding level for WFO is approximately $4 million and is expected to increase in future years.

A WFO proposal submitted by Ames to CH represents a commitment to perform work at the site. Such a commitment should, in every case, include a review by Ames of how that work will impact ES&H concerns. Whether the work may involve

special permits, is unusually dangerous, involves hazardous or toxic materials, or may leave behind residual environmental remediation issues, are important factors requiring consideration in preparing and submitting proposals.

Discussions with Ames revealed that no formal process exists for subjecting WFO proposals to review by ES&H professionals prior to submission of the proposals to CH. The system places reliance upon the individual researcher and/or his supervisor to recognize potential ES&H concerns and to seek ES&H advice or review. Thus, ES&H review is not a required step in the process; the decision as to whether to have such a review is left to persons who generally lack the expertise to identify an ES&H concern, and who may lack objectivity in making such an identification.

The current process consists of a Preliminary Proposal form which, among other things, requires a brief description of the proposed project, and addresses such matters as technology transfer and budget and personnel requirements. It does not mention ES&H. When the form is approved, the proposal is prepared (or completed) and submitted to CH.

The Tiger Team was advised that Ames is planning to issue WFO procedures that conform to Change 2 to DOE 4300.2A, which expressly requires ES&H review of WFO proposals. However, it is not clear how soon this will occur or the degree of guidance Ames will receive from CH.

Self-Assessment

This finding was fully identified in the Ames Self-Assessment Report.

5.6 NOTEWORTHY PRACTICE

There was one noteworthy practice identified by the Management Subteam. Ames was responsible for the initiation of an accredited ES&H graduate level course at Iowa State University.

NPF-1 Graduate Level Course in ES&H

At the initiative of Dr. Tom Barton, Director of Ames Laboratory, Iowa State University is initiating a one credit graduate course entitled "Environmental Safety and Health in the Chemical Laboratory." The graduate level course, which will be a requirement for all incoming graduate students in Chemistry and will also be open to undergraduate students as a prerequisite to research, will require a grade of "B" or better.

Dr. Barton recognized the need to begin ES&H education during the formative stages of research training and the Chairman of the ISU Chemistry Department not only agreed, but enthusiastically supported the proposal. The goal is to provide the necessary information and to instill the proper attitude toward ES&H in students at the beginning of their research training. The course, and the resulting research environment, would eliminate the "culture shock" currently experienced by young American scientists transitioning from the University to the more stringent environment of U.S. industry and the national laboratories.

The first year of this course, beginning September 1992, will train 50 graduate students in ES&H in the chemical laboratory. The Department is also considering making this course a requirement for a B.S. degree in Chemistry.

Fundamentals will be covered in the first portion by S&H videotapes and workbooks developed by the American Chemical Society. These initial classes will consist of viewing the videotapes followed by open discussion. The second portion of the course will feature lectures by specialists in various aspects of ES&H. Lecturers (who will also serve as discussion leaders) will come from both the ISU and Ames Lab's ES&H offices, ISU professors and Ames Lab scientists, industry and other national laboratories. The third and final portion of the course will break the class into groups depending on their area of specialization. Thus, for example, organic chemists will receive intensive training on the use of carcinogenic and highly toxic chemicals while physical chemists receive laser safety training. Classes will be videotaped for internal review and future course development. Ultimately the refined course will be made available to other national laboratories and universities.

5.7 SUBTEAM COMPOSITION AND AREAS OF RESPONSIBILITY

Area of Responsibility	Name/Organization
Management Subteam Leader	Marshall Bishop Department of Energy, Rocky Flats Office
Management Assessment	Justine Alchowiak Department of Energy, Office of Special Projects
Management Assessment	Mayhue Bell Private Consultant
Management Assessment	Ray Duncan Private Consultant
Management Assessment	Marvin Laster Private Consultant
Management Assessment	Robert McCallum Private Consultant

6.0

EVALUATION OF SELF-ASSESSMENT PROGRAMS AND REPORTS FOR THE OFFICE OF EMERGENCY RESEARCH, THE DOE CHICAGO FIELD OFFICE, AND AMES LABORATORY

6.0 EVALUATION OF SELF-ASSESSMENT PROGRAMS AND REPORTS FOR THE OFFICE OF ENERGY RESEARCH, THE DOE CHICAGO FIELD OFFICE, AND AMES LABORATORY

6.1 INTRODUCTION

On January 26, 1990, the Secretary of Energy directed all line organizations to implement a comprehensive self-assessment program to identify and characterize Environmental, Safety, and Health (ES&H) concerns as they relate to the operations directed by line organizations. The Secretary of Energy also directed the Tiger Teams to evaluate effectiveness of the self-assessment programs as part of their appraisal efforts. On July 31, 1990, the Secretary issued guidance on the conduct of self-assessments, stressing the importance of comprehensive, routine self-assessments within DOE and its contractors.

6.2 SCOPE

The Tiger Team evaluated the self-assessment program in the DOE Program Office of Energy Research (ER) and the self-assessment reports and programs of the DOE Chicago Field Office (CH) and the Ames Laboratory (Ames). ER has not yet produced a self-assessment report.

6.3 SELF-ASSESSMENT WORK GROUP METHODOLOGY

The Tiger Team established a Self-Assessment Work Group composed of two members from the Management Subteam and one member from each of the Environmental and the Safety and Health Subteams.

The Self-Assessment Work Group used the following guidance to evaluate DOE and facility self-assessment activities, programs, and reports:

- Secretary of Energy Notice, SEN-6D-91: Departmental Organizational and Management Arrangements, May 16, 1991;
- Memorandum, Guidance On Environmental, Safety, and Health Self-Assessment, from the Secretary of Energy to Secretarial Officers, Managers, Operations Offices, Administrators, and Power Marketing Administrations, July 31, 1990; and
- Draft Environment, Safety and Health Management Performance Objectives and Criteria for Tiger Team Management Assessments, August 15, 1991.

This evaluation included the following:

- The ER Self-Assessment Program, including the ER Self-Assessment Program Plan, dated August 2, 1991;
- The CH Self-Assessment Program, including the draft CH Program Plan, dated July 1991;
- The Chicago Self-Assessment Reports: the Chicago Self-Assessment of Ames Laboratory Management, dated December 1991, and the DOE Field Office, Chicago (CH) Self-Assessment Report, dated November 1991;

- The Ames Self-Assessment Program, including the Ames draft Self-Assessment Program Plan, dated November 1991;
- The Ames Laboratory Self-Assessment report, dated December 1991; and
- A comparison of the Tiger Team findings and concerns to the findings and concerns in the Ames and CH Self-Assessment Reports.

Interviews were conducted with the management of the ER Office of Assessment and Support to determine the status of ER's Self-Assessment Program and to assess the guidance and training ER has provided for its line organization.

Interviews were conducted with CH Division Acting Field Office Manager; two assistant managers; the Environment, Safety and Health Division Director; the Laboratory Management Officer/Contracting Officer; the Self-Assessment Officer; and the management team leader of the CH Self-Assessment of Ames Laboratory Management to determine the status of the CH Self-Assessment Program.

Interviews at various levels of Ames management and staff were conducted to determine the involvement of Ames personnel during the performance of the initial self-assessment and to evaluate their understanding of self-assessment concepts and culture for ongoing self-assessment activities.

6.4 EVALUATION SUMMARY

ER has established a self-assessment program but has not scheduled or conducted self-assessments at any level of ER. Although CH does not have an approved Self-Assessment Program, CH has initiated self-assessments of its own line management. Ames does not have an approved Self-Assessment Plan and has not established a self-assessment program.

6.4.1 Summary of Program Findings

The Tiger Team assessment of the ER and CH Self-Assessment Programs, including their program plans, led to the identification of two findings for ER and one findings for CH. The Tiger Team assessment of Ames self-assessment program plan and its implementation identified two findings. The self-assessment findings are summarized in Table 6-1 below.

TABLE 6-1
SUMMARY OF SELF-ASSESSMENT FINDINGS

SA-1	The Department of Energy Office of Energy Research has not fully implemented or institutionalized their Self-Assessment Program and has not scheduled or conducted a self-assessment at any level of ER.
SA-2	The Department of Energy Office of Energy Research has not provided adequate guidance or timely direction to the Chicago Field Office and Ames regarding ES&H self-assessment.
SA-3	The Department of Energy Chicago Field Office has not fully implemented or institutionalized a self-assessment program.

TABLE 6-1 SUMMARY OF SELF-ASSESSMENT FINDINGS	
SA-4	Ames has not developed a self-assessment program.
SA-5	Ames has not provided adequate training of personnel or communication of self-assessment requirements.

6.4.2 Evaluation of Self-Assessment Reports

The Tiger Team findings and concerns were compared with those identified by Ames and CH in their Self-Assessment Reports, and a determination was made whether each finding and concern was fully or partially identified or not identified at all. The results of these evaluations are summarized in Table 6-2.

TABLE 6-2
COMPARISON OF FINDINGS AND CONCERNS OF CH AND AMES SELF-ASSESSMENT REPORTS WITH TIGER TEAM FINDING AND CONCERNS

Organization	Fully Identified	Partially Identified	Not Identified
CH	4 (40%)	2 (20%)	4 (40%)
Ames	81 (43%)	54 (28%)	56 (29%)

6.5 EVALUATION OF DEPARTMENT OF ENERGY OFFICE OF ENERGY RESEARCH

SA-1 **The Department of Energy Office of Energy Research has not fully implemented or institutionalized their Self-Assessment Program and has not scheduled or conducted self-assessments at any level of ER.**

Discussion

ER issued the "Energy Research Self-Assessment Program Plan," on August 2, 1991, developed through the collaboration of ER contractors, DOE Field Offices, ER Program Offices, and the ER Office of Assessment and Support. The plan required the DOE Field Offices, Chicago and San Francisco, to prepare and submit self-assessment implementation plans, procedures, and schedules for each Field Office and their ER contractors by September 3, 1991. On September 3, 1991, ER Program Offices collectively issued the "ER Program Associate Directorate Implementation Plan for the Self-Assessment Program." These two plans represent important steps toward the full implementation of a formal ES&H self-assessment program in ER. However, there is not a fully functioning corrective action program in place to conduct such processes as tracking, trending, root cause analysis, prioritization, corrective action closure and verification, and lessons learned. Furthermore, to date, ER has neither scheduled nor conducted a self-assessment at any level of ER.

SA-2 **The Department of Energy Office of Energy Research has not provided adequate guidance or timely direction to the Chicago Field Office and Ames regarding ES&H self-assessment.**

Discussion

Prior to ER's issuance of their Self-Assessment Program Plan and Implementation Plan on August 2, 1991, ER did not provide adequate training or formal guidance to either CH or Ames regarding implementation of the Secretary's July 31, 1990, memorandum "Guidance on Environment, Safety, and Health (ES&H) Self-Assessment."

Prior to and subsequent to the issuance of the August 2, 1991, guidance, CH and Ames prepared self-assessment program plans. These were submitted to ER in July and November 1991, respectively. ER provided comments on both the CH and Ames plans in December 1991. At the time of this report, neither plan has been approved by ER.

CH has chosen not to wait for ER approval and is currently implementing their Self-Assessment Program. This situation needs to be resolved expeditiously as continued implementation could result in unnecessary expenditures of resources.

ER has participated in the Intra-office Self-Assessment Task Force to develop the draft notice/Self-Assessment Guidance document issued January 17, 1992. The final notice/Self-Assessment Guidance document is scheduled to be completed by April 1992. ER does not plan to issue interim guidance. Therefore, this document will be used to provide CH and the sites for which ER is responsible the additional guidance necessary to properly implement self-assessment in accordance with SEN-6D-91 and the Secretary's July 31, 1990, guidance. ER also intends to conduct workshops and training for ER, CH, and its contractors on how to implement ER's self-assessment guidance documents.

6.6 EVALUATION OF DEPARTMENT OF ENERGY CHICAGO FIELD OFFICE

6.6.1 Evaluation of Self-Assessment Program

SA-3 **The Department of Energy Chicago Field Office has not fully implemented or institutionalized a self-assessment program.**

Discussion

The CH Program Plan was drafted before the final ER Program Plan was approved and issued. Self-assessment program plans were also drafted for: (1) Assistant Manager for Laboratory Management, July 24, 1991; (2) Assistant Manager for Projects and Energy Programs, undated; (3) Assistant Manager for Safety and Security (AMSS), July 1991, and (4) Environment, Safety and Health Division, July 1991. To date, self-assessments have been performed by all functional organizations, in accordance with their draft program plans. However, the overall plan has not been approved by ER.

SEN-6D-91 directs elements of DOE to establish self-assessment organizations and programs for conducting independent self-assessments of their activities

by September 30, 1991. As of January 27, 1992, CH appointed an individual as the Self-Assessment Officer (SAO) reporting directly to the CH Field Office Manager. CH 1100.c identifies the responsibilities of this individual; however, neither CH 1100.c nor the CH program plan specifies in any detail the manner, the interrelationships, or the authorities by which the SAO will assure that all the disparate elements of the self-assessment program will come together to produce effective ongoing CH-wide self-assessment.

CH does not have a formal "lessons learned" program for disseminating information on deficiencies, corrective actions, and noteworthy practices within the CH divisions and among the sites for which CH is responsible.

Self-Assessment

This finding was identified in the CH Self-Assessment Report.

6.6.2 Evaluation of CH Self-Assessment Report

CH completed an overall self-assessment of the Field Office in November 1991 and a self-assessment of Ames Laboratory Management including CH's management responsibilities for Ames in December 1991. CH also completed an ES&H assessment of Ames in December 1991.

TABLE 6-3
COMPARISON OF CH SELF-ASSESSMENT REPORT FINDINGS AND CONCERNS WITH TIGER TEAM FINDINGS AND CONCERNS

Area	Fully Identified	Partially Identified	Not Identified
Safety and Health	0 (0%)	1 (25%)	3 (75%)
Environmental	NA	NA	NA
Management	3 (60%)	1 (20%)	1 (20%)
Self-Assessment	1 (100%)	0 (0%)	0 (0%)
TOTAL	4 (40%)	2 (20%)	4 (40%)

6.6.2.1 Environment

The CH ES&H assessment was a functional environmental appraisal of Ames. No findings were directed against CH. The CH assessment identified programmatic deficiencies in nearly all environmental disciplines (11 were fully identified and 21 were partially identified). Table 3-1 does provide a comparison of the CH ES&H and the Tiger Team Assessments; however, since these findings are not part of a self-assessment for CH they were not included in the summary tables.

6.6.2.2 Safety and Health

The CH ES&H assessment in the Safety and Health section was mainly a functional appraisal of Ames. Four Safety and Health concerns identified by the Tiger Team were directed at CH. Only one of these concerns was partially

identified in the self-assessment. The four concerns were identified in the areas of Quality Verification, Auxiliary Systems, and Radiological Protection.

6.6.2.3 Management

CH either partially or fully identified 80 percent of the Tiger Team management findings (see Table 6-4, MF-2 through MF-6). However, CH utilized broad descriptions of all of the traditional management areas.

In the self-assessment CH completed on the Field Office, the report included corrective actions; however, these actions are incomplete since there are no milestones and resource requirements specified. Action plans were not completed for the findings identified in the management portion of the CH assessment of Ames.

6.7 EVALUATION OF AMES

6.7.1 Evaluation of Self-Assessment Program

The Secretary's guidance of July 31, 1990, outlines the elements of an effective self-assessment program as it applies to all elements of the Department of Energy system, while SEN-6D-91 directs various elements of DOE to establish "self-assessment" organizations and programs for conducting independent self-assessments of their activities by September 30, 1991.

Interviews were conducted with personnel who participated in self-assessment to determine how it was conducted, the ES&H qualifications of the personnel involved in the assessment, and to determine whether the self-assessment process is institutionalized at Ames.

The evaluation of the self-assessment activities resulted in two findings which reflect the fact that the self-assessment program is in the beginning stages of development and implementation. The self-assessment was conducted by Ames personnel. Specific findings are stated and discussed below.

SA-4 Ames has not developed a self-assessment program.

Discussion

Ames has no formal, comprehensive ES&H self-assessment program tailored to comply with the Secretary's self-assessment requirements under SEN-6D-91 and the Secretary's memorandum "Guidance on Environment, Safety, and Health (ES&H) Assessment," dated July 31, 1990. However, Ames did prepare and submit to CH a draft Self-Assessment Program Plan in September 1991. Neither this plan nor the correlative CH Program Plan have been approved by ER (see SA-2).

Development of a formal self-assessment process is still in the initial developmental stages. Other than preparing the self-assessment program plan, Ames has neither completed any policies and procedures that designate a responsible organization and specifies its authorities and responsibilities, nor are there performance indicators to advise management of the status and quality of the self-assessment process at all levels. Moreover, the draft Self-Assessment Program Plan does not address the qualifications required for the independent self-assessment organization's personnel.

Ames does not have a formal system for developing, executing, and verifying corrective actions. Corrective actions have not been developed for most of the findings identified in the Ames December 1991 Self-Assessment. Ames plans to use the Argonne Management Information System to facilitate the corrective action tracking process.

There is no formal documented procedure to analyze findings, concerns, and deficiencies so that there is consistency in developing root causes for similar findings.

There is no formal process to identify trends and to communicate lessons learned throughout Ames and to incorporate the lessons learned into daily operations and planning.

Self-Assessment

This finding was partially identified in the Ames Self-Assessment Report. Ames did not address the need to develop a responsible organization with specific roles and responsibilities and the need to develop performance indicators.

Finding

SA-5 **Ames has not provided adequate training of personnel or communication of self-assessment requirements.**

Discussion

There is no formal self-assessment training to ensure that line managers to understand how to conduct self-assessments. In addition, there are no training requirements specified in the program plan to ensure that personnel assigned to the self-assessment organization are knowledgeable in appraisal techniques and appropriate ES&H technical areas.

Line managers are aware of the overall goals of the self-assessment program and understand the need to routinely evaluate their ES&H performance. However, line managers have not had adequate guidance and training to effectively develop procedures to evaluate their current and future ES&H roles and responsibilities.

Self-Assessment

This finding was partially identified in the Ames Self-Assessment Report. Ames did not identify the training requirements for line managers.

6.7.2 Evaluation of Ames Self-Assessment Report

Ames has no formal self-assessment program for ES&H. However, the Ames Self-Assessment Report can be used as a baseline which identifies many of the elements missing in Ames' ES&H program. The self-assessment was completed in December 1991 by a team with members from the ES&H Group, the Operations Division, and Administrative Services Division. Although Ames has been able to partially or fully identify 71 percent of the findings and concerns reported in the Tiger Team Assessment, the majority of these findings represent broad issues which indicate the lack of entire programs or systems

that should be in place to have a comprehensive and effective ES&H program. Causal factors were determined for each concern identified, and root causes were determined. The process used to determine the causal factors and root causes was not a formal documented process (see SA-4).

Ames completed their initial self-assessment just prior to the arrival of the Tiger Team, and they decided to wait until the Tiger Team Assessment was completed to initiate development of corrective action plans for the majority of the issues that Ames identified. Therefore, there are no corrective action plans in progress to provide insight into whether Ames has a full understanding of the magnitude and complexity of the actions and resources that will be required to implement the corrective action program.

TABLE 6-4
COMPARISON OF AMES SELF-ASSESSMENT REPORT FINDINGS AND CONCERNS WITH TIGER TEAM FINDINGS AND CONCERNS

Area	Fully Identified	Partially Identified	Not Identified
Safety and Health	51 (42%)	28 (23%)	43 (35%)
Environmental	16 (31%)	23 (44%)	13 (25%)
Management	14 (93%)	1 (7%)	0 (0%)
Self-Assessment	0 (0%)	2 (100%)	0 (0%)
TOTAL	81 (43%)	54 (28%)	56 (29%)

6.7.2.1 Environment

Based on the comparison of the Ames self-assessment with the findings identified by the Environment Subteam, 16 (31 percent) were fully identified and 23 (44 percent) were partially identified. Thirteen (25 percent) were not identified. In the environmental areas, the Ames Self-Assessment Report provides a good initial step in identifying the programmatic deficiencies in nearly all environmental disciplines. The most notable exception was in the area of inactive waste sites. In this area, Ames only identified deficiencies in their management of the Chemical Disposal Site and was not aware of programmatic deficiencies in the characterization and management of potential inactive waste sites. Ames was less successful in identifying some of the specific technical and regulatory deficiencies as evidenced in the areas of Waste Management and Quality Assurance.

6.7.2.2 Safety and Health

While conducting the self-assessment, Ames corrected many safety concerns immediately upon identification. However, Ames has not developed corrective action plans that will eliminate the root cause of these safety issues.

Ames either fully or partially identified 65 percent of the findings identified by the Tiger Team Assessment. As with the Environmental findings, Ames identified broad issues that included the absence of programs, policies, and procedures. Ames was able to identify the majority (over 70 percent fully

or partially) of the global issues in the functional areas of Training and Certification, Site/Facility Safety Review, and Fire Protection, Organization and Administration, Quality Verification, Emergency Preparedness, Technical Support, Packaging and Transportation, and Worker Safety. The areas with poor identification (less than 40 percent) included Maintenance, Auxiliary Systems, Radiological Protection, and Medical Services.

6.7.2.3 Management

Ames either fully or partially identified 100 percent of the Tiger Teams management findings (see Table 6-4). However, it should be noted that Ames utilized broad descriptions of all of the traditional management areas and appears to have assigned findings to these areas with the help of the December 1991 CH ES&H appraisal and Tiger Team performance objectives and criteria. The general absence of specificity in discussions that accompany the findings, and the absence of a corrective action plan, raise some doubts concerning the full understanding and knowledge (see Sections 2.3 and 2.4) necessary to fully address the identified deficiencies.

TABLE 6-5
COMPARISON OF SELF-ASSESSMENT FINDINGS TO MANAGEMENT FINDINGS

MF	Finding Title	Ames Self-Assessment	CH ES&H Self-Assessment and Assessment of Ames
MF-1	ER Oversight	NA	NA
MF-2	Contractual Matters	F	P
MF-3	CH ES&H Roles, Responsibilities, and Authorities	NA	F
MF-4	CH Oversight	NA	F
MF-5	CH Work for Others	NA	N
MF-6	Corporate Support-Iowa State University	F	F
MF-7	Ames Planning Process	F	F
MF-8	Ames ES&H Roles, Responsibilities, and Authorities	P	P
MF-9	Ames Stop-Work and Restart Authority	F	F
MF-10	Ames Human Resource Planning Process	F	F
MF-11	Ames ES&H Training	F	F
MF-12	Ames Personnel Management System	F	F

TABLE 6-5
COMPARISON OF SELF-ASSESSMENT FINDINGS TO MANAGEMENT FINDINGS

MF	Finding Title	Ames Self-Assessment	CH ES&H Self-Assessment and Assessment of Ames
MF-13	Ames Corrective Action System	F	F
MF-14	Ames Directive Management System	F	F
MF-15	Ames Policies and Procedures	F	N
MF-16	Ames Formality of Operations	F	P
MF-17	Ames Oversight	F	F
MF-18	Ames Safety Coordinator Program	F	F
MF-19	Ames Work for Others	F	F

F = Fully
N = Not Identified
P = Partially
NA = Not Applicable

APPENDICES

Appendix A

ASSESSMENT TEAM PERSONNEL AND BIOGRAPHICAL SKETCHES

Appendix A-1

BIOGRAPHICAL SKETCHES OF TIGER TEAM ASSESSMENT TEAM LEADER AND TEAM LEADER STAFF

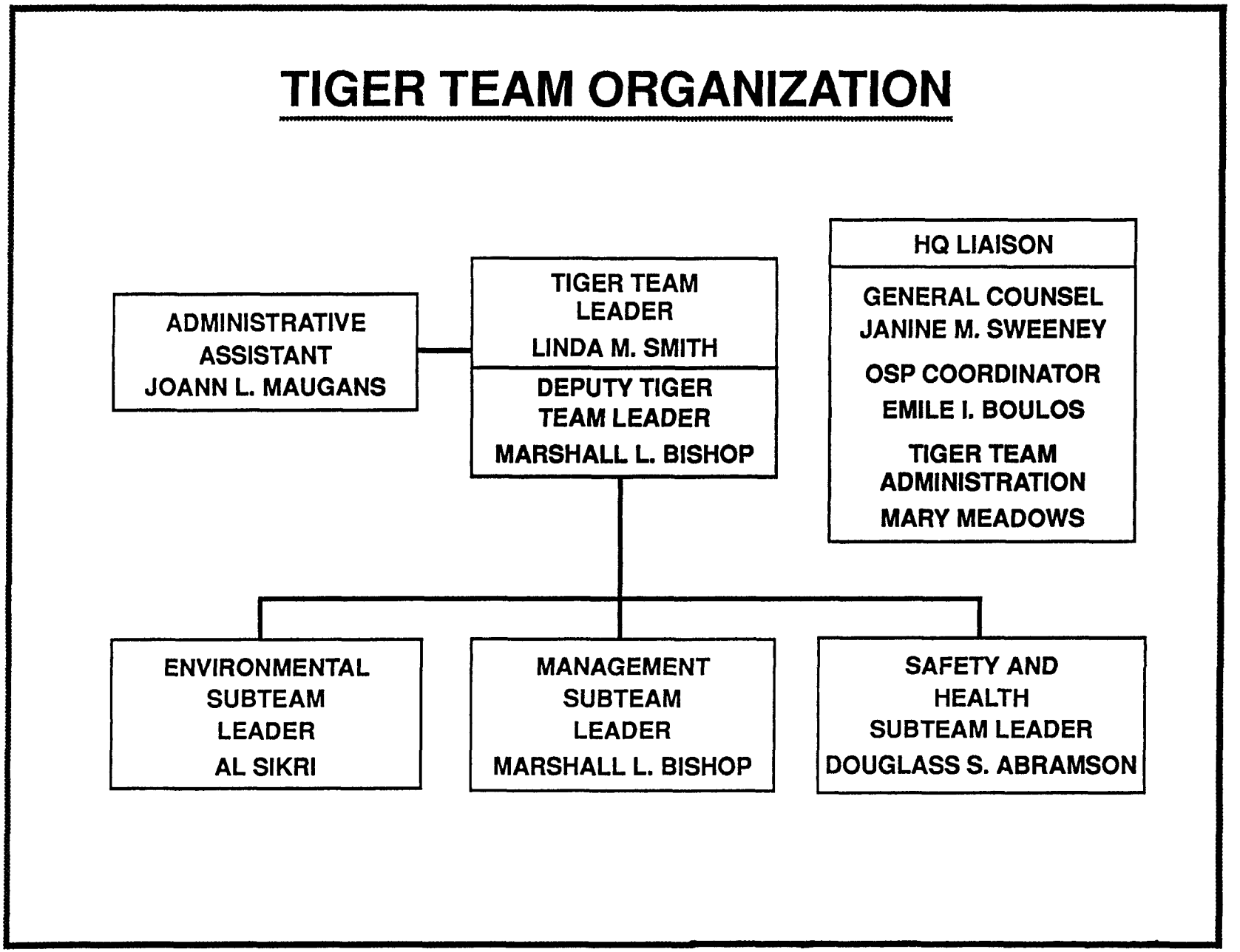

Figure A-1
Ames Laboratory Tiger Team Organization

NAME: Linda M. Smith

AREA OF RESP: Tiger Team Leader

ASSOCIATION: Acting Deputy Manager, Nevada Field Office, Department of Energy

EXPERIENCE: 27 years

- Nevada Field Office, Department of Energy
  - Acting Deputy Manager (collateral duty) - responsible for assisting Manager in management and oversight of field office programs and projects, including the nation's nuclear weapons test program; national nuclear emergency response; nuclear treaty verification activities; environmental restoration and waste operations; and support to the Yucca Mountain Project, the nation's first high-level nuclear waste repository for civilian nuclear power plants.
  - Assistant Manager for Administration - responsible for managing all administrative resources, including finance, accounting, budgets, planning, human resources, industrial relations, training, procurement, property, information systems, and contract administration. Serves as Contracting Officer for four major management and operations contracts which provide 8000 people and nearly one billion dollars worth of support to the complex.
  - Deputy Assistant Manager for Administration. As primary Deputy to the AMA, assisted in executing management and oversight of activities as reflected above.
  - Director, Organization and Personnel Division - responsible for directing and overseeing all human resources programs, including federal personnel, contractor industrial relations, employee development, and organization and management.
- Arizona Projects Office
  - Manager, Administration - responsible for management of all administrative functions supporting the APO, Bureau of Reclamation, Phoenix, including personnel, procurement, property, budget, finance, and administrative support. APO is responsible for construction, operations and maintenance of the Central Arizona Project, a multibillion dollar water delivery system.

EDUCATION: M.B.A., Arizona State University
B.A., Political Sciences, University of Nevada - Las Vegas

NAME: Marshall L. Bishop

AREA OF RESP: Deputy Tiger Team Leader

ASSOCIATION: Rocky Flats Office, Department of Energy

EXPERIENCE: 25 years

- U.S. Department of Energy
  - Assistant Manager for Administration, Rocky Flats Office (RFO). Responsible for management and administrative functions within RFO including budget, Federal personnel, finance and internal assessment, industrial relations, procurement and property management, and site support. As Contracting Officer performs related oversight and contract administration.
  - Chief, Contract Management Branch, Richland Field Office. Responsible for procurement management and contract administration of major site Management and Operating contracts. Contracts included Westinghouse Hanford Company, UNC Nuclear Industries, Rockwell Hanford Company, J.A. Jones Construction Management Company, and Battelle Pacific Northwest Laboratory.
  - Contracting Officer, Region X Office. Solicited, selected, and awarded financial assistance instruments for advanced energy technology, weatherization, and school and hospital conservation programs. Responsibilities included administration and close out of technology programs.
- U.S. Department of Defense
  - Subcontract Manager, AFPRO, The Boeing Company. Managed major subcontracts for the E3A AWACS aircraft program, including negotiation and development of MOUs for the E3A NATO Program.
  - Contracting Officer, Air Force Logistic Command. Contracted for spare parts for F4 Phantom and other aircraft. Negotiated prices, terms, and conditions to meet critical logistics maintenance requirements.
  - USAF, Munitions and emergency ordnance disposal.

EDUCATION: B.S., Business Management, Weber State University
A.A., Real Estate Management, Everett Community College
Post Graduate Work, City University

NAME: Joann L. Maugans

AREA OF RESP: Administrative Assistant to Tiger Team Leader

ASSOCIATION: Nevada Field Office, Department of Energy

EXPERIENCE: 30 years, Federal Civil Service

- Office of Assistant Manager for Operations, Nevada Field Office, Department of Energy

  - Secretary to the Assistant Manager for Operations - providing administrative and stenographic support in an organization having operational control for the Nevada Test Site and responsibility for test operations, safeguards and security, verification control technology, environmental restoration and waste management, and Nevada Test Site operations.

- HQ Pacific Air Forces, Hickam AFB, HI

  - Secretary to the Director of Operations - provided administrative and stenographic support in an organization having responsibility for all Air Force operations functions throughout the Pacific and Far East.

- Cannon AFB, NM

  - Secretary to the Commander, Communications Squadron; Base Chaplain; and Base Supply Officer - provided administrative and stenographic support in the above organizations having responsibility for providing these services at Cannon AFB, NM.

- Commander-in-Chief Pacific, Camp Smith, HI

  - Secretary to Media and Community Affairs Officers in the Public Affairs Office - provided administrative and stenographic support in an organization having responsibility for all contact with the media and public, in addition to supporting the visits of the President and Vice President of the United States, Secretary of State, and other U.S. and foreign dignitaries.

- Defense Contract Audit Agency, Minneapolis, MN; Bangkok, Thailand; and Los Angeles, CA

  - Secretary to the Manager - provided administrative and stenographic support and performed desk audits in an organization having responsibility for auditing Department of Defense contracts.

NAME: Mary Meadows

AREA OF RESP: Tiger Team Administrator

ASSOCIATION: Office of Performance Assessment, Headquarters, Department of Energy

EXPERIENCE: 32 years

- U.S. Department of Energy
  - Supervisory Appraisal Specialist: Responsible for the overall administrative planning and conduct of Tiger Team Assessments, Technical Safety Appraisals, Management Appraisals, Nuclear Safety Program Appraisals, Design Reviews, and Comprehensive Appraisals. Responsible for the overall coordination of production for draft reports in the field and final publication of reports at Headquarters, DOE.
  - Staff Assistant, Office of Environmental Compliance and Overview. Recommended specific changes in administrative procedures for the purpose of increasing efficiency, eliminating unnecessary details, and providing needed management control.
  - Staff Assistant, Office of Bio-Medical and Environmental Research, USAEC, ERDA. Obtained and communicated information to organizations and individuals inside/outside of the Agency on a wide range of organizational, personnel, and procedural issues.
  - Staff Assistant, Office of the Commissioner, USAEC.
  - Administrative Assistant, Office of the Assistant General Manager for Research and Development, USAEC.
- Other Related Experience
  - Administrative and conference planning responsibilities within the USAEC, ERDA, and DOE.

EDUCATION: Numerous work-related courses and workshops at various colleges, training centers, SSDC, and the American Management Association.

OTHER: Member, U.S. Delegation to Disarmament Conference, Geneva, Switzerland, USAEC
Recipient of Federal Government Awards for superior performance

Appendix A-2

BIOGRAPHICAL SKETCHES OF ENVIRONMENTAL SUBTEAM MEMBERS

NAME: Atam P. (Al) Sikri

AREA OF RESP: Environmental Subteam Leader

ASSOCIATION: U.S. Department of Energy, Office of Environmental Audit

EXPERIENCE: 24 years

U.S. Department of Energy

- Team Leader and Environmental Engineer, Office of Environmental Audit. Provides guidance, direction, and assistance to a multi-disciplined group of professionals performing Environmental Audits and Assessments at DOE facilities. Participated as the Environmental Subteam Leader for the Stanford Linear Accelerator Center, Tiger Team Assessment; Team Leader for the West Valley Demonstration Project, Environmental Audit; and an Assistant Subteam Leader for the Sandia National Laboratories, Tiger Team Assessment.

- Assessment and Validation Engineer, Office of Program/Project Management. Provided independent appraisal of projects involving design/construction, environmental aspects planning/scheduling, and cost estimating. Also, NEPA Compliance Officer for the Office of Procurement.

- Program Manager/Assistant Director, Office of Fossil Energy. Responsible for directing and managing synthetic fuel research, development, and demonstration of technologies. Processes were developed in full compliance with environmental regulations.

- General Engineer, Office of Defense Programs. Worked with uranium enrichment technology, project management, and classification determination capability.

Other Experience

- Petroleum Engineer, U.S. Corps of Engineers. Work involved process design, project engineering, and cost studies.

- Senior Process Design/Development Engineer. Have worked with DuPont Company, Cities Service Company (now part of Occidental Petroleum Corporation), Johnson & Johnson, and Hoffmann-LaRoche, Incorporated

EDUCATION: Ph.D., Chemical Engineering, University of Pennsylvania
M.S.E., Chemical Engineering, University of Michigan
B.S.E., Metallurgical Engineering, University of Michigan
B.S.E., Chemical Engineering, University of Michigan

NAME: William A. Eckroade

AREA OF RESP: Deputy Environmental Subteam Leader

ASSOCIATION: U.S. Department of Energy, Office of Environmental Audit

EXPERIENCE: 5 years

U.S. Department of Energy, Office of Environmental Audit

- Environmental Engineer under the direction of the Environmental Subteam Leader, provides guidance, direction and assistance to a multidisciplined group of professionals performing Environmental Audits and Tiger Team Assessments at DOE facilities.

- Served as the Deputy Team Leader for environmental audits at the Maywood, New Jersey FUSRAP site, the Grand Junction Project Office, and the Bonneville Power Administration.

- Served as the Team Leader for the Line Program Environmental Management Audit of the Western Area Power Administration.

- Served as the Deputy Environmental Subteam Leader for Tiger Team Assessments at the Energy Technology Engineering Center and the Ames Laboratory.

U.S. Department of Energy, Office of Environmental Compliance

- Environmental Engineer responsible for conducting independent oversight of Environmental Compliance activities at the Savannah River Site.

U.S. Environmental Protection Agency, Office of Waste Programs Enforcement

- Environmental Engineer responsible for providing assistance in technical case development to assigned EPA regional offices. Additionally, responsible for conducting oversight of regional activities involving activities at enforcement lead Superfund sites.

EDUCATION: M.S., Civil Engineering, University of Maryland
B.S., Geophysics, Virginia Polytechnic Institute

NAME: Christopher B. Martel

AREA OF RESP: Group Coordinator

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 9 years

Arthur D. Little, Inc.

- Participated in the Tiger Team Assessments of the Energy Technology Engineering Center, Stanford Linear Accelerator, and Oak Ridge K-25 Site as the radiation specialist; and served as the radiation team leader for the Tiger Team Assessment of the Idaho National Engineering Laboratory.

- As Corporate Radiation Safety Officer for Arthur D. Little, Inc., for 5 years, managed all radiation safety activities for the company's Type A Broad Scope License issued by the Nuclear Regulatory Commission. Developed and implemented all programs, training, environmental surveillance, dosimetry, and licensing aspects of the program.

- Project manager for a quantitative radiological hazard assessment for a major phosphate mining operation to evaluate worker exposures from, and environmental releases of, naturally occurring radioactive materials (NORM). Conducted extensive surveys, material sampling, and air sampling. Evaluated handling and disposal procedures of wastes containing high activity concentrations of NORM.

- Performed remedial investigations to quantify environmental levels of a variety of radionuclides on several sites that included research reactors, accelerators, depleted uranium working facilities, and research laboratories.

- Performed several quantitative risk assessments for the transport of low-level radioactive waste, high-level radioactive waste, and large quantity shipments of radioactive materials.

- Conducted radiological health and safety audits at oil and gas operations, a major hospital, numerous biotechnology laboratories, chemical plants, research and development laboratories, and government institutions.

EDUCATION: M.S., Health Physics, University of Lowell
B.S., Environmental Sciences, University of Lowell

NAME: James P. Daniel

AREA OF RESP: National Environmental Policy Act

ASSOCIATION: U.S. Department of Energy, Office of NEPA Oversight

EXPERIENCE: 16 years

U.S. Department of Energy

- Environmental Protection Specialist. Responsible for the review and processing of DOE NEPA documentation for approval by the Assistant Secretary for Environment, Safety, and Health.

- NEPA Group Leader, Environmental Subteam, DOE. Performed DOE Tiger Team surveys at the Paducah and Portsmouth Gaseous Diffusion Plants, Pinellas Plant, Sandia National Laboratories (Albuquerque) and Ames Laboratory to evaluate the adequacy of NEPA documentation.

Federal Energy Regulatory Commission (FERC)

- Environmental Biologist/Project Manager. Responsible for the preparation and review of environmental assessments (EAs), environmental impact statements (EISs), and related NEPA documentation for natural gas pipelines, liquified natural gas (LNG) plants, and associated facilities proposed for certification.

Wheeler Industries, Inc.

- Research Assistant. Responsible for the preparation of environmental analysis and reports for mariculture operations, biological filters, and underwater ship husbandry.

EDUCATION: Graduate Studies in Environmental Biology, George Mason University
B.S., Wildlife Management, Northwestern State University of Louisiana

NAME: Paul H. Jones, Jr., C.H.P.

AREA OF RESP: Radiation

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 10 years

Arthur D. Little, Inc.

- Provided radiological data for nuclear power facility exercises. This program included generation of in-plant, onsite and offsite radiological data and development and analysis of data for reentry/recovery and ingestion pathway drills. Developed and taught training programs for emergency response and radiological data development. Served as the DOE environmental radiation specialist for the Weldon Spring Remedial Action Project, Grand Junction Project Office, and Uranium Mill Tailing Remedial Action Project Environmental Audits, and as the Solar Energy Research Institute, Pittsburgh Energy Technology Center and Los Alamos National Laboratory Tiger Teams. Served as the environmental radiation team leader for the Los Alamos National Laboratory Tiger Team. Served as the Environmental protection Programs and Risk Assessment specialist for the Western Area Power Administration Line Management Audit

General Electric Company, Knolls Atomic Power Laboratory

- Served as the site radiological controls auditor. Conducted comprehensive evaluations, audits, and surveillance of laboratory and prototype radiological work activities, and provided comprehensive assessments useful to management in assuring a high degree of compliance with radiological controls requirements, improvement in radiological work practices, and attainment of high and uniform radiological standards.

- Prepared and reviewed radiological work permits, procedures, and packages, including comprehensive ALARA review. Provided technical evaluation of work practices and implementation of proper radiological controls for site facilities, including radioactive waste disposal, critical facilities, fuel processing, chemistry laboratories, and materials characterization laboratories.

EDUCATION: M.S., Environmental Engineering, University of Lowell
M.S., Radiological Sciences and Protection Physics, University of Lowell
B.S., Civil Engineering, University of Lowell

OTHER: Certified by the American Board of Health Physics as a Certified Health Physicist
Engineer-in-Training in Massachusetts

NAME: Richard Lynch

AREA OF RESP: Environmental Subteam Report Administration

ASSOCIATION: META

EXPERIENCE: 4 years

META

- Technical Editor/Information Management Specialist. Provides administrative oversight, technical editing, and graphics support to Environmental Subteams during Tiger Team Assessments. Also, oversees the preparation of the camera-ready copy of final assessment reports for the U.S. Department of Energy's (DOE's) Office of Special Projects.

- Writer/Editor. Provides technical writing and editing support for DOE's Office of New Production Reactors (NPR), including writing NPR's Correspondence Manual and a variety of technical articles for publication.

Advanced Sciences, Inc.

- Writer/Editor. Researched, wrote, and edited fact sheets and information briefs on energy conservation and renewable energy topics for a DOE-funded energy information service.

- Response Analyst/Media Liason. Analyzed and researched inquiries on energy from the general public, U.S. Congress, and trade associations. Also, wrote information briefs, press releases, and assisted with media outreach activities.

EDUCATION: B.A., Liberal Arts, Louisiana State University

NAME: Donald Neal

AREA OF RESP: Waste Management

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 8 years

Arthur D. Little Inc.

- Waste management specialist for Tiger Team Assessment of Oak Ridge K-25 Site.
- Provides technical guidance to commercial client on household hazardous waste management.

CSI Resource Systems Inc.

- Managed environmental permitting of waste management facilities including environmental impact assessments, air, water, and solid waste permits.
- Prepared solid and hazardous waste management plans for industry and municipalities.
- Evaluated waste management facility compliance with environmental permits and regulations.
- Investigated methods for air pollution monitoring, air emissions control, and source testing, for independent engineering evaluations for investors and other interested parties.

ENSR Consulting and Engineering

- Managed environmental assessments and permitting of industrial facilities including solid and hazardous waste, power generation, cogeneration, pulp and paper, and natural gas storage and transmission.

GCA Technology Division

- Project manager for quality assurance for 1985 National Acid Precipitation Assessment Program (NAPAP) emissions inventory.
- Designed and implemented Continuous Emissions Monitoring System for air emission sources.

EDUCATION: M.S., Biology, University of Massachusetts
B.S., Biology, University of Massachusetts

NAME: Paul Pifalo

AREA OF RESP: Quality Assurance

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 18 years

Arthur D. Little, Inc.

- Evaluated quality assurance capabilities, risk to the government, and contractor quality compliance during site audits as a U.S. Department of Defense support contractor.
- Served as Quality Assurance Manager for the Engineering Sciences Section of Arthur D. Little, Inc. Prepared and received government approval of a Program Quality Assurance Plan which required MIL-Q-9858A compliance.
- Managed a manufacturing system, certified by the American Society of Mechanical Engineers (ASME) and National Board of Boiler and Pressure Vessel Inspectors, to be compliant to ASME Code Section VIII (Unfired Pressure Vessels) with welders certified under ASME Code Section IX.
- Broad-based quality and manufacturing engineering experience in DOD/U.S. Department of Energy projects.

M/A-COM, Inc. (Missile Sub-system Division)

- Managed a manufacturing organization which produced hardware sub-assemblies used in the guidance and control of 7 M and 7 F sparrow missiles, built by Raytheon and General Dynamics.
- Extensive manufacturing engineering and management experience in defense electronics, metal fabrication, and the plastics industry.

EDUCATION: M.B.A., Business Administration, Suffolk University
B.S., Industrial Engineering, University of Lowell

NAME: Steven Railsback

AREA OF RESP: National Environmental Policy Act

ASSOCIATION: Oak Ridge National Laboratory

EXPERIENCE: 10 years

Oak Ridge National Laboratory

- Research Associate, Environmental Sciences Division. Prepare site-specific and programmatic NEPA documents for the U.S. Department of Energy (DOE), the Federal Regulatory Commission, and the National Science Foundation. Analyze impacts to water resources of single and multiple hydroelectric projects, national energy policies, clean coal technologies, and operation of the U.S. Antarctic Program. Conduct research on effects of energy development on aquatic ecosystems. Perform environmental audits at DOE and Air Force installations.

Entrix, Inc.

- Environmental Engineer. Conducted research and preparation of environmental impact documents on effects of hydroelectric power on fisheries.

U.S. Army

- Environmental Branch Chief, Environmental Engineer. Responsible for compliance with NEPA and other environmental laws at Army installations in Alaska.

- Environmental Engineer. Conducted research to assist military bases in compliance with environmental regulations.

EDUCATION: M.S., Environmental Engineering, University of Illinois at Urbana-Champaign
B.S., Civil Engineering, University of Illinois at Urbana-Champaign

NAME: Patricia Rodden

AREA OF RESP: Inactive Waste Sites

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 7 years

Arthur D. Little, Inc.

- Coordinated environmental, health, and safety audit teams for commercial and government organizations and operations. Participated in Tiger Team Assessment of the Oak Ridge K-25 Site as the inactive waste site specialist.

Massachusetts DEP

- Developed policies and guidance on conducting environmental assessments at solid waste landfills. This guidance described the assessment process from file review and facility inspection, to designing the environmental monitoring program, interpreting the results, and determining the need for corrective action.

- Designed and managed the assessment and remediation of hazardous waste and solid waste sites. Responsible for designing the sampling and analysis plan, evaluating quality of field work, interpreting the data gathered, and determining the human health and environmental risk associated with the site.

- Conducted inspections of facilities to determine their compliance with Federal regulations. Inspections focused on environmental issues, and included: File review; evaluation of the environmental monitoring system; and ground water, surface water, and soil sample collection. Analytical results of the samples collected were compared with the facility's monitoring results to check the accuracy of their analytical laboratory.

EDUCATION: B.S., Geology, Boston College

NAME: William E. Schramm

AREA OF RESP: National Environmental Policy Act

ASSOCIATION: Oak Ridge National Laboratory

EXPERIENCE: 12 years

Oak Ridge National Laboratory

- Research Associate. Integrated Resource Management, Environmental Assessment, Ecological Economics. Provides technical assistance on NEPA related issues to the U.S. Department of Energy, Office of NEPA Oversight, and to other Federal agencies. Participated in Tiger Team Assessments of the Solar Energy Research Institute, Los Alamos National Laboratory, Stanford Linear Accelerator Center, and Naval Petroleum Reserve.

Martin Marietta Energy Systems, Hazardous Waste Remedial Actions Program

- Project Manager. Environmental Protection and Restoration. Directed remedial actions and environmental studies under CERCLA, RCRA, and CWA. Investigations included assessments of the level and type of contamination, and feasibility of alternative remediation approaches at 16 Department of Defense facilities in 14 states.

University of Texas at Austin, Texas Bureau of Economic Geology

- Research Associate. Investigated geologic and economic feasibility of alternative methods of enhanced oil and gas recovery. Developed estimates of the state's remaining gas.

Ocean Drilling and Exploration Company

- Senior Staff Geologist. Supervised exploration and development team activities for several company properties.

Union Oil Company of California

- Geologist. Oversight of field development activities on 10 company fields.

EDUCATION: Ph.D. Program, Ecology, University of Tennessee
M.B.A., Natural Resource Management, University of Texas-Austin
M.S., Geology, Louisiana State University
B.S., Geology, Rensselaer Polytechnic Institute

NAME: Sarah J. Simon

AREA OF RESP: Air

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 20 years

Arthur D. Little, Inc.

- Participated in the Pittsburgh Energy Technology Center and Oak Ridge K-25 Tiger Team Assessments as air specialist for the Environmental Subteam.
- Performed environmental risk/liability assessments for pulp and paper, electrical connector, and manufacturing facilities. Coordinated risk assessment teams.
- Presented session on excellence in environmental management systems

Massachusetts Division of Air Quality Control

- Directed the quality assessment programs including monitoring, modeling, and emission inventories. Planned and developed an air toxic monitoring program. Procured a mobile laboratory and data acquisition system.
- Provided air program liaison and developed recommendations for new programs addressing site cleanup and multi-media permits and operations; network computer systems; and legislative commissions on lead and indoor air pollution.

U.S. Environmental Protection Agency, Region I

- Evaluated state air programs. Reviewed technical and regulatory adequacy of energy facility emission limits; emission inventories; state implementation plan submittals; and acid deposition programs.
- Reviewed Federal air and water permit applications and grants; audited state programs; and performed compliance inspections.

EDUCATION: M.S., Environmental Engineering, Northeastern University
B.S., Civil Engineering, Massachusetts Institute of Technology

NAME: Clifford H. Summers

AREA OF RESP: Surface Water

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 31 years

Arthur D. Little, Inc.

- Performs inspections and audits for a variety of clients, both commercial and government, in areas such as aerospace manufacturing, power generation, and chemical and petrochemical manufacturing.

- Supports a commercial client in remedial planning to ensure compliance with the Clean Water Act and NPDES regulations, including development and implementation of sampling programs, preparation of a water pollution control manual, preparation of an application for an NPDES permit modification, and assistance in negotiations with state regulators.

- Resident Environmental Coordinator on Johnson Island for the Army Chemical Demilitarization program. Responsible for preparation and implementation of environmental compliance by the Operations and Maintenance Contractor. Oversight responsibility for five environmental engineers and five plant operations departmental staff.

EDUCATION: Graduate Studies at Louisiana State University and Northeastern University
A.B., Chemistry, Florida State University

NAME: Linda S. Wennerberg, Ph.D.

AREA OF RESP: Toxic and Chemical Materials

ASSOCIATION: Arthur D. Little, Inc.

EXPERIENCE: 16 years

Arthur D. Little

- Participated in the Weldon Spring Site Remedial Action Project Environmental Audit, Morgantown Energy Technology Center, Pittsburgh Energy Technology Center, Stanford Linear Accelerator Center, and Oak Ridge K-25 Site Tiger Team Assessments as the toxic and chemical materials specialist.
- Negotiated the Statement of Work with the Environmental Protection Agency at a combination CERCLA/FUSRAP site.
- Assessed the availability and efficacy of new technologies to treat and remediate radioactive, hazardous, and mixed waste contamination.
- Provided oversight to a commercial client developing a comprehensive TSCA program for all employees.

Commonwealth of Massachusetts

- Low-Level Radioactive Waste Coordinator, Department of Environmental Protection. Analyzed radioactive waste laws, regulations, and management practices, serving as a technical expert on mixed waste regulation.
- Drafted performance framework analyzing hazardous waste programs for the state-wide Environmental Impact Report of 1986.

State of Michigan

- Audited the environmental compliance program of the Geological Survey Division on oil and gas drilling operations.

Michigan State University

- Assessed the implementation of TSCA regulations and the impact on the regulated industries.

EDUCATION: Ph.D., Environmental Law, Resource Economics and Hazardous Waste Management, Michigan State University
M.S., Environmental Law, Michigan State University
B.S., Terrestrial Ecology, Michigan State University

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BIOGRAPHICAL SKETCHES OF SAFETY AND HEALTH SUBTEAM MEMBERS

NAME: Douglass S. Abramson

AREA OF RESP: Safety and Health Subteam Leader

ASSOCIATION: Office of Performance Assessment, Headquarters, Department of Energy

EXPERIENCE: 17 years

- U.S. Department of Energy, Germantown, MD
  - Subteam Leader for Accelerators TSA at Los Alamos National Laboratory.
  - Assistant Subteam Leader for Technical Safety Appraisals (TSAs) in support of Tiger Teams at ETEC, METC, and SERI.
- U.S. Department of Energy, Assistant Secretary, Conservation and Renewable Energy, Washington, DC
  - Program Manager and Mechanical Engineer for Test Procedures and Energy Conservation Standards for central air conditioners, room air conditioners, refrigerator/freezers, humidifiers and dehumidifiers, fluorescent lamp ballasts, and television sets.
- National Institutes of Health, U.S. Department of Health and Human Services, Bethesda, MD
  - Team Leader for the design and construction of multimillion dollar renovation and new construction of medical facilities, research facilities, and animal facilities. Project Manager for the construction of the nuclear medicine cyclotron facility.
- U.S. Army, Corps of Engineers, United States and Europe
  - Captain, Commander of Engineer Company, responsible for all activities including training, maintenance, and safety.

EDUCATION: B.S., Mechanical Engineering, Drexel University
Engineer Officer Basic Course and Engineer Officer Advanced Course, Fort Belvoir, VA
U.S. Army Command and General Staff College, Fort Leavenworth, KS

NAME: J. Kenneth Anderson

AREA OF RESP: Technical Support and Packaging and Transportation

ASSOCIATION: Private Consultant

EXPERIENCE: 40 years

- U.S. Department of Energy (contractor employee/consultant)
  - Participated in 12 Technical Safety Appraisals
- Westinghouse Hanford Company
  - Manager, Safety Assessment Office
  - Manager, Nuclear Safety
  - Executive Secretary and Member, Westinghouse Hanford Company Safeguards (Nuclear Facility Safety Review) Council
  - Classification Officer
- Nuclear facility (reactor and nonreactor) design, operations, and safety analyses and safety appraisals
- Six years of experience with experimental and analytical heat transfer and hydraulics

EDUCATION: B.A., Physics, University of Utah
Graduate courses in physics, mathematics, and reactor design analysis, University of Idaho

NAME: George P. Bailey

AREA OF RESP: Emergency Preparedness and Fire Protection

ASSOCIATION: Advanced Systems Technology, Inc.

EXPERIENCE: 31 years

- Advanced Systems Technology, Inc.
  - Manager, Emergency Preparedness
- Stone & Webster Engineering Corp.
  - Senior Emergency Planning Analyst
- Public Service of Indiana
  - Senior Emergency Preparedness Licensing Engineer, Marble Hill, Nuclear Generating Station
- Louisiana Power and Light
  - Site Emergency Planning Coordinator, Waterford 3, Steam Electric Station
- Nuclear Energy Services, Inc.
  - Manager, Protective Services
- U.S. Air Force, Retired
  - Onsite Controller, Nuclear Emergency Team

EDUCATION:
University of Philippines
Tunxis Community College
Hartford State Vocational College
NET Course, Sandia Base, NM
Disaster Preparedness Instructor Course
CBR Warfare Instructor Course
Nuclear Weapons Basic Course
Nuclear Weapons Advance Recertification

OTHER:
AF - Former Member, Subcommittee on Siting, Licensing and Emergency Preparedness
AIF - Former Member, Subcommittee on Safeguards
Member, Society of Fire Protection Engineers

NAME: Lorin C Brinkerhoff

AREA OF RESP: Organization and Administration, Training and Certification, and Security/Safety Interface

ASSOCIATION: Private Consultant

EXPERIENCE: 38 years

- Private Consultant, associated with ORAU; Scientech, Inc.; and EG&G Idaho
- Participant in more than 20 Tiger Team Assessments and Technical Safety Appraisals.
- Technical Safety Appraisal Team Leader/DOE Office of Safety Appraisals
- Acting Reactor Safety Branch Chief, DOE Headquarters
- Senior Nuclear Safety Specialist, AEC/ERDA/DOE
- Senior Nuclear Engineer, Aerojet General Corporation, Nerva Program, Nuclear Rocket Development Site (NRDS), Nevada Test Site
- Manager, Nuclear Critical Facility, Lawrence Livermore National Laboratory
- Reactor Foreman, Phillips Petroleum Co., Idaho Test Site
- Graphite Research Analyst, Hanford, WA

EDUCATION: B.S., Chemical Engineering, University of Utah

OTHER: Member, ANS-15 Standards Committee on Research Reactor Safety (1980-1989)
Member, ANSI N-16 Standards Committee on Nuclear Criticality Safety (1978-1984)
Listed in Who's Who in the East and Who's Who in the World

NAME: David M. Drury

AREA OF RESP: Worker Safety and Health (OSHA) Compliance and Personnel Protection

ASSOCIATION: Private Consultant

EXPERIENCE: 7 years

- Private Consultant
  - Participant in Technical Safety Appraisals (TSAs) for Tiger Team Assessments

- Monterey Coal Company (MCC) (subsidiary of Exxon, USA)
  - Training Specialist: Coordinating and documenting training requirements and individualized assessments for training.
  - Safety Specialist: Analyzed MCC accident statistics, maintained MSHA CFR 30 updates, maintained Illinois Right-to-Know law requirements, including MSDSs.
  - Health and Safety Technician: Maintained all health monitoring equipment, conducted air quality and noise sampling, fire protection audits, and self-rescuer audits.

- Safety Inspector: Loss control system, Computer Loss Control Surveillance System, MSHA inspections and worker safety audits; Emergency Preparedness system.

- Exxon U.S.A.
  - Field Safety Coordinator: Valdez oil spill - conducted State and Federal OSHA inspections of all facilities (barges, petroleum storage areas, vessels, food handling, etc.); worker safety and equipment audits.

EDUCATION: B.S., Industrial Technology, Southern Illinois University
Associates Degree, Mining Technology, Wabash Valley College
MSHA Instructor Certifications
MSHA Electrical Qualifications
Emergency Medical Technician (EMT-I)
OSHA 24-Hour Hazard Material Certification

OTHER: U.S. Army, 4 years
Ansul Industrial Fire School
National Safety Council Congress & Exposition
Mine Emergency Preparedness
Loss Control Management Training
Loss Control Surveillance System (data processing)

NAME: Tobias E. Drury

AREA OF RESP: OSHA 1B Technical Specialist

ASSOCIATION: Private Consultant

EXPERIENCE: 3 years

- Member, Technical Safety Appraisals
  - OSHA Technical Support, Los Alamos and Oak Ridge K-25 Tiger Team Assessments
- J.W. Gant and Associates
  - Stockbroker: Performed computerized analysis of individual stocks, mutual funds, and various other portfolios.
- Prudential Financial Services
  - Stockbroker/Financial Planner: Performed computer analysis for individual investment plans

EDUCATION: B.S., Finance with minors in Business Administration and Economics, Illinois State University

NAME: Lydia G. Guerra

AREA OF RESP: Report Coordinator, Safety and Health

ASSOCIATION: M. H. Chew and Associates

EXPERIENCE: 13 years

- M. H. Chew and Associates
  - Administrative Assistant to Tiger Team Leader for the Tiger Team Assessment at the Los Alamos National Laboratory (LANL). Responsible for assisting Tiger Team Leader with communications, weekly and monthly reports, schedules, and administrative support.
  - Report Coordinator responsible for the overall coordination and production of the draft report at the Princeton Plasma Physics Laboratory.
  - Report Coordinator for the Management Team Report of the Tiger Team Assessment at the Idaho National Engineering Laboratory (INEL) and LANL.
  - Report Coordinator for the Safety and Health Subteam Reports of the Tiger Team Assessments at Lawrence Berkeley Laboratory, Pittsburgh Energy Technology Center, Princeton Plasma Physics Laboratory, LANL, and the Oak Ridge K-25 Site.
- Westinghouse Idaho Nuclear Company, Inc.
  - Report Coordinator for Safety and Health Subteam Reports of the Tiger Team Assessments at Savannah River Site, Pinellas Plant, and Brookhaven National Laboratory.
  - Report Coordinator for Technical Safety Appraisal Reports at Oak Ridge National Laboratory, Strategic Petroleum Reserve Site, and Y-12 Plant TSA Followup.
  - Coordinator for the Technical Safety Appraisal at the Idaho Chemical Processing Plant at INEL.
  - Manager, Information Processing Services, responsible for the management direction and operation of two centralized information processing centers.

EDUCATION: B.S., Education: Corporate Training, Idaho State University

OTHER: Certified Instructional Trainer for Corporate Training
Word-Processing Instructor, Eastern Idaho Technical College

NAME: Jack J. Janda

AREA OF RESP: Worker Safety and Health (OSHA) Compliance and Personnel Protection

ASSOCIATION: Comprehensive Environmental Health Services, Inc.

EXPERIENCE: 19 years

- Comprehensive Environmental Health Services, Inc.
  - Safety and health training
  - Phase I and II site assessments
  - Onsite OSHA-type compliance inspections
  - Safety and industrial hygiene surveys
  - DOE Technical Safety Appraisals and Tiger Team Assessments
- Occupational Safety and Health Administration
  - Established regional enforcement goals, policies, and procedures
  - Directed industrial hygiene and safety compliance activities
  - Managed agency programs, supervised industrial hygienists and safety specialists, and team leader on major inspections
  - Expert witness
- Accident Prevention Laboratory, Institute of Agricultural Medicine
  - Accident investigations involving consumer products, flammable clothing and products, etc.

EDUCATION: M.S., Preventive Medicine and Environmental Health - emphasis on Industrial Hygiene, University of Iowa College of Medicine
B.S., General Science, University of Iowa

OTHER: Member: American Industrial Hygiene Association, American Conference of Governmental Industrial Hygienists
Certified under Asbestos Hazard Emergency Response Act as Building Inspector and Asbestos Management Planner
Accredited by U.S. Department of Labor/OSHA as Instructor for Safety and Industrial Hygiene

NAME: Michael D. Kinney

AREA OF RESP: Maintenance and Auxiliary Systems

ASSOCIATION: WASTREN, Inc.

EXPERIENCE: 19 years

- WASTREN, Inc., Hanford, WA
  - Engineer: Supported DOE-HQ-EM34 in preparation of ORR modules for three Savannah River Site facilities (1H Evaporator, DWPF, ITP) for DOE startup readiness evaluation of the contractor ORR. Provided technical support for Tiger Team Assessment at Los Alamos National Laboratory.

- Comanche Peak Steam Electric Station, Glen Rose, TX
  - Room Area Completions Turnover Lead: Supervised/trained personnel in all phases of piping system/mechanical equipment acceptability walkdown; verified acceptability of systems and mechanical components for maintenance to meet STA-810; coordinated maintenance activities during room turnover to maintain system boundary integrity to meet STA-606.
  - System Readiness Engineer, Startup Team: Initiated matrix tracking program for completion of multi-process piping system restraints. Coordinated activities to maintain milestone dates. Supervised load balancing of piping systems for maintenance activities to comply with STA-802.

- Diablo Canyon Nuclear Station, Avila Beach, CA
  - MN-5 Code Data Review Task Force Lead: Initiated review task force format and supervised/trained personnel; revised construction procedures as required to meet ANSI piping codes; interfaced with ANII and ASME quality engineers to resolve interpretational differences; established manpower requirements per client schedules.

- St. Lucie #2 Nuclear Station, Jensen Beach, FL
  - Civil Construction Completion Supervisor: Supervised/trained personnel for all task force activities. Duties included initiating fastener qualification program in accordance with AISC, 7th edition; coordinating with Project Manager and client; maintaining calibration program for mechanical and hydraulic torque sensing equipment; coordinating with NRC to prove traceability of work packages.

EDUCATION: A.A.A.S., Mechanical Engineering, Indian Hills Community College

OTHER: American Welding Society Certified Welding Inspector (AWS-CWI)

NAME: Laurent P. LaRoche, M.D.

AREA OF RESP: Medical Services

ASSOCIATION: Private Consultant

EXPERIENCE: 45 years

- Consultant for Government and private agencies, offering expertise in medical services with respect to medical organization, administration, documentation, quality assurance, and clinical treatment.
- Consultant, Southern Bell
- Southern Regional Medical Director, AT&T Health Affairs
- Associate General Medical Director, AT&T Technologies
- Associate General Medical Director, Western Electric
- Medical Director Atlanta Works, Western Electric
- Medical Director Cape Canaveral and Kennedy Space Center, Pan American World Airways
- Private Practice

EDUCATION: M.D., Medicine, Medical University of South Carolina
B.S., Pre-Medicine, Charleston College
Coursework, University of Maryland

OTHER: Diplomate, American Board of Preventive Medicine
Certified, Occupational Medicine
Fellow, College of Preventive Medicine
Fellow, American College of Occupational Medicine
Licensed in Florida, Georgia, North Carolina, and South Carolina

NAME: Oliver D. T. Lynch, Jr.

AREA OF RESP: EH Senior Manager

ASSOCIATION: Director, Office of Performance Assessment, Headquarters, Department of Energy

EXPERIENCE: 28 years

- U.S. Department of Energy, Germantown, MD
  - Director, Office of Performance Assessment
  - Acting Director, Office of Safety Appraisals
  - Director, Safety Inspections Division
  - Deputy Tiger Team Leader, Nevada Test Site

- U.S. Nuclear Regulatory Commission, Rockville, MD
  - Radiation Measurements and Health Effects Section Chief
  - Standardization and Decommissioning Section Chief
  - Safeguards and Non-Power Reactors Section Chief
  - Radiation Protection Section Leader
  - Senior Operating Reactor Project Manager
  - Environmental Assessment Section Chief, TMI Program Office
  - TMI Special Inquiry Group (Rogovin)
  - Senior Environmental Project Manager

- International Atomic Energy Agency
  - Technical Working Group Leader, Vienna, Austria
  - Instructor, Cairo, Egypt

- General Dynamics, Electric Boat Division, Groton, CN
  - Chief, Radiological Control Health Engineering

- U.S. Atomic Energy Commission, Las Vegas, NV
  - Radiological Specialist

- San Diego State University, San Diego, CA
  - Assistant Radiological Safety Officer

EDUCATION: B.S., Applied Physics, San Diego State University
M.S., Nuclear Physics, San Diego State University

OTHER: Member, Health Physics Society
Member, American Forestry Association
Sigma Pi Sigma
Author, Textbooks and Training Manuals on Small Craft Safety, Operations and Navigation

NAME: J. Lawrence McCabe

AREA OF RESP: Quality Verification

ASSOCIATION: Office of Performance Assessment, Headquarters, Department of Energy

EXPERIENCE: 7 years

- U.S. Department of Energy
  - Performed Quality Verification at National Renewable Energy Institute (NREI) during Tiger Team Assessment in 1991.
  - Performed Quality Verification at the Los Alamos National Laboratory (LANL) during Tiger Team Assessment in 1991.
- U.S. Department of Defense, Fort Lee, VA
  - Developed soldier reliability and maintainability requirements for Quartermaster equipment in the areas of water purification, materials handling, and airdrop resupply missions.
  - Coordinated the Quartermaster School position on reliability and maintainability with other Department of Defense installations throughout the country.
  - Conducted safety appraisal of current Army Quartermaster School Soldier Feeding Concepts.

EDUCATION: M.B.A., Shippensburg University
B.S., Mining Engineering, Pennsylvania State University

OTHER: Quality and Reliability Engineering Internship, Texarkana, TX
Registered Professional Engineer, PA
Registered Professional Engineer, WV
Member, American Society for Quality Control (ASQC)

NAME: Leon H. Meyer

AREA OF RESP: Operations, Experimental Activities, and Site/Facility Safety Review

ASSOCIATION: The LHM Corporation - President

EXPERIENCE: 39 years

- Technical expert under contract to Oak Ridge Associated Universities and EG&G Idaho, Inc. Served on 36 Technical Safety Appraisals for DOE-EH.

- Savannah River Plant, E.I. DuPont de Nemours & Company, Aiken, SC

  - Program Manager: Responsible for safeguards and security, long-range planning, budget coordination, quality assurance, environmental control, energy conservation, and away-from-reactor spent fuel storage

- Atomic Energy Division, E.I. DuPont de Nemours & Company

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

- Savannah River Laboratory, E.I. DuPont de Nemours & Company, Aiken, SC

  - Assistant Director
  - Director, Separations Chemistry and Engineering Section
  - Research Manager, Separations Chemistry Division
  - Research Supervisor, Separations Engineering Division: Responsibilities in areas of chemical separations; plutonium, uranium, and thorium processing; and tritium technology

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

NAME: Linda F. Munson

AREA OF RESP: Radiation Protection and Personnel Protection

ASSOCIATION: Evergreen Innovations, Inc.

EXPERIENCE: 19 years

- Evergreen Innovation, Inc., President
  - Assist Allied Signal Kansas City Plant in preparing a Safety Assessment Report
  - Project manager to assist EPRI in preparation of a radwaste desk reference
  - Consultant to Battelle on cleanup of Three Mile Island
  - Technical Safety Analysis and Tiger Team participant for Industrial Hygiene, Emergency Readiness, and Radiation Protection technical areas

- Battelle Pacific Northwest Laboratory
  - Associate Section Manager, Dosimetry Technology Section
  - Project Manager for various technical assistance programs of including cleanup of Three Mile Island and upgrade of the RMI, Inc., Health Physics program
  - Participated in the team appraisal of six uranium mills for and with the NRC
  - Appraised, with DOE-HQ, Emergency Preparedness of the Rocky Flats Plant
  - Observed about six Emergency Preparedness exercises for NRC

- UNC Nuclear Industries
  - Manager, Industrial Safety - responsible for industrial safety and fire protection at N-Reactor and the associated fuel fabrication facilities
  - Managed the preparation of Environmental Information Reports and license application for various nuclear facilities, primarily uranium mills, and fuel fabrication plants
  - Responsible for industrial hygiene at N-Reactor and the associated fuel fabrication facilities
  - Responsible for industrial safety and fire protection at N-Reactor and associated fuel fabrication facilities
  - Evaluated decontamination alternatives for the West Valley Reprocessing Plant

EDUCATION: M.S., Analytical Chemistry, Iowa State University
B.A., Chemistry, United States International University
Short courses in Radiation Protection, Industrial Hygiene, Industrial Safety, MORT, Respiratory Protection, Management, and Communication

NAME: Darla Treat Courtney

AREA OF RESP: Technical Editor

ASSOCIATION: Program Management, Inc.

EXPERIENCE: 11 years

- Program Management, Inc.
  - Provided editorial support in the preparation of reports for several investigations and site appraisals/assessments conducted by teams from Headquarters, DOE, including Tiger Team Assessments.
  - Assisted the Office of Environment, Safety and Health and the Office of Nuclear Safety Policy and Standards in the preparation of documents related to international standards, Federal rules, and Departmental directives regulating the operation of nuclear facilities.
  - Assisted in the preparation of industry-related litigation materials. Provided editorial and analytic support, reviewed documents, and consolidated data for client use.

- Carltech Associates, Inc.
  - Provided senior-level editorial and production support for the preparation of over 40 book-length toxicology and carcinogenesis reports published by the National Toxicology Program.

- Twenty-First Century Books
  - Served as Managing Director and Book Editor for a small publishing house.

- University of Maryland, College Park
  - Served as Editor of The Maryland Historian, a semiannual academic journal.
  - Worked as Staff Historian for an interdisciplinary project contracted by the U.S. Department of Interior to prepare a prototype for an interactive computerized encyclopedia on the Holocaust. Duties included extensive editorial support to the project team.

- Background includes experience as an educator and editing/ production for a variety of organizational newsletters.

EDUCATION: M.A., European and Jewish History, University of Maryland
B.A., European and Jewish History, University of Maryland
A.A., Liberal Studies, Montgomery College
Doctoral Studies, History, University of Maryland

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BIOGRAPHICAL SKETCHES OF MANAGEMENT SUBTEAM MEMBERS

NAME: Marshall L. Bishop

AREA OF RESP: Management Subteam Leader

ASSOCIATION: U.S. Department of Energy, Rocky Flats Office

EXPERIENCE: 25 years

- U.S. Department of Energy
  - Assistant Manager for Administration, Rocky Flats Office (RFO). Responsible for management and administrative functions within RFO including budget, Federal personnel, finance and internal assessment, industrial relations, procurement and property management, and site support. As Contracting Officer performs related oversight and contract administration.
  - Chief, Contract Management Branch, Richland Field Office. Responsible for procurement management and contract administration of major site Management and Operating contracts. Contracts included Westinghouse Hanford Company, UNC Nuclear Industries, Rockwell Hanford Company, J.A. Jones Construction Management Company, and Battelle Pacific Northwest Laboratory.
  - Contracting Officer, Region X Office. Solicited, selected, and awarded financial assistance instruments for advanced energy technology, weatherization, and school and hospital conservation programs. Responsibilities included administration and close out of technology programs.
- U.S. Department of Defense
  - Subcontract Manager, AFPRO, The Boeing Company. Managed major subcontracts for the E3A AWACS aircraft program, including negotiation and development of MOUs for the E3A NATO Program.
  - Contracting Officer, Air Force Logistic Command. Contracted for spare parts for F4 Phantom and other aircraft. Negotiated prices, terms, and conditions to meet critical logistics maintenance requirements.
  - USAF, Munitions and emergency ordnance disposal.

EDUCATION: B.S., Business Management, Weber State University
A.A., Real Estate Management, Everett Community College
Post Graduate Work, City University

NAME: Justine Alchowick

AREA OF RESP: Management Assessment

ASSOCIATION: U.S. Department of Energy, Office of Special Projects

EXPERIENCE: 19 years

- U.S. Department of Energy
  - Office of Special Projects, Tiger Team Assessment Coordinator for K-25.
- Versar, Inc.
  - Project Manager for programs established to conduct treatability studies to evaluate applicability of technologies to treat hazardous wastes. Prepared quality assurance program and project plans for environmental studies. Quality assurance officer for sampling and analysis projects.
  - Project Manager for programs to provide technical support for EPA regulatory programs, e.g., the Land Disposal Restrictions Regulations and the Effluent Guidelines Regulations. Project manager for various environmental studies, e.g., fate and effects of toxic pollutants and potential environmental releases.
  - Conducted environmental audits at industrial facilities to determine potential third party liabilities due to off-site contamination.
- Monroe County Health Department, Environmental Health Laboratory
  - Managed an inorganic analytical chemistry laboratory. Responsible for environmental analysis of industrial and surface water samples. Participated in audits of water and sewage treatment plants.

EDUCATION: MBA, George Mason University
B.S., Chemistry, State University of New York at Albany

NAME: Mayhue Bell

AREA OF RESP: Management Assessment

ASSOCIATION: Private Consultant

EXPERIENCE: 40 years

- Management Consultant
  - Management Appraisals, Technical Appraisals
- U.S. Department of Energy, Washington
  - Managed the DOE Reactor Safety, Fusion Safety, Space Power System Safety, and Emergency Preparedness Programs: Policy and safety requirements development; planning, coordinating, and performing over 150 management and technical safety appraisals, individually and as team leader.
- Carolina Virginia Nuclear Power Associates, Inc.
  - General Manager responsible to sponsoring power companies served on the Board of Directors.
  - Operating Director responsible to General Manager for company operations, including technical support, health protection experiments, research programs, training and certification, emergency preparedness, and operations through Plant Superintendent.
- Nuclear Regulatory Commission
  - Reactor Inspection Specialist responsible for performing inspections of licensed facilities during construction, plant testing, and operation.
- Dupont, Savannah River Plant, Aiken, South Carolina
  - Senior Supervisor for Plant Operations, Shift Supervisor for Reactor Operations, and Nuclear Engineer.

EDUCATION: B.S., Nuclear Engineering, North Carolina University, with honors
Diploma, Nuclear Power Reactor, Harwell, England
Diploma, Quality Assurance Nuclear Power Industry, NRC
Diploma, Federal Executive Institute, University of Virginia

OTHER: U.S. Representative to IAEA - Served on panel of experts and as editor, preparing manual on emergency preparedness, and on IAEA team responsible for training Spanish speaking nations.

NAME: Ray D. Duncan

AREA OF RESP: Management and Organization

ASSOCIATION: Private Consultant

EXPERIENCE: 41 years

- Private Consultant
  - Chaired Task Group to examine management systems and project management controls at the Savannah River Field Office.
  - Conducted analysis of existing business management systems at the Nevada Field Office.
  - Chaired Task Force of nationally recognized experts to examine SAIC's quality assurance program in support of the High-Level Waste Storage Program at the Nevada Test Site.
  - Chaired a Task Force to develop and document a detailed operational plan for hosting U.S.S.R. scientists at the Nevada Test Site.
- U. S. Department of Energy, Energy Research and Development Administration, Atomic Energy Commission
  - Deputy Manager, Nevada Operations Office, responsible for directing high technology research and development programs with annual budget in excess of $650 million and an organization of more than 9,000 employees.
  - Assistant Manager for Operations, Nevada Operations Office, responsible for directing eight major Divisions including Contracts, Procurement, Financial Management, Auditing, Electronic Data Processing (EDP), Property Management, Industrial Relations, Personnel, Communications, and Safeguards and Security.
  - Director of EDP and Administrative Services Division, Nevada Operations Office, responsible for all scientific and computer systems and direction of internal administrative functions.

EDUCATION: Masters level course work at Graduate School of Public Administration, University of Washington

OTHER: Distinguished Career Service Award
Meritorious Executive Award

NAME: Marvin J. Laster, Esq.

AREA OF RESP: Management Assessment

ASSOCIATION: Private Consultant

EXPERIENCE: 32 years

- Private consulting in environmental and safety law, management and organization.
  - Participated in Tiger Team Assessments of the Lawrence Livermore National Laboratory, the Paducah Gaseous Diffusion Plant, the Oak Ridge National Laboratory, the Lawrence Berkeley Laboratory, the Energy Technology Engineering Center, the Sandia National Laboratory, the Stanford Linear Accelerator Center, and the Idaho National Engineering Laboratory, as a member of the Management Assessment Subteam.
  - Participated in DOE Headquarters Task force which developed Management Performance Objectives and Performance Criteria for use in Tiger Team Assessments.
- U.S. Atomic Energy Commission, U.S. Energy Research and Development Administration, U.S. Department of Energy:
  - Assistant Chief Counsel, Office of General Counsel: Chicago Operations Office, Brookhaven Area Office, Princeton Area Office, New York Support Office, and Environmental Measurements Laboratory.
  - Member, Accident Investigation Boards; participant in annual Laboratory institutional appraisal programs; represented U.S. Government in litigation, claims, and disputes.

EDUCATION: LL.B., New York University School of Law
Princeton Fellow, Public and International Affairs, Princeton University
B.A., Political Science, Brooklyn College

OTHER: Recipient, Federal Government Sustained Superior Performance and other awards
Awarded National Institute of Public Affairs (Ford Foundation) Fellowship

NAME: Robert F. McCallum

AREA OF RESP: Management and Organization

ASSOCIATION: Private Consultant

EXPERIENCE: 14 years

- Private Consultant
  - Provides environment and management consulting services in variety of energy technology areas. Provided support to Department of Energy LANL Tiger Team as a member of Management Subteam and to the NPRC Tiger Team as the Report Technical Manager.
- Packer Engineering, Inc.
  - Responsible for coordinating technical and cost proposals to government and industrial clients addressing a broad range of engineering and scientific disciplines. Served on the ETEC, METC, and SERI Tiger Team Assessments as the Report Technical Manager. Served on the PETC Tiger Team as a member of the Management Subteam.
- Battelle Memorial Institute
  - Responsible for coordinating site selection, institutional, and regulatory compliance support to DOE as part of basic technology development associated with DOE's geologic repository and interim waste storage programs.
  - Coordinated preparation of environmental data reports and decision methodology document in support of DOE's Crystalline Repository Program for disposal of high-level nuclear waste. Participated in numerous public and state briefings during program.
  - Coordinated development of responses to public comments on multidisciplinary Environmental Impact Statement for Management of Commercially Generated Radioactive Waste.
  - Assisted in development of site selection methodology for identification of potential host locations for disposal of low-level radioactive waste in Illinois.

EDUCATION: M.S., Management, Purdue University
B.S., Civil Engineering, University of Lowell

OTHER: Received Engineer-In-Training Certificate, MA 1976

Appendix B

ENVIRONMENTAL SUBTEAM ASSESSMENT PLAN

1.0 Introduction

On June 27, 1989, Secretary of Energy Watkins announced a 10-point Initiative to strengthen environmental protection and waste management activities in the U.S. Department of Energy (DOE). One of the initiatives involves conducting Environmental Assessments at DOE's operating facilities.

The purpose of the Environmental Assessment Portion of the Tiger Team Assessment of the Ames Laboratory is to provide the Secretary with information on the current environmental regulatory compliance status and associated vulnerabilities of the facility, root causes for noncompliance, adequacy of DOE and site contractor environmental management programs, and response actions to address the identified problem areas.

The scope of the Environmental Assessment for the Ames Laboratory is comprehensive, covering all environmental media and applicable Federal, state, and local regulations, requirements, and Best Management Practices (BMP). The environmental disciplines to be addressed in this Assessment include air, soil, surface water, groundwater, waste management, toxic and chemical materials, quality assurance, inactive waste sites, and environmental management. The Assessment will also address National Environmental Policy Act (NEPA) requirements.

2.0 Environmental Assessment Implementation

The Assessment of Ames Laboratory will be conducted by a Team managed by a Team Leader and an Deputy Team Leader from the DOE's Office of Environmental Audit (OEV), and technical specialists from Arthur D. Little, Inc. (ADL) and Oak Ridge National Laboratory (ORNL). The names and responsibilities of the team members are listed below:

Al Sikri	DOE	Team Leader
William Eckroade	DOE	Deputy Team Leader
James Daniel	DOE	NEPA
William Schramm	ORNL	NEPA
Steven Railsback	ORNL	NEPA
Christopher Martel	ADL	Group Coordinator
Sarah Simon	ADL	Air
Clifford Summers	ADL	Surface Water/Drinking Water
Patricia Rodden	ADL	Groundwater/Soils, Sediment and Biota Inactive Waste Sites
Donald Neal	ADL	Waste Management
Linda Wennerberg	ADL	Toxic and Chemical Materials
Paul Pifalo	ADL	QA/QC
Paul Jones	ADL	Radiation

2.1 Pre-Assessment Activities

Pre-Assessment activities for the Ames Laboratory Assessment included the issuance of an introduction and information request memorandum, a Pre-assessment site visit, and initial review of documentation which was sent to the Environmental Subteam by Ames Laboratory as a result of the information request memorandum.

The Pre-Assessment site visit was conducted on January 22 through 23, 1992 by the Team Leader, the Subteam Leader and Assistant Subteam Leader for Environmental, Health and Safety, and Management, the Arthur D. Little Group Coordinator for the Environmental Subteam, as well as representatives from the Office of Special Projects and other DOE Offices. The purpose of the Pre-Assessment visit was to become familiar with the site, to review information being supplied and request additional information, and to coordinate plans for the upcoming Assessment with Ames Laboratory personnel. Representatives from Federal and state government presented their concerns with respect to environment, safety and health (ES&H) concerns.

2.2 Onsite Activities and Reports

The onsite activities for the Environmental Assessment will take place from February 10 through March 5, 1992. Onsite activities will include field inspections, file/record reviews, and interviews with site personnel and regulatory personnel. The Detailed agenda for the Environmental Subteam Technical Specialists is shown in Appendix C. An overall Environmental Subteam Assessment schedule is shown in Figure B-1. Any and all modifications to the agenda will be coordinated with the environmental site contacts at Ames.

A daily debriefing with site/facility personnel will be held each afternoon, at which time team specialists will relate their activities and concerns that may develop into findings.

Written draft findings will be provided to the Ames personnel and to the DOE Site Office before the Factual Accuracy Reviews (FAR).

A close-out briefing will be conducted at the conclusion of the onsite Assessment activities. A draft report containing findings from the Environmental Assessment will be provided to the Ames Laboratory personnel for their review and comment.

3.0 Air

The air portion of the Assessment will evaluate the current operating practices and air quality programs to determine compliance with regulations promulgated under the Federal Clean Air Act, the Iowa Department of Natural Resource laws, regulations, DOE orders, guidance and Secretary of Energy notices; best management practices; and any Ames Laboratory site contractor policies and procedures.

3.1 Issue Identification

The general approach to this Assessment will involve an examination of the facilities and sources of air emissions, including emission control systems, and standard operating procedures; an examination of documentation and plans for air quality and meteorological monitoring; interviews with Ames Laboratory, Iowa State University, state and Federal officials, and review of documents and files pertaining to air issues.

The air assessment will review the applicability of related requirements to confirm whether the Ames Laboratory is in compliance. The focus will be on air effluent emissions from the laboratories and maintenance shops as well as

Figure B-1

Activity Schedule						January 1992
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22 Pre-Assessment Site Visit	23 Pre-Assessment Site Visit	24	25
26	27	28	29 Pre-Assessment Team Meeting in Cambridge	30 Finalize Audit Plan and Agenda	31 Send Assessment Plan and Agenda to Site/OSP/CH	

Figure B-1

Activity Schedule						February 1992
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
						1
2	3 Site/OSP/CH Receives Assessment Plan and Agenda	4	5 Conference call with ADL/DOE/Site to discuss Agenda	6	7	8
9 Travel to Site	10 General Site Orientation	11 Begin Field Work	12 Field Work (continue)	13 Field Work (continued)	14 Field Work (continued)	15 Team and Individual Meetings
16 Day Off	17 Field Work (continued) Develop Findings	18 Field Work (continued) Develop Findings	19 Field Work (continued) Surface Water, Factual Accuracy Review (FAR), Develop Findings	20 Field Work (continued) TCM, FAR; NEPA, FAR; Develop Findings	21 Field Work (continued) Radiation, FAR; Travel back to office; Develop findings	22
23	24	25 Return to Site	26 FARs Completed	27 Finalize Findings and Overviews; Key Findings due to Management Team	28 Appendices due to Printer	29

Figure B-1

Activity Schedule						March 1992
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
1	2 Report ready for Printer	3 Proofread Draft Report	4 Prepare for Closeout Briefing	5 Closeout Briefing	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

fugitive organic emissions from various materials handling and storage activities. Cross issues related to radionuclides will also be addressed in each of these activities. The interdependencies of the DOE Field Office and Ames in reporting air emissions and preparing annual monitoring plans and reports will be researched and examined in greater detail. The conformance of air pollution control procedures with accident and emergency preparedness plans will be reviewed. The vehicle-related emissions and practices will be evaluated.

Ames' Laboratory site emission inventory will be assessed to determine if emission sources have been adequately characterized. The Assessment will also review SARA 312 and 313 compliance and determine if significant air emissions are listed that correlate with waste minimization, Chemical Inventory, and other records. Inventory quantities will be evaluated as they pertain to compliance with regulatory reporting requirements, permits, and potential risks they may pose to staff or the environment on a continuing or emergency basis.

3.2 Records Required

Pre-Assessment evaluation has included review of:

- Relevant DOE Orders, SEN's and Guidance (5400.1B, Design Criteria, Environmental Audit Manual Section 2);
- Ames Laboratory Environmental Survey Preliminary Report (3/89);
- Federal and state air regulations;
- SARA 313 records; and
- Ames Laboratory Organization.

The following records will be reviewed onsite during the Assessment:

- Ames Laboratory Five Year Plan;
- Site Air Management Plan;
- Regulatory agency correspondence and documents;
- Facility operation, control, and emission records;
- Stack and vent or release point surveys;
- Environmental Monitoring Plan;
- Ambient air quality monitoring data records;
- Meteorological monitoring data records; and
- Materials Purchasing Records.

4.0 Surface Water

The surface water portion of the Assessment will evaluate compliance with Federal, state, and local water pollution control requirements established for conformance with the Clean Water Act (CWA), and with drinking water regulations promulgated as part of the Safe Drinking Water Act (SDWA) requirements. In addition, the Assessment will evaluate compliance with DOE Orders, Secretary of Energy Notices (SENs), and water pollution control practices with industry-accepted Best Management Practices. Since Ames Laboratory is a contributor to the Iowa State University (ISU) sewer system at both the main campus and the Applied Science Center (ASC) locations, the Assessment will also include review of the industrial wastewater pretreatment program agreements between the City of Ames and ISU for these two locations, and a review of programs to periodically physically inspect the premises for potential non-routine discharges (which may have a negative impact on the City of Ames Water Pollution Control Plant (WPCP)) as well as procedures for notification to the WPCP that a non-routine discharge has occurred.

An inspection of the space owned by Ames Laboratory will be made to determine if there is sufficient oil storage capacity to require it to prepare a Spill Prevention Control and Countermeasures (SPCC) Plan.

As part of the Assessment, reviews and inspections will be coordinated with members of the Assessment Team as necessary to evaluate potential surface water contamination from contaminated areas.

Ames Laboratory purchases its drinking water from the City of Ames' municipal supply. The distribution system in buildings owned or leased by the Ames Laboratory will be assessed for the presence of backflow prevention devices and the potential for crossover connections to other piping systems. Inspection of facility drawings and interviews with members of the facilities departments of both ISU and Ames Laboratory will be conducted to obtain an understanding of the drinking water and wastewater systems.

Stormwater runoff from buildings situated on the main campus, generated by rainfall and snowmelt runoff, is routed through storm sewers and ditches, and ultimately reaches Squaw Creek, which discharges into the South Skunk River.

Stormwater generated at the ASC can potentially discharge onto the Squaw Creek floodplain. The potential need for an NPDES stormwater permit has been the subject of discussions between Ames Laboratory, ISU, and the state Department of Natural Resources, but has not as yet been acted on.

4.1 Issue Identification

Inspections of the buildings at both the ISU and ASC locations (in conjunction with the waste management specialist) will be made to observe current practices with regard to disposal of chemicals into the sanitary sewer system which have the potential to negatively impact operation of the City of Ames WPCP, or pass through the WPCP without treatment.

A review of documentation regarding sampling and analysis of the discharge to the City of Ames sanitary sewer system will be made to determine if pretreatment agreement requirements are being met. A review of available documentation regarding the requirement to apply for a permit to discharge

potentially contaminated stormwater, and a physical inspection of building exteriors, parking lots and surrounding grounds will be made.

4.2 Records Required

Documentation required by regulations, DOE Orders, Secretary of Energy Notices (SENs), as well as any Ames Laboratory policies and procedures which relate to wastewater discharges will be reviewed as part of the Assessment. Specific documents located in files and operational areas will be reviewed as part of the Assessment include those received as well as those not yet received or reviewed. Additional documents required for this Assessment include the following:

- Reports required by the pretreatment agreements, both on a regularly specified basis as well as exception reporting, such as for agreement exceedances;
- Layout drawings of all sewers, sampling locations, etc.;
- Installation drawings for water supply and distribution systems;
- Inventory and locations of oil storage tanks;
- Procedures for sampling and analysis of wastewater, and the records of analysis;
- Maintenance and calibration procedures for control and monitoring equipment pertaining to wastewater;
- The file of correspondence between Ames Laboratory and regulatory agencies;
- Maintenance and inspection records for the drinking water supply system;
- Descriptions of processes that are wastewater generators;
- Internal memoranda relating to wastewater and/or drinking water issues; and
- Notices of unusual occurrences or releases to the wastewater system as reported in memos or letters.

5.0 Groundwater

The groundwater portion of the Assessment will evaluate the programmatic and technical status of groundwater protection and monitoring programs. The groundwater protection and monitoring programs will be evaluated based on applicable requirements and regulations, guidance documents and best management practices (BMP). Applicable requirements may include DOE Orders, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) the Resource Conservation and Recovery Act (RCRA), and the requirements and regulations of the Iowa Department of Natural Resources. Guidance documents may include those developed by EPA as part of the CERCLA

and RCRA programs, as well as other technical publications used as industry guidance.

The Assessment will include a review of written reports, records, and documents, interviews with key technical and management personnel, and direct observation of the site and field operations. This effort will be coordinated with the assessments conducted by other environmental subteam specialists, particularly the Radiation, RCRA, and Surface Water Specialists.

5.1 Issue Identification

Based on a preliminary review of applicable regulations and information supplied to the Tiger Team by Ames Laboratory, a number of issues concerning groundwater protection and monitoring programs have been identified. These issues include program management and implementation, technical execution of data collection activities, and data management and interpretation.

There are a number of potential sources of groundwater contamination associated with past or present activities at Ames Laboratory, including:

- Chemical Disposal Site at the Applied Science Center (ASC);
- ASC Warehouse Septic System;
- Former Annex I and Annex II building sites;
- Historic release of wastewater to the City of Ames Water Pollution Control Plant;
- Sludge disposal area at City of Ames Municipal Airport;
- Inactive septic tank associated with the Ames Laboratory Research Reactor (ALRR);
- Discharges from Cooling Towers; and
- Active and inactive underground storage tanks.

There are groundwater production wells located within close proximity to Ames Laboratory which formerly and/or currently provide drinking water and irrigation water. These wells may be hydraulically connected to the aquifer underlying the lab.

Groundwater protection plans, environmental monitoring program plans and recent copies of environmental monitoring reports will be reviewed to determine if they are in compliance with DOE requirements. The reports will also be reviewed for technical accuracy and data validity. Well construction and closure records will be examined to determine adherence to regulations and guidelines.

Observation of sample collection and handling procedures will be performed along with review of written sampling protocols to evaluate data quality. The sampling frequency and sample locations will be evaluated to determine if they provide an adequate data base for identification of groundwater quality.

Other specific issues to be investigated further include, but are not limited to:

- Adequacy of existing and proposed monitoring well network;
- Sampling Procedures - the appropriateness and technical execution of the groundwater sampling program;
- Characterization of the hydrogeologic regime including aquifer flow and recharge mechanisms, interaction of groundwater and surface water, hydraulic connection between site contaminant sources and potential receptors;
- Groundwater Monitoring Well construction and maintenance; and Data Management.

These issues will be investigated through a review of reports, written records, and documents, direct observation of field operations, and interviews with key technical and management personnel. Applicable regulatory agencies will also be contacted if needed.

5.2 Records Required

Additional documents which will be reviewed as part of the Assessment include the following:

- Groundwater Protection Program Management Plan, Environmental Protection Program Implementation Plan, Environmental Monitoring Plans (past and present) and Annual Site Environmental Reports, all of which are required under DOE 5400.1 (which we would like to receive prior to arriving at the facility);
- Site specific reports of groundwater investigations, monitoring programs or remedial actions;
- Data and maps which contain information on subsurface geology, hydrology and potential or known areas of contamination;
- Field Operations plans and Work Plans for conducting past or present groundwater investigations;
- Akhavi, 1970, Occurrence, Movement,and Evaluation of Shallow Groundwater in the Ames Iowa area. ISU doctoral dissertation;
- Soil Survey of Story County, US Dept. of Agriculture Soil Conservation Service;
- Ground Water Resources, Story County Iowa Geol. Survey (GWR), Open File Report 82-85, WRD;
- Boring logs and well construction reports;
- Well closure and abandonment records;
- Sampling and analysis plans;

- Work Plan for Chemical Disposal Site.(approved by DNR);
- Sampling data;
- Environmental Monitoring at Ames. Annual Report. Voss, 1975-1985;
- USGS topographic quadrangle map; and
- Site plan.

6.0 Soil, Sediment, and Biota

The purpose of the soil, sediment and biota portion of the Assessment will be to evaluate the programmatic and technical status of environmental monitoring programs for soils, sediment and biota in the site area. The programs will be evaluated for their effectiveness in determining both actual and potential contamination of these media by past and ongoing operations at Ames Laboratory, and for their effectiveness in preventing future contamination and the spread of existing contamination. The soil, sediment, and biota monitoring programs will be evaluated based on applicable requirements and regulations, guidance documents and best management practices (BMP). Applicable requirements may include DOE Orders, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) the Resource Conservation and Recovery Act (RCRA), and the requirements and regulations of the Iowa Department of Natural Resources. Guidance documents may include guidance documents developed by EPA as part of the CERCLA and RCRA programs, as well as other technical publications used as industry guidance.

The Assessment will include review of written reports, records, and documents, interviews with key technical and management personnel, and direct observation of the site and field operations. This effort will be coordinated with the assessments conducted by other environmental subteam specialists, particularly the radiation, waste management, inactive waste sites, and surface water specialists.

6.1 Issue Identification

Based on preliminary review of applicable regulations and site information supplied by Ames to the Tiger Team, a number of issues have been identified. Other issues that will be investigated will include:

- Program Management - the interaction and implementation of state and Federal soil monitoring requirements and the relationship with offsite areas;
- Sampling Procedures - the appropriateness and technical execution of the soil, sediment and biota sampling program;
- Sample QA/QC and Chain-of-Custody - the appropriateness and technical execution of the soil, sediment and biota sampling program;
- Laboratory Analytical Procedures - the appropriateness and enforcement of laboratory analytical procedures;

- Data Validation - the level of data validation and personnel qualifications employed in the data validation;
- Data Management; and
- Characterization of the surface/subsurface soil.

6.2 Records Required

Documents and records will be reviewed as part of the Assessment. In addition to the documents reviewed thus far, the following materials will be examined.

- Environmental Monitoring Reports;
- Field Operations Plans (with supporting SOPs), for conducting soils/sediment investigations;
- Environmental Monitoring Plans
- Data and Maps Concerning Subsurface Geologic Investigations;
- Remedial Action Plans and Reports;
- Site specific reports of surface or subsurface soils;
- Natural Resource Damage Reports;
- Radiological Surveys of Flora and Fauna; and
- Biological Monitoring and Abatement Plan.

7.0 Waste Management

The purpose of the waste management portion of the Assessment is to examine compliance of Ames Laboratory with applicable state and Federal laws and regulations, DOE Orders and Secretary of Energy Notices pertaining to the generation and management of hazardous and non-hazardous wastes. Included in the Environmental Assessment will be evaluations of waste accumulation, characterization, labelling, transportation, storage, recycling, and disposal practices.

7.1 Issue Identification

Ames Laboratory hosts a variety of research and development programs that result in the generation of radioactive, hazardous and non-hazardous wastes. Hazardous waste consists primarily of spent solvents, reagents, acids and bases. The Ames Laboratory, Operations Division collects hazardous and radioactive wastes, places it into temporary storage, and arranges for ultimate transport and disposal at offsite facilities. The Environmental Assessment will examine waste management at the Ames Laboratory and evaluate compliance with the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments of 1984 (HSWA), applicable Iowa Laws and regulations, and DOE Orders.

Management and control of RCRA wastes will be assessed through interviews with site personnel, inspections of waste generation points and waste management facilities, site records, and other relevant documents. The primary purpose of this evaluation will be to assess compliance with applicable laws and regulations. However, in the case of unregulated waste management procedures and practices, the concept of Best Management Practice (BMP) will be applied to prevent or minimize releases of materials to the environment, and to suggest more-efficient operational procedures.

Based on an initial review of the Ames Laboratory, there are several waste management facilities and programs that warrant evaluation including, but not limited to:

- Waste Disposal Building;
- Waste generator training and procedures;
- Temporary waste storage areas;
- Waste characterization and tracking;
- Waste minimization; and
- Hazardous and radioactive waste management planning.

The waste storage building, located at the Iowa State University Applied Science Center, is used to store hazardous, mixed, and radioactive wastes prior to ultimate transport offsite for treatment and disposal. The Environmental Assessment will inspect the design, operation, maintenance and management of this facility. Compliance with Federal and state regulations will be evaluated.

Waste generation points will be investigated and in-place management systems will be assessed. Persons responsible for waste generation will be interviewed to ascertain basic waste generator knowledge and training programs and records will be examined.

Ames Laboratory contains several temporary waste accumulation areas where generators may deposit hazardous waste or waste oil. The design, operation, maintenance and management of these areas will be evaluated for compliance with applicable laws and regulations as well as potential impacts to the environment.

The overall system for managing waste at Ames Laboratory will be evaluated, including waste characterization and tracking, the waste minimization plan, and waste management planning. Each of these programs will be assessed for completeness and consistency with Federal and state laws and DOE Orders. A major consideration in the assessment is the status of Ames Laboratory as a small quantity generator.

The status of onsite documents will be evaluated to determine whether appropriate documents are maintained as required by the regulations. These documents include, but are not limited to: manifests, waste analysis records, contingency plans, inspection reports. In addition, the status of any Ames

Laboratory procedures as they relate to environmental waste management will be evaluated.

As part of waste management and in conjunction with toxic and chemical materials specialist, the status of the site's underground storage tank will be evaluated for compliance with applicable regulations. Activities related to RCRA corrective actions will be examined in conjunction with the inactive waste sites Specialist.

7.2 Records Required

In addition to documents reviewed prior to the initiation of onsite activities, we will be reviewing, but not limited to, the following:

- Training records and curriculum;
- Last 3 years of manifests including landfill restriction notification forms;
- Inspection reports and waste tracking reports; and
- Ames Laboratory Self-Assessment.

8.0 Toxic and Chemical Materials

Ames Laboratory is a DOE facility dedicated to basic and applied technical research in materials science and energy technology development. Toxic substances at the site represent past activities and current operations. The current Assessment will emphasize the management systems for significant hazardous materials such as laboratory chemicals, compressed gases, PCBs, asbestos, pesticides, herbicides and other toxic and chemical materials.

8.1 Issue Identification

The toxic and hazardous substances portion of the Assessment will address the management and use of chemical products used at Ames Laboratory with an emphasis on handling, storage, recordkeeping and disposal. Primary emphasis will be given to the substances regulated by the Toxic Substance Control Act (TSCA), including polychlorinated biphenyls (PCBs), asbestos controls under the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Management and control of the toxic and hazardous substances will be determined through interviews with appropriate site personnel, inspections of pertinent facilities, and a review of relevant documents. The information obtained will be evaluated to assess whether Ames Laboratory management and control of toxic and hazardous substances are in compliance with Federal, state, and local regulations and pertinent DOE Orders. In addition, for those situations not covered by regulations, the concept of Best Management Practice (BMP) will be applied to prevent or minimize the potential for releases of toxic substances to the environment.

Many toxic/chemical substances are currently used at Ames, generally for analytical or experimental purposes. As many as possible of these locations of past or current use and storage will be inspected during this Assessment. The management and handling of these materials to prevent or minimize releases

to the environment will be evaluated. Areas of emphasis include the management of solvents, acids, bases, metals, acutely hazardous materials, and compressed gases.

The management of electrical equipment which contains or has contained PCB and PCB-contaminated fluids will be reviewed during the Assessment. Ames Laboratory documents reviewed indicate that there was use of power transformers and switches in service during the site's earlier operations. Remaining equipment, such as the transformer outside the Campus Warehouse, will be inspected to determine its condition, the potential for leakage, and spill control systems available. PCB fluid and equipment disposal practices will be reviewed for current and past inventories to determine the methods of disposal and the locations of disposal sites. Procedures for PCB analysis, removal, and handling will be reviewed. Inspection and reporting requirements for PCB equipment and any past spills will be evaluated to determine any potential problem areas.

Asbestos management, the past records or proposed plans to remove, store, and dispose of the material from contaminated buildings, soil, water, and equipment will be evaluated during this portion of the Assessment. Evaluation of procedures, record-keeping, storage, and monitoring for asbestos will be conducted at Ames Laboratory. Use of certified Ames Laboratory employees or subcontractors for asbestos removal will be evaluated and site buildings will be inspected to determine the extent of asbestos management issues.

Pesticide/herbicide usage on the site will be reviewed to determine the risks of environmental contamination. Herbicides and pesticides are used at Ames Laboratory. The Assessment will focus on application records, storage, disposal practices, and environmental monitoring procedures. The site's use of subcontractors for the application of herbicides and pesticides will be reviewed as to management practices and environmental compliance.

Sampling and analysis conducted by Ames Laboratories or outside subcontractors will be reviewed to determine if these activities conformed to regulatory and DOE Order specifications. The QA programs governing sampling and analysis of toxic or chemical materials will be evaluated, including any relevant internal QA audits performed at Ames.

The Assessment will also review Ames Laboratory's progress in the mitigation of toxic and chemical material findings from the 1989 Environmental Survey Preliminary Report. These findings focus on incomplete tracking of chemicals subject to peroxide formation, inadequate or improper chemical storage, inadequate management of PCB equipment, and incomplete management of USTs.

8.2 Records Required

Files will be reviewed as part of the Assessment, including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified).

Specific documents and files to be reviewed as part of the Assessment include, but will not be limited to, the following:

- Toxic substances labeling and tracing system;

- Procedures for handling, control, and management of toxic substances, including excess chemicals and equipment or scrap;
- Waste Minimization Plan and/or Pollution Prevention Awareness Plan;
- PCB annual inventory documents (1985-1990);
- Inventory of current PCB-contaminated electrical equipment, or documentation of their removal;
- Records of inspections of PCB transformers (1985 to present);
- PCB handling, storage, and disposal procedures;
- Correspondence with fire department on PCB equipment;
- Training, handling, storage, disposal records, and environmental monitoring related to pesticide and herbicide use;
- SOPs for pesticides;
- Pesticide reports to regulatory agencies;
- SOPs for herbicides;
- Herbicide reports to regulatory agencies;
- Special procedures involving handling, storage, use and disposal of asbestos;
- Inventories/monitoring records for uncontained asbestos;
- Spill control and emergency preparedness plans for management of PCBs;
- Audits or inspections pertaining to the toxic substances program; and
- Other records as determined onsite.

9.0 Quality Assurance

The quality assurance (QA) portion of the Assessment will evaluate Ames Laboratory compliance with environmental quality assurance requirements and proper practices.

The Assessment will independently evaluate the site-wide implementation of the Ames Laboratory Quality Assurance Program, especially in those areas that could effect the surrounding environment. The scope of the Assessment will cover the programmatic application of quality requirements, plus effluent monitoring and environmental surveillance activities, waste management, chemical and radiological analyses, as well as the evaluation and reporting of data.

9.1 Issue Identification

The QA procedures for the site environmental programs will be reviewed for the effectiveness of implementation and compliance with DOE requirements. The following issues will be specifically reviewed:

- Implementation of all environmental requirements, including DOE 5400 series Orders;
- Implementation of the documented QA program and its required compliance with DOE Order 5700 and the basic requirements of ANSI/ASME NQA-1;
- Contractual interface between Ames Laboratory and the DOE-CH Office;
- Environmental interface between Ames Laboratory, Iowa State University, the City of Ames and Story County;
- Proper QA procedures for laboratory operations; and
- Training of union and university personnel involved in laboratory activities.

9.2 Records Required

A portion of the Assessment will consist of a review of pertinent documents and files. Some specific documents and files that will be reviewed include, but are not limited to the following:

- Implementing procedures for effluent monitoring and environmental surveillance;
- Ames Laboratory Self-Assessment;
- Contractual agreements for offsite analytical and radiological laboratory service, plus union, city or county arrangements;
- Internal QA audits of Ames Laboratory operations;
- Progress toward implementation of DOE Order 5700.6C and the "Basic R&D Facility" arrangement that Ames has with DOE-CH;
- Laboratory notebooks, procedures, sampling and training records.

10.0 Radiation

The radiation portion of the Assessment at will include reviewing all activities, facilities, and areas that involve or potentially involve radiation or radioactive material. Environmental radiation protection programs at Ames Laboratory will be assessed to determine compliance with the documents listed in the Tiger Team Guidance Manual, applicable Federal and state regulations, and Department of Energy (DOE) Orders. These programs will also be reviewed against commonly accepted best industry practices and standards of performance.

The Assessment will consist of evaluating environmental radiation protection programs in the following six areas: environmental surveillance, effluent releases, radioactive waste management, radiological analyses, decontamination and decommissioning and inactive waste sites. Radiation issues cut across all media and areas to be evaluated during the environmental assessment; hence, the radiation specialist will coordinate his reviews with the other team specialists to ensure all radiation related issues are reviewed in appropriate detail.

10.1 Issue Identification

The approach used in conducting the assessment will consist of interviews with Ames Laboratory employees, contract personnel, and DOE personnel (including DOE-CH personnel); inspections of selected Ames Laboratory facilities and operational processes; and review of documents, procedures and records. Program areas will be evaluated by reviewing their defined scope, design bases, data quality, and the effectiveness of program implementation. Facility design, safety analysis, engineered safety features, and monitoring and control devices will be evaluated as they pertain to the environmental release of radioactive materials.

The radiological environmental surveillance program assessment will include evaluating the pathways monitored, their associated sampling locations and the bases for selection. Potential issues have been identified in the following areas: types of media, numbers of samples, and types of analysis; ambient air monitoring (on- and offsite) used in performing dose assessments; uranium and thorium soil contamination; and solid and liquid radioactive waste treatment, storage and disposal.

Monitoring equipment and its maintenance and calibration requirements will be reviewed. Analytical requirements will be reviewed including lower limits of detection, warning levels and action levels. Analytical techniques, collection methods and sampling frequency will be evaluated for the following media, as appropriate: air, surface water, groundwater, storm drain water, sewerage, milk, soil, sediment, sludge, vegetation, direct radiation, and wildlife.

Offsite dose assessment methodologies, for maximum exposed individual, and population dose calculations, will be reviewed and evaluated including sample locations, sample media, data validity, calculation methods, and analysis documentation. The methods used for data review and preparation of the radiological portion of the Annual Site Environmental Report will be reviewed.

Review of the radioactive effluent monitoring program will include both liquid and gaseous effluents. Potential issues have been identified in the following areas: liquid and gaseous effluent monitors and sampling and application of ALARA. The radiation specialist will coordinate these reviews with the surface water, groundwater and air specialists. The gaseous effluent review will include release points and evaluations performed to assess potetnial for radionuclide release from these points. The liquid effluent review will include control and monitoring of batch releases. In addition, the team will evaluate Ames Laboratory's ability to identify, control, mitigate, evaluate, and quantify unmonitored or unplanned effluent releases.

The radioactive waste management program review will include both solid and liquid low level waste (LLW), transuranic (TRU) wastes, and mixed wastes (MW). Potential issues have been identified in the following areas: mixed waste disposal, waste management plan, waste acceptance criteria and a waste performance assessment. The radiation specialist will coordinate this review with the waste specialist. Waste generation and transportation to storage will be evaluated. Waste decontamination, processing, minimization and volume reductions operations will be evaluated. Characterization, packaging, storage and shipment of LLW, TRU, and MW will be reviewed. Compliance with Waste Isolation Pilot Plant (WIPP) acceptance criteria will be reviewed.

The program for decommissioning and decontamination (D&D) of facilities will be evaluated. Potential issues have been identified in the following areas: release of materials, property, and equipment for unrestricted use; and adequacy of a formal D&D program for surplus, new, and operating facilities. Historical records for facilities that have undergone D&D, or decontamination and subsequent release for unrestricted use will be reviewed. Plans for existing facilities awaiting D&D and operational facilities requiring D&D at the end of their life time will also be reviewed.

Inactive radioactive material waste sites and radioactively contaminated areas will be reviewed. The radiation specialist will coordinate these reviews with the groundwater and inactive waste site specialists. The radiation specialist's concerns include radiological monitoring of these sites, the degree to which radioactivity is migrating offsite into the environment, and the associated offsite dose impact, if any.

Some of the above programs require radiological analysis of various sample media. Laboratories performing these analyses will be evaluated to ensure that analytical techniques, records, equipment, and QA/QC are adequate to produce accurate high quality data in a manner consistent with regulatory requirements. The radiation specialist will coordinate this review with the quality assurance specialist.

10.2 Records Required

Files will be reviewed as part of this assessment, including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified). Specific documents and files to be reviewed as part of the assessment include, but will not be limited to the following:

- Annual Site Environmental Reports;
- Radioactivity-related ambient air quality information;
- Radioactivity data for all sampled media;
- Inventories of air, soil, surface water, and groundwater radionuclide release points and quantities;
- Unscheduled or unplanned release reports;
- Radioanalytical quality assurance programs and procedures;

- Dose assessment methodologies, including assumptions, calculations, reporting, etc;
- Building plot plans showing equipment and locations;
- Building plot plans noting radiologically controlled areas;
- Description of radiation monitoring equipment, practices and procedures (e.g., calibration, maintenance, etc.);
- Reports or recommendations for upgrading radiation monitoring systems;
- Reports prioritizing new radiation monitoring installations;
- Offsite and onsite radionuclide sampling point criteria;
- Radioactive waste management practices, policies, procedures, treatment, storage and disposal;
- NESHAPS reports (40 CFR 61 Subpart H);
- NESHAPS quality assurance plan;
- Environmental Protection Implementation Plan;
- Radioactive Waste Management Implementation Plan;
- Radioactive Waste Management Plan;
- Waste Minimization Plan;
- Pollution Prevention Awareness Plan;
- Meteorological Monitoring Plan;
- Emergency Response Plans;
- Decontamination and Decommissioning information, plans, and data;
- Environmental Monitoring Plan;
- Radioactive Effluent and Onsite Discharge Data (ODIS) Reports;
- Radioactive waste performance assessment; and
- Radioactive waste acceptance criteria.

11.0 Inactive Waste Sites

The inactive waste sites portion of the Assessment will identify compliance issues related to: past waste handling and disposal practices; past disposal sites; contaminated structures; areas which received releases or spills of hazardous materials or wastes; and inactive waste site identification, management and cleanup. The Assessment will be guided specifically by the

requirements of CERCLA and guidelines set forth in the NCP (the Emergency Planning and Community Right-to-Know Act of SARA Title III will be conducted by the air specialist). The Assessment will also include applicable DOE Orders, especially 5400.1, 5400.4, 4300.1B, 4320.1B, and 5000.3A. In addition, current status of the findings from the 1989 preliminary survey will be determined. Much of the effort will be coordinated with the surface water, radiation, and waste management specialists.

The general approach used in conducting this Assessment will consist of interviews with Ames Laboratory employees and contracted personnel; interviews with DOE personnel; interviews with regulatory personnel; inspections of site facilities; observations of various operational processes; and review of documents and records associated with the management of inactive waste sites.

11.1 Issue Identification

Documents Ames Laboratory has provided to the Tiger Team to date states that there are currently no ongoing CERCLA or RCRA corrective action activities onsite. The site does not have any environmental permits. In addition, compliance reports state that the site is in compliance with all state and Federal regulations, and that there are no existing agreements with regulatory agencies. However, there have been several removal actions, preliminary assessments of potential inactive waste sites, and a remedial investigation/feasibility study is planned for at least one inactive waste site, the chemical disposal site, at Ames Laboratory. The Assessment will focus on the activities surrounding those inactive waste sites identified by the site, by the previous audit conducted by DOE in March 1989, as well as evaluate the existing programs to ensure that all potential inactive waste sites are identified and addressed.

As part of an evaluation of the site's ability to properly characterize and remediate inactive waste sites, the Assessment will evaluate past and existing programs and procedures in place to ensure all property owned by DOE is/was properly cleared and certified clean prior to disposal in accordance with DOE Orders and CERCLA.

In addition, the following specific activities will be evaluated to determine their compliance with applicable regulations:

- Environmental Restoration Program Planning;
- Release Reporting;
- Remedial Investigation(s);
- Identification of Response Action alternatives (with respect to past activities as well as future activities) and remedy selection;
- Natural Resource Damage Assessments;
- Administrative Record and Community Relations Program; and
- Roles and Responsibilities of Ames Lab personnel involved in identification, characterization and remediation of inactive waste

sites, (e.g., Environmental Restoration, Decontamination and Demolition, Safety, Health and Personnel Protection).

11.2 Records Required

An extensive file and document review will be performed as part of both the pre-site and onsite Assessment. Specific documents and files to be reviewed include, but are not limited to:

- Preliminary assessments of all inactive waste sites, including all support documentation;
- Procedures to identify, characterize and categorize inactive waste sites;
- Spill reports;
- Spill and environmental incident reporting procedures;
- Documentation of all removal actions;
- All RI/FS work plans;
- All Site Assessment Plans;
- Draft and/or Final Action Plan prepared in response to previous audit;
- Leases/titles for properties currently or previously owned/leased by DOE, with associated certification, for disposed properties, that they were free from radiation and hazardous materials prior to disposal;
- Program plans and policies in place to ensure properties will be certified sufficiently free from contamination prior to their disposal;
- Technical Site Information document and Site Development Plan;
- Historical aerial photographs and site plans;
- UST information and tank removal reports;
- Reportable Quantities Calculations; and
- Continuous Release Report procedures.

12.0 National Environmental Policy Act

12.1 Issue Identification

The objectives of the NEPA assessment are (1) to evaluate the Ames Laboratory NEPA management structure and review processes; (2) to identify problems that may lead to inappropriate procedures or inadequate NEPA documentation; and (3) to ensure consistency with the NEPA Council on Environmental Quality (CEQ)

regulations, and DOE NEPA Guidelines, Orders, and Memoranda. The overall goal of the NEPA assessment is to foster improved and environmentally sound decisionmaking for those DOE actions having the potential for significant impacts on the environment.

A NEPA protocol, developed by the Office of NEPA Oversight (EH-25) and ORNL includes worksheets that focus the teams lines of inquiry to ensure a comprehensive, consistent approach to the assessment. The content of the worksheets is divided into seven main areas as follows:

- Overview of NEPA issues;
- Management structure (overall organization, training, use of contractors, recordkeeping, etc.);
- NEPA compliance planning;
- NEPA/CERCLA, NEPA/RCRA integration;
- Determination of level of NEPA review required;
- Procedural aspects of NEPA documents; and
- Technical content of NEPA documents.

The general approach to the assessment will include interviews, as appropriate, with Ames Laboratory staff responsible for the NEPA procedures and review process; Ames Laboratory project and program managers, the legal and public relations staff and the classification officer; and others as the need arises. The use of the categorical exclusion (CX), memorandum-to-file, and action description memoranda (ADMs) will be evaluated, as appropriate, for consistency with DOE guidelines.

12.2 Records Required

As part of the NEPA assessment, files will be reviewed, including documents not previously received or reviewed as part of the pre-visit document request (e.g., classified documents, individual files, documents not previously identified). Specific documents and files requested for review prior to the Tiger Team visit include the following:

- Records that locate, identify, and describe both onsite and offsite impacts on the following resources, which may be affected by facility activities: endangered and threatened species and their critical habitats, baid and golden eagles and migratory birds and their nests, wild horses and burros, waterways (including waters and navigable waters of the U.S., floodplains, wetlands, and wild and scenic rivers); coastal zones; national recreational trails; wilderness and wilderness study areas; sacred Native American sites, prime/unique farmland, archaeological and historical sites; historic and prehistoric ruins and monuments and other Federal lands (e.g., National Forests);
- Documentation of consultation with agencies responsible for the administration of the natural resources listed above (e.g.,

Section 7 consultation with the Department of the Interior on endangered species);

- Any facility-specific or Field Office NEPA guidance or policies;
- Any correspondence or guidance which refers to delegation of authority to make NEPA determinations;
- Lists of ongoing and proposed actions or initiated changes in operations (e.g., Major Systems Acquisitions, Major Projects, Line Items, General Plant projects, DOE-sponsored research, Work for Others);
- Lists of ongoing and proposed CERCLA response actions;
- Lists of ongoing and proposed RCRA closures and correction actions;
- All NEPA-integrated documents prepared in support of remedial action;
- State or local "NEPA-type" statutes or regulations;
- Description of litigation related to NEPA;
- All documents used to make, support, or record NEPA determinations (e.g., Environmental Evaluations, Environmental Checklists, ADMs, Categorical Exclusions) prepared since September 1990;
- All environmental assessments (EAs) Environmental Impact Statements (EISs) that are still used for the assessment of all ongoing and proposed activities;
- Documents and studies that are cited in support of major aspects of facility EAs (e.g., biological assessments for endangered species, engineering details of projects);
- Mitigation reports available for EAs and EISs; and
- Printout from a data base which tracks NEPA documents (if such a data base exists).

Appendix C

ENVIRONMENTAL SUBTEAM DAILY AGENDAS

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Air Sarah Simon am	Orientation	Interviews: K. Malaby Re: Monitoring Plans D.Miller (ISU Utilities, Re: Permits, Agency Relations	Interviews: J. Withers (8-9) Re: SARA Compliance Lab Inspection O. Buck, R. Schmidt (Metals Dev. Building/Spedding Hall) B. Thompson Re: Research Emissions	Inspect: Maintenance Shops with M. Vaclav, R. Gress Observed: Emergency Drill (outside)	Interviews: L. Mathison Re: Air Planning, Inventories, DOE Reports T. Wessels policies guidance, procedures coordination	Team Meeting
pm	Orientation	Interviews: R. Struss (2:00) Re: Air and Monitoring Plans, Permitting E. Sabotka (ISU) Re: Permitting, ES&H Program	Inspect: Laboratories Interview: C. Lin (Wilhelm Hall) G. Small (Gilman Hall)	Interviews: M. Nelson, Equipment and Maintenance Oversight Inspect: Epensen Group Labs	Interviews: C. Bradley Metallurgy and Ceramics Inventory B. Conzemius	

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Surface Water Clifford Summers am	Orientation	Interviews: M. Vaclav Re: Util., Bldg Plans S. Townsend Re: Util., Bldg Plans (ill: rescheduled for later in week) D. Miller Re: Util., Bldg Plans	Interviews: Lab managers K. Malaby (or J. Ostenson) Re: Guide Arrange. Inspect: Laboratories Re: Disposal Practices	Inspect: Fossil Energy Program Re: Disposal Practices	Interviews: W. Gleason D. Shield Re: Impact on WPCP by ISU & Ames Effluent	Team Meeting
pm	Orientation	Interviews: R. Staggs Re: ASC, Util. Inspect: ASC, Util.	Inspect: Maintenance Bldgs Re: Surface Water Issues	Interview: J. Fletcher Re: CH oversight of Ames wastewater issues Interview: S. Townsend Re: Utilities, Bldg Plans	Follow-up Interviews, Staff in Metals Devlopment Bldg. Re: Understanding of "Permitted Releases to Sanitary Water System" Inspect: Sumps in Ames Lab Bldgs.	Develop Findings

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Groundwater/ Inactive Waste Sites Patricia Rodden am	Orientation	Interview: R. Struss ER Manager (10-12) Re: ER Program IWS Closeout Documentation IWS Character-ization Program Groundwater Program Corrective Action Program	Interview: R. Struss (8-9) Re: Prop. Transfer and Remediation Activities IWS Characterization Program	Interviews: R. Rosdale Re: Inactive Waste Sites Status P. Waters Re: Emergency Response J. Huemer State UST Person Re: Ames Lab Compliance Review State Files	Interview: 10:00 Disposal of ALRR R. Struss 5-Year Plan Annual Site Report	Team Meeting Inspect: Well Sampling Techniques at IWS 8:00
pm	Orientation	Tour Disposal Site with P. Jones (1:00) Interview (2:30): K. Malaby & Sampling Team Re: Env. Sampling Procedures Diesel Soil Remediation UST Monitoring	Interview: K. Malaby Manager of Underground Storage Tanks Removal & Testing Re: Status of Program, Documentation of Previous Tank Removal, inspection of UST, maintenance storage area	Review: DOE Order 4320.1B Site Development Plan Interviews: H. Nameras, CH Re: Real Property Transfer D. Williams Re: Site Development Plan Tech Site Document	Interview: K. Malaby with P. Pifalo, QA Specialist	

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Waste Management Donald Neal am	Orientation	Inspect: Radioactive Waste Disposal Facility Applied Science Center	Inspection: Laboratories Interviews: Waste Generators	Inspect: Laboratories Interviews: Waste Generators	Interviews: H. Hammond Re: Training K. Malaby Re: Waste Min. M. Godar Re: Emergency Response	Team Meeting
pm	Orientation	Inspect: Spedding Hall 855/57	Inspect: Laboratories Interviews: Waste Generators	Inspect: Laboratories, Paint & A/C, Shop Maintenance, Garage Interviews: Waste Generators	Interviews: L. Mathison Re: Waste Mgmt.	Document Review

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Toxic and Chemical Materials Linda Wennerberg am	Orientation	Interviews: L. Mathison Re: TCM Management/PPAP T. Siebold Re: TCM Training H. Hammond Re: TCM Training	Interviews: J. Cummings Re: Management of Scrap/Excess D. Burlingmair (9-10) Re: Compressed Gas Management G. P. Jones Spill Response H. Hammond Compressed Training	Interviews: M. Vaclav Re: Chemical Storage Construction R. Staggs K. Malaby Re: Excess Chemical Management, PCBs, Asbestos Testing Inspect: Manintenance Shops	Interviews: J. Oswood Re: Stores Management Inspect: Wilhelm Hall Laboratories and Chemical Storage	Team Meeting
pm	Orientation	Interviews: G. Walter Re: TCM Shipping, Receiving, and Storage Inspect: Ames Warehouse Receiving Interviews: J. Withers Re: TCM Use	Interviews: M. Vaclav M. Godar Re: Contractor Procurement	Inspect: Chemical/ Compressed Gas Storage in Labs and Bulk Chemical Storage Inspect: Metals Development Building Laboratories and Chemical Storage Interviews: O. Buck F. Schmidt L. Jones T. Lograsso Re: MDC, TCM management, PCBs	Interview: J. Withers Re: Pesticide/ Herbicide Application and Use Inspect: Pesticide/ Herbicide Storage Inspect: Spedding Hall Laboratories and Chemical Storage	Develop Findings

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
QA/QC Paul Pifalo am	Orientation	Interviews: J. Fletcher L. Olendorf (9:00) Re: Ames/CH Contract Interviews: J. Echert QA Representative (11:00) Re: QA Committee	Interviews: R. Struss (9:00) Ops. Div. Assoc. Director Re: Env. QA	Document Review Finding Development	Interviews: K. Malaby 10:00 Re: Sampling E. Sobotka 11:00 Re: ISU ES&H	Team Meeting IWS Well Sampling with IWS Specialist (12:00) Interview: IWS Well Sampling Specialist Inspect: Well Sampling Techniques at IWS
pm	Orientation	Interviews: L. Mathison (1:00) Env. Safety & Health Re: Env. QA	Interview: T. Wessels (1:30) Conduct of Operations and Environmental QA Re: EQA Self- Assessment	Interview: (1:00) B. Thompson Sc. & Tech. Div. Assoc. Director Re: Lab Operations QA, Training, Records	IWS Well Sampling with IWS Specialist (12:00) Interview: IWS Well Sampling Specialist Inspect: Well Sampling Techniques at IWS	Develop Findings

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
Radiation Paul Jones am	Orientation	Interview: R. Staggs Re: Radiation Waste Management and Dose Assessment, NESHAPs, ALARA	Interview: L. Mathison Re: ES&H Program NESHAPs Dose Assessment	Interviews: K. Malaby Re: Environmental Radiation Program, Environmental Sampling D. Meyer Re: Environmental TLDs	Document Review Findings Development	Team Meeting Develop Findings
pm	Orientation	Inspect: Chemical Waste Disposal Site (1-2:30) Radioactive Waste Building Interviews: G. Jones K. Malaby R. Staggs Re: Inactive Waste Site, Radioactive Waste, Radioactive Waste Management Document Review	Inspect: Materials Preparation Lab Interviews: P.Millis R. Schmidt T. Lagrasso Document Review	Document Review Findings Development	Develop Findings Interviews: P. Millis Re: Radioactive Materials Storage Vault L. Mathison Re: Dose Assessment K. Malaby Re: Release of Real Property	Develop Findings

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 10-15, 1992

	Monday 2/10	Tuesday 2/11	Wednesday 2/12	Thursday 2/13	Friday 2/14	Saturday 2/15
NEPA am	Orientation	Interviews: Facility NEPA R. Struss Assoc. Dir. Operations M. Godar Facilities Services Review: Nepa Guidance Facility Site Office Operations Office (if appropriate)	Interviews: Plant Engineering GPPs Plant Management Work Orders Plant Maintenance Work Orders K. Mallaby D. Knutson Budget Office D. Bluhm Engineering Science H. Hammond Training S. Merritt Procurement Eddleson Nuclear Safeguards J. Korones Waste Management O. Buck Metals P. Thirt Chemistry Review: Continuing	Interviews: L. Mathison ES&H - NEPA J. Nelson (CH-NCO) - NEPA Procedures and Communications Document Review	Follow-up Interviews Document Review File Searches Field Observations	Development Findings
pm	Orientation	Interviews: J. Fletcher T. Wessels DOE Site Office Reviews: NEPA Documents EAs EISs CXs MTFs (if applicable to ongoing or proposed actions)	Work for Others (application Forms) DOE-sponsored Research (FIPs) Budgeting/Planning Line Items Major Projects D. Williams Assoc. Dir. Planning & Technology	Develop Findings	Initial Discussion of Responsibility for Findings	

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 17-22, 1992

	Monday 2/17	Tuesday 2/18	Wednesday 2/19	Thursday 2/20	Friday 2/21	Saturday 2/22
Air Sarah Simon am	Interviews: K. Malaby Re: SARA Reports H. Hammond Re: Fire Training Notices	Interviews: Re: Verification of Information Findings Development	Findings Development		Potential Factual Accuracy Review	
pm	Inspection: D. Berlington Re: Cool Prep Bldg. J. Hand Re: Graphite Machine Shop Findings Development	Findings Development				
Surface Water Clifford Summers am	Findings Development Document Review	Findings Development Document Review	Overview Preparation			

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 17-22, 1992

	Monday 2/17	Tuesday 2/18	Wednesday 2/19	Thursday 2/20	Friday 2/21	Saturday 2/22
pm	Findings Development Document Review	Findings Development Document Review		Factual Accuracy Review		
Groundwater/ Inactive Waste Sites Patricia Rodden am	Interviews: J. Beno Re: Institutionalize Policy T. Wessels Re: Policy Writing	Interviews: T.Neumann Re: Water Quality Monitoring Near Muni. Wells				
pm		Document Review Interviews: ISU Physical Plant Manager Re: Water Quality Monitoring at ISU Well, Historic and Current Document Review Interviews: CH Representative Re: ER and Groundwater Programs, DOE-CH Expectations, Real Property Activities	Document Review			

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 17-22, 1992

	Monday 2/17	Tuesday 2/18	Wednesday 2/19	Thursday 2/20	Friday 2/21	Saturday 2/22
Waste Management Donald Neal am	Inspect: Reporting and Recordkeeping System	Interviews: L. Mitchell D. Inyang	Interviews: L. Matheson B. Staggs K. Malaby Inspections: Hazardous Waste Manifests	Findings Development Inspections: Metals Development Building Radioactive Waste Disposal Building Room B55, Spedding Hall	Travel	
pm	Interviews: J. Corones (ER)	Interviews: T. Wessels T. Lograsso P. Yeung		Findings Development	Travel	
Toxic and Chemical Materials Linda Wennerberg am	Findings Development	Findings Development Review Documents	Findings Development Review Documents		Factual Accuracy Review	
pm	Findings Development	Findings Development Review Documents	Submit Findings to Site	Factual Accuracy Review		

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 17-22, 1992

	Monday 2/17	Tuesday 2/18	Wednesday 2/19	Thursday 2/20	Friday 2/21	Saturday 2/22
QA/QC Paul Pifalo am	Interviews: R. Staggs K. Malaby Re: Ames Sampling	Interviews: L. Matheson T. Barton	Findings Development	Interviews: By Telephone Findings Development	Review Documents	
pm	Interviews: ES&H	Findings Development	Findings Development	Findings Development	Travel	
Radiation Paul Jones am	Findings Development Review Documents	Findings Development Review Documents	Findings Development Review Documents	Factual Accuracy Review		
pm	Findings Development Review Documents	Findings Development Review Documents	Findings Development Review Documents			

ENVIRONMENTAL SUBTEAM
SCHEDULE OF ONSITE ACTIVITIES
February 17-22, 1992

	Monday 2/17	Tuesday 2/18	Wednesday 2/19	Thursday 2/20	Friday 2/21	Saturday 2/22
NEPA am	Findings to Environmental Team Leader Revisions	Findings to Facility Staff and DOE	Factual Accuracy Review			
pm						

Appendix D

ENVIRONMENTAL AND MANAGEMENT SUBTEAM CONTACTS/INTERVIEWS (Attached on Microfiche)

Appendix E

LIST OF DOCUMENTS REVIEWED BY ENVIRONMENTAL AND MANAGEMENT SUBTEAMS (Attached on Microfiche)

Appendix F

OSHA NONCOMPLIANCE
(Attached on Microfiche)

Appendix G

DEFINITION OF ENVIRONMENTAL SUBTEAM CAUSAL FACTORS

DEFINITION OF ENVIRONMENTAL SUBTEAM CONTRIBUTING CAUSAL FACTORS

POLICY

Evaluate if ineffective, outdated, or nonexistent policies contributed to the finding.

POLICY IMPLEMENTATION

Ascertain if written policies reflecting Federal, state, and local laws and regulations codes, and standards were appropriately disseminated, implemented, and updated.

RISK

Evaluate if the site personnel responsible for a situation contributing to a finding have assessed and were aware of the relative degree to risk involved in the action.

PROCEDURES

Identify if written procedures that have been prepared to effectively implement site policy, DOE Orders, and Federal, state, and local laws and regulations were a contributing factor to the finding. Determine if unfamiliarity with or unavailability of those procedures contributed to the finding.

PERSONNEL

Identify if the educational and work experience backgrounds for personnel holding responsible positions contributed to the finding. Determine if the level of personnel knowledge about the technical and safety aspects of their jobs contributed to the finding.

RESOURCES

Ascertain if the number of personnel or extramural resources available to a job were a contributing factor in the finding. Evaluate if inadequacies in facilities and equipment were a contributing factor to the finding.

TRAINING

Identify if adequate personnel training on implementing site policy, DOE Orders, and applicable Federal, state, and local laws and regulations was a contributing factor to the finding.

CHANGE

Evaluate if changes in site missions, function, operation, and established requirements, which rendered existing policies of procedures inadequate or inappropriate, were contributing factors to the finding. Evaluate if the timeliness and effectiveness of changes to site and DOE

policy, and the implementing procedures, were a contributing factor to the finding.

APPRAISALS/AUDITS/REVIEWS

Determine if ineffective or insufficient appraisals/audits/reviews or oversight were contributing factors to the findings. These factors should only be used as secondary contributing factors to the findings.

DESIGN

Evaluate if inadequate design of system was a contributing factor to the finding.

HUMAN FACTORS

Ascertain if human factors, such as fatigue or deliberate circumvention of safety system, were contributing factors to the finding.

BARRIERS AND CONTROLS

Determine if inadequacies in established barriers and controls, both administrative and physical, including operation readiness, routine inspections, and preventive maintenance, and/or a lack of these controls contributed to the finding.

SUPERVISION

Identify if ineffective direct supervisory controls for implementing policies, procedures, standards, laws, etc., were a contributing factor to the finding.

QUALITY ASSURANCE/QUALITY CONTROL

Identify if inadequacies in the quality assurance/control program were causal factors in the identified findings. This includes inadequate followup to previously identified findings.

Appendix H

HOT LINE CALLS

TIGER TEAM HOT LINE CALLS AND RESPONSES
AMES LABORATORY

An onsite environment, safety, and health (ES&H) hot line was established for the Ames Laboratory assessment and operated by the Tiger Team between February 10 and 25, 1992. The hot line was established to allow Ames Laboratory personnel, as well as the general public, to report specific ES&H concerns. Notifications of the hot line and its purpose were made in local newspapers, at a press conference, and through site newsletters. In addition, notices were distributed to each Ames Laboratory organizational entity. The notices also informed Ames Laboratory employees that information related to fraud, waste, abuse, misconduct, and environmental issues of a criminal nature could be reported directly to the DOE Office of the Inspector General at 1-800-541-1625, or 202-586-4073, or FTS 896-4073.

This appendix provides a synopsis of calls received on the hot line and the subsequent response actions taken by the Tiger Team.

CONTROL #1

DATE: February 18, 1992

NATURE OF CONCERN: Caller expressed concern regarding the different manner in which two chemical spills in laboratories at Spedding Hall were handled, one of which occurred on February 17, 1992, and the other which occurred approximately three years ago. Caller stated that the spill which occurred three years ago was not handled with the same responsiveness as the recent spill.

RESPONSE: This concern was passed to the Safety and Health Subteam who inspected the area of the spill of about one liter of chromic acid which occurred three years ago. It was found that the floor area that sustained the spill was covered by a new hood installed about a year ago. Ames Laboratory will place a letter in the building file to ensure examination of the floor if and when the hood covering the spill area is removed. Caller was satisfied with this response.

CONTROL #2

DATE: February 18, 1992

NATURE OF CONCERN: Caller expressed concern with regard to worker safety. In particular, caller mentioned two areas of concern: (1) electrical breakers that are so old that they do not trip, and (2) danger of asbestos and thorium in duct work in which workers crawl around.

RESPONSE: This concern was passed to the Safety and Health Subteam who has addressed these issues in the Tiger Team report.

CONTROL #3

DATE: February 18, 1992

NATURE OF CONCERN: Caller expressed concern about the dangers of the crosswalk at the intersection of Pammel and Morrell.

RESPONSE: This concern was outside the scope of the Tiger Team appraisal since the area in question is owned by Iowa State University. It was referred to the Ames Laboratory Director for information.

CONTROL #4

DATE: February 25, 1992

NATURE OF CONCERN: Caller expressed concern about the smoking policy at Ames Laboratory and the fact that the office the caller was in was designated as a smoking area--the caller was a nonsmoker.

RESPONSE: This concern was passed to the Safety and Health Subteam who discussed with Ames Laboratory management the Iowa State University smoking policy which states, "All regular occupants of offices in which smoking takes place must consent to smoking in the office." Ames Laboratory management will take appropriate action regarding this matter. Caller was satisfied with this response.

CONTROL #5

DATE: February 26, 1992

NATURE OF CONCERN: Anonymous caller expressed concern about the misuse of government property.

RESPONSE: Caller's concern was outside scope of Tiger Team. Referred to DOE/CH for appropriate action as potential waste, fraud, or abuse issue.