

**The Secretary of Energy**

Washington, DC 20585

June 14, 1993

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004

Dear Mr. Conway:

On September 22, 1992, the Defense Nuclear Facilities Safety Board transmitted to the Department Recommendation 92-7, which addresses technical training and qualification in the Department for defense nuclear facilities. On January 19, 1993, all elements of the Recommendation were accepted by then-Secretary Watkins. On April 28, 1993, the Department notified the Board that there would be a 45-day delay in the submittal of the implementation plan.

I understand that the Board continues to believe that the single most serious and far-reaching problem affecting the safety of Department of Energy defense nuclear facilities is insufficient numbers of highly qualified technical and management personnel. There appears to be an opportunity for the Department to reevaluate current and past Board recommendations and deal with them comprehensively at one time.

It is my intention to establish an "ad hoc" group reporting to the Acting Under Secretary consisting of Department employees along with outside experts familiar with government and industry techniques for achieving technical excellence within government organizations. This group would use Recommendation 93-3 as the umbrella under which the Department could bring the training and qualification components of this and other Board recommendations together and use the Department's response and Implementation Plan for Recommendation 93-3 as the vehicle for addressing these issues. This consolidation effort would not in any way conflict with training activities resulting from early Board recommendations which have been found acceptable and are underway.

In accordance with 42 U.S.C. 2286d(e), I am forwarding to you the enclosed implementation plan for Recommendation 92-7.

Sincerely,

A handwritten signature in cursive script that reads "Hazel R. O'Leary".

Hazel R. O'Leary

Enclosure

IMPLEMENTATION PLAN FOR
DEFENSE NUCLEAR FACILITIES SAFETY BOARD RECOMMENDATION 92-7
TRAINING AND QUALIFICATION THROUGHOUT
THE DEFENSE NUCLEAR COMPLEX

Introduction

On September 22, 1992, the Defense Nuclear Facilities Safety Board forwarded to the Secretary Recommendation 92-7 concerning training and qualification of operations, maintenance, technical support and supervisory personnel at defense nuclear facilities. On January 19, 1993, the Department responded by accepting all elements of the Board's Recommendation.

Board Recommendation 92-7 consists of four recommendations which are summarized below:

1. Senior managers and line managers, both at Headquarters and Operations Offices, need to become more actively involved in the implementation of training and qualification programs and communicate to their subordinates, both Federal and contractor, the high priority to be placed on training. The Department should conduct a study to determine organizations' needs such as staffing, funding organizational structure, and action to upgrade management.
2. An accelerated effort needs to be made to improve training and qualification programs of operations, maintenance and technical support personnel at defense nuclear facilities. The Board has found weaknesses in the technical qualifications of personnel in organizational units responsible for the training and qualification of personnel. To expedite implementation of existing requirements and in anticipation of additional training and qualification requirements, there may be a need to clarify responsibilities, strengthen the infrastructure, and increase the resources available.
3. An accelerated effort should be made to assess the roles, responsibilities and effectiveness of groups overseeing the Department's defense nuclear facilities. It suggests a review of the selection criteria, and structure of, on-site technical oversight groups to ascertain if they have the technical expertise sufficient to effectively evaluate training and qualification programs of operations, maintenance and technical support personnel.
4. Measures to improve training and qualification programs for operations, maintenance and technical support personnel at defense nuclear facilities need to be established and implemented. In establishing these measures, the Board requested the Department to consider Recommendation 90-1. In particular, the Board asked the Department to consider applicable trade, industry and professional standards, guidance and requirements, and to identify differences between the Department's requirements and standards from trade, professional and industry standards. The Board also asked the Department to consider: (1)

extending the performance-based training principles of Order 5480.18A to all defense nuclear facilities; (2) extending continuing training requirements to require continued improvement after initial training; and, (3) requiring maintenance of auditable records to verify completion of training and use for determining the degree of success.

In carrying out this plan, the Department's strategy is to proceed on several simultaneous activities, each with its own deliverables, over the next year. These activities will include policy initiatives, workshops for stakeholders, and surveys of Headquarters and field organizations. Intervening assessments and incremental decisionmaking will lead to the full implementation of Recommendation 92-7.

The Department is proposing this implementation plan as a rigorous beginning to establish a process of continuous improvement through identification of problems; cooperation among all stakeholders; free communication from the lowest levels of the Department and its contractors to the highest, in both directions; and decisive action to solve the problems.

This plan, therefore, is principally focussed on the five sites specified in the Recommendation: the Hanford Site, the Pantex Plant, the Savannah River Site non-reactor facilities, the Oak Ridge Y-12 Plant and the Rocky Flats Plant, referred to below as the "affected sites." The purpose is to start with these sites not only because of their priority to the Department, but also with the view that the lessons learned during this first year will be important to carrying on the principles of the implementation plan to all of the other defense nuclear facilities. It is the Department's intention to implement a continuous improvement effort throughout the entire defense nuclear facilities complex.

The Department sees the sequence of the four recommendations as being cumulative in terms of their implementation. Of all the recommendations in Recommendation 92-7, the Department regards the first as the most critical. This urges the Department "to expand senior management's involvement" in the implementation and effectiveness of training and qualification programs at the applicable facilities. The necessary first step is to establish a chain of command with the authority to attack the problem. Empowerment of this chain of command is essential for the plan to succeed.

Consistent with, but arising from a separate motivation, the Department's new leadership immediately began a number of initiatives aimed at the goal of improving safety and health in the Department. Recognizing that the time was ripe to establish a new ethic, the Secretary set as the number one priority, "to develop the road map for a clear set of policies and principles...around the fact that we value people." To do that, it was recognized that clear lines of authority must be established to replace the tremendous confusion over responsibility and adherence to directives. The Secretary has focussed the Department on how to develop, in each employee, a behavior that comes from the expectation that each individual understands the requirements.

Recently, the Department initiated a number of actions designed to clarify assignments of responsibility and enhance performance. These actions included

the creation of the Office of the Associate Deputy Secretary for Field Management. This Office will centralize responsibility for strategic planning, management coordination and oversight of field execution of programs and projects for the eight multi-purpose Operation Offices, including the five priority sites specifically cited in the Board's Recommendation 92-7. This Office will represent the field perspective concerning adequacy of resources for infrastructure requirements and the impacts of proposed policies on the execution of Departmental programs. It will play a primary role in the consistent execution of the deliverables set forth in this implementation plan and other Departmental initiatives. This role will mitigate the divergence in field execution of the Department's policies.

The plan is designed so that the Department senior line management at the Headquarters level, as well as at defense nuclear facilities and sites, will be meaningfully involved in technical training and qualification of Federal and contractor workers. Preliminary steps have been taken to improve coordination among and provide support to the senior line managers in their training, qualification and development activities.

Note: This implementation plan uses the term "line management" to mean those Secretarial Officers (Secretary, Deputy Secretary, Assistant Secretaries) and supporting program offices in Headquarters, together with Operations Office managers, assistant managers and support staff directly involved in supervising management and operating contractors. The term, in most cases, also applies to the chain of command existing in the contractor organizations.

With steps now underway to establish a shared vision of the Department's new ethic in all areas, emphasizing health and safety, and the need for leaders to be involved, the logical next step with respect to Recommendation 92-7 is to look at the people in both the Headquarters and the field to accelerate implementation of the Department's own requirements. This is the second recommendation. In a similar manner, this leads to an examination of the oversight structure of the Department - Recommendation 3 - which will be the mechanism for achieving and measuring continuous improvement.

Finally, measurable progress on these first three recommendations, leads logically to Recommendation 4, which addresses the infrastructure necessary to solidify and codify technical training and qualification in the Department.

The Department recognizes this is not a "once through" task; there will be iterations of each step, and the whole process will take time before the Department's and its contractor's employees are confronting the issues at the optimum level. Therefore, quarterly status reports will be provided by the Technical Training Executive Committee to the Secretary, which will be made available to the Board, on the progress of completing commitments made in this implementation plan.

Deputy Assistant Secretaries from the line organizations and Operations Office Managers, or their senior designates, will participate in a Technical Training Executive Committee (see Recommendation 1). This will enable their full involvement in the development of training strategies and providing oversight

of the Departmental technical training and qualification programs. The update of the 5-Year Plan for Training to include contractor training will assure consistency and synergism for the entire program.

The Department has expended considerable effort and resources to develop Orders 5480.18A, Accreditation of Performance-Based Training for Category A Reactors and Nuclear Facilities, and 5480.20, Personnel Selection, Qualification, Training and Staffing Requirements at the DOE Reactor and Non-Reactor Nuclear Facilities. These Orders invoke industry standards for the Department's nuclear facility management and operating contractors' training and qualification programs. Although promulgated in 1991, these Orders are not fully implemented at the defense nuclear facilities.

The Board's introductory material expressed concern about: (1) the level of knowledge of personnel and supervisors in the fundamentals of training and qualification programs; and, (2) the cognitive level of examinations at various sites. Although these concerns were not specifically addressed in the Recommendation, the Department's activities in fundamentals training for operations, maintenance and technical support personnel at the applicable defense nuclear facilities is described in Attachment 1.

RESPONSE

Recommendation 1 states:

"The Department take timely action to expand senior management's involvement in implementing training programs at defense nuclear facilities and to enhance senior management's communication of the importance of effective training and qualification programs to all levels within relevant Department and contractor defense nuclear facilities organizations, particularly within line organizations. With regard to operations, maintenance and technical support personnel, the Department should determine what personnel, funding, organizational, or managerial strengthening actions are needed to (a) elevate the priority and importance of training and qualification programs to assure public health and safety; (b) communicate the importance of training and qualification from the highest level of management to all appropriate Department personnel; (c) expand personnel and supervisor training and qualification guidance and increase program resources to facilitate the rapid review, approval and implementation of training and qualification programs; and (d) make other changes as are warranted."

Course of Action:

The Department has consistently supported the premise that line management is totally responsible for the recruitment, training and development of the technical talent to run the Department's complex operations. This is the underlying principle of the Department's Nuclear Safety Policy, which states, "Organizations responsible for [the Department's] nuclear activities shall have the ability to recruit, train and qualify personnel . . . for job specific positions." Personnel must be qualified by technical education and experience to provide adequate management direction and guidance essential to the safe operation of the Department's defense nuclear facilities.

The Department concurs with the Board's observation that its senior management officials and those of its contractors need to provide more timely and focused attention to assuring the implementation of an effective technical training and qualification program. Given the comprehensive and cross-cutting nature of technical training and the diversity of related environment, safety and health requirements which have impacted the training requirements of contractors, the Department accepts the observation that expanded and continuous management attention must be applied to implementing technical training and qualification.

Senior line managers at Headquarters need to be involved to provide the leadership for their Federal staff as well as the contractors under their cognizance. This concept of line management responsibility and accountability for training and qualification is reflected in the Department's directives for quality assurance (Order 5700.6C) and conduct of operations (Order 5480.19).

To carry forward Recommendation 1, the following strategy will be followed:

The Department will provide Senior Management data on the advisability of making organizational changes that might enhance technical training and qualification programs and any required enhancement of budgetary and personnel resources. On March 19, 1993, the Acting Assistant Secretary for Defense Programs, in response to the former Secretary's direction, established a Technical Training Executive Committee to set strategy, foster coordinated planning and oversee Federal and contractor worker technical training throughout the Department. The membership of this committee consists of Deputy Assistant Secretaries from the line organizations, and Operations Office Managers, with the Acting Assistant Secretary for Defense Programs as the Chairman. This committee was convened, in part, to initiate activities to obtain the detailed data needed for meeting the Board's recommendations. These activities include conducting studies and site surveys whose results will provide the data needed by Department of Energy senior management.

The Secretary will issue a policy statement setting forth a strong technical training and qualification program for all defense nuclear facilities.

The Department will collect and analyze current status information on the training implementation plans required by Order 5480.18A and Order 5480.20. The Office of Defense Programs, in coordination with the Office of Environmental Restoration and Waste Management, issued direction on May 25, 1993, to the affected Operations Offices Managers to provide current status information on the training implementation plans required by Orders 5480.18A and 5480.20. These plans are required to contain an overview of the training programs subject to the specified requirements, a description of the current status of compliance, milestones for achieving compliance, and a justification for exceptions taken for requirements that are not implemented.

The status information requested in the May 25, 1993, memorandum will include a list of facilities for which a plan is required, the date the

plan was submitted or is scheduled for submittal, and the approval status. The information is to be provided by July 2, 1993, and will be the basis for a workshop with responsible managers from Headquarters, the Operations Offices, and Area Offices from the affected sites to resolve issues related to the implementation plans and to establish firm review and approval schedules. The target date for approval of all plans is December 1993. On June 9, 1993, the Associate Deputy Secretary for Field Management issued an additional memorandum to all Operations Office Managers not addressed in the May 25, 1993, memorandum. This requested their status information and in order to accelerate the approval of required training implementation plans for all defense nuclear facilities. Key Departmental personnel from these other defense nuclear facility sites will also be requested to attend this workshop to assist them in beginning a similar effort for all other defense nuclear facilities.

As part of this workshop, a standardized training and qualification program status and activities report will be developed. The training and qualification report will be used as a tool by senior line management in the monitoring of actions which will provide the necessary feedback to meet the deliverables in this Recommendation. In addition, it will, in the long term, provide a communications system to assure the continued implementation of training and qualification programs for both Federal and contractor personnel.

Implementation of the Department's training Orders has not progressed in a timely manner. A Technical Training Executive Committee-chartered task force, composed of recognized experts from industry, national laboratories, Operations Offices and Headquarters will take steps to assist management in accelerating the implementation of the training Orders.

The task force will conduct training and qualification field surveys at the five affected sites. The surveys will examine specific areas identified in this Recommendation, as well as Recommendations 2 and 3, to assist the Department in strengthening the overall technical training and qualification infrastructure. To facilitate improvements, the following general areas will be subject to examination by the task force:

- The comprehensive process of training and qualification of both Federal employees and contractors,
- The capability of Federal employees to provide adequate and knowledgeable oversight to these activities, and
- The personnel, funding, management and organization related to these activities.

The task force will also review the current implementation status of Orders 5480.18A and 5480.20. By identifying roadblocks preventing timely Order implementation and by making recommendations to eliminate

these roadblocks, the task force will be providing direct assistance to the Operations Offices and contractors. Through this short-term, focussed support to the Operations Offices, it is intended that the rate of Order implementation will rapidly improve.

In addition, the task force will provide recommendations to the Technical Training Executive Committee on strengthening the Department's operations office and contractor organizational structure to enhance the training and qualification programs. It will recommend actions to eliminate internal barriers as well as to promote communications that will enhance the execution of the programs intended by the Orders. The Technical Training Executive Committee, after studying the task force recommendations, will make its recommendations to the Offices of the Associate Deputy Secretary for Field Management, Defense Programs, and Environmental Restoration and Waste Management. The task force effort is expected to take five months.

The task force recommendations, together with the results of the site visits already conducted and scheduled by the Office of Professional and Technical Training and Development (see Recommendation 2), will be reviewed by the Technical Training Executive Committee. The Committee will then recommend to the senior line program management in Headquarters and the field changes that can be accommodated within the Fiscal Years 1994 and 1995 budgets by December 31, 1993.

Deliverables:

To accomplish this, the following milestones have been and will be pursued:

March 19, 1993 - The Technical Training Executive Committee was formed.

May 25, 1993 - A memorandum was issued to obtain the current status information on training implementation plans required by Orders 5480.18A and 5480.20 at the affected sites (completed).

June 9, 1993 - The Office of the Associate Deputy Secretary for Field Management issued a memorandum to the remaining Operations Offices where defense nuclear facilities are located to obtain the current status information on training implementation plans required by Orders 5480.18A and 5480.20.

July 1, 1993 - A task force chartered by the Technical Training Executive Committee, comprised of recognized experts from industry, national laboratories, Operations Offices and Headquarters will begin the evaluation of the training and qualification programs at the five specific sites and identify corrective actions as necessary.

July 1, 1993 - A working group will be chartered by the Technical Training Executive Committee to conduct an internal study which will develop the necessary information and options to enable the Secretary to make decisions

regarding the optimum headquarters organizational alignment to support line management with respect to technical training and qualification issues.

July 1, 1993 - The Technical Training Executive Committee will initiate the process to revise the 5-Year Plan to improve Scientific and Technical Training and Recruitment to include contractor activities.

July 2, 1993 - Operations and Office managers at the five sites will provide the Offices of Defense Programs and Environmental Restoration and Waste Management a list of facilities for which a training plan is required, the date the plan was submitted or is scheduled for submittal, and the approval status.

July 30, 1993 - The Secretary's technical training and qualification policy statement will be issued.

By August 31, 1993 - The Offices of the Associate Deputy Secretary for Field Management, Defense Programs and Environmental Restoration and Waste Management, with assistance from the Office of the Assistant Secretary for Environment, Safety and Health, will host a workshop to resolve training implementation plan issues; establish firm review and approval schedules; and define a standardized training activities/status report along with its frequency for submission to senior managers in the field and Headquarters.

September 30, 1993 - The study, begun July 1, 1993, to provide the Secretary with necessary information and options to enable a decision on establishing an optimal headquarters organizational alignment to support line management will be completed.

October 1, 1993 - Each Operations Office will submit the first of a recurring training program status report, as discussed in the August 31, 1993, deliverable.

December 10, 1993 - The task force evaluation of the training and qualification programs at the five specific sites and its recommendations for corrective actions as necessary will be completed.

December 31, 1993 - The Offices of the Associate Deputy Secretary for Field Management, Defense Programs and Environmental Restoration and Waste Management will complete the review and approval of training implementation plans and/or matrices for the affected sites, and establish final review and approval schedules for all other sites based on lessons learned.

December 31, 1993 - The Technical Training Executive Committee, after reviewing the recommendations of the task force, will provide its recommendations to the Offices of the Associate Deputy Secretary for Field Management, Defense Programs, and Environmental Restoration and Waste Management.

December 31, 1993 - The update to the 5-Year Plan for Training to include contractor as well as Federal training will be completed. It will also include organizational charts and responsibilities for the offices responsible

to implement, manage and oversee the technical training and qualification programs in the Department. This 5-Year Plan will include data on both Federal and contractor training programs.

January 3, 1994 - The Offices of the Associate Deputy Secretary for Field Management, Defense Programs and Environmental Restoration and Waste Management will begin implementation of the changes to the technical training and qualifications program which result from the task force survey, along with the site visits conducted by the Office of Professional and Technical Training and Development (see Recommendation 2) and begin implementation of changes that can be accommodated within the Fiscal Years 1994 and 1995 budgets. These changes may include such things as organizational realignments, minor redirection of existing training programs, utilization of additional offsite education and training opportunities and development of new or modified policy or guidance. All identified actions will become part of the training activities and status report discussed in Recommendation 1.

Recommendation 2 states:

"Where it is found to be necessary, the Department strengthen organizational units responsible for training and qualification at the Department Operations Offices, Department Area Offices, and contractor organizations responsible for defense nuclear facilities at these sites, especially to include the appropriate technical qualifications of the personnel assigned to defense nuclear activities. The infrastructure, responsibilities, and resources of the training and qualification programs of those organizations need to be strengthened to expedite implementation of existing and additional training and qualification requirements issued by DOE."

Course of Action:

As discussed in the introduction, many of the actions scheduled in response to Recommendation 1 are cumulative with respect to satisfying the succeeding Recommendations. For example, the changes that will probably be made within the limits of the Fiscal Year 1994 budget, such as organizational changes, will have an effect on the response to Recommendations 2, 3 and 4.

Over the past several years the Department has expended a significant effort on the matters raised in this Recommendation. Through a variety of reviews, such as visits, inspections, Operational Readiness Reviews and Tiger Team assessments, there have been consistent indications of the need to strengthen the training and qualification effort.

In the best cases, the reviews have shown that the sites have an approach that is sound, and implementation is progressing. At other sites, however, plans are not comprehensive, staffing is inadequate, and implementation indicates no sense of urgency. A preliminary view indicates that, generally, the contractor progress is superior to that found in the Federal sector.

The challenge is to maintain and upgrade the training and qualification of Federal and contractor personnel at all levels of the Department. This requires a number of different but interrelated activities ranging from employee recruitment practices to the training and professional development of managerial and technical staff to feedback on performance.

The Office of Professional and Technical Training and Development will initiate a series of site visits to develop a better definition of the training and qualification requirements of Operations Offices and Headquarters program offices. The focus of this activity will be on issues and information important to developing a Departmental curriculum for technical, scientific, and engineering training for Federal employees. Information gathering and site visits will be restricted to field and Headquarters organizations involved in the management and oversight of nuclear facilities. The results and recommendations of these visits and meeting will be sent to the Technical Training Executive Committee for its review.

Recommendations made to the Technical Training Executive Committee will be evaluated for immediate implementation, as can be accommodated in the Fiscal Years 1994 and 1995 budgets, as described in Recommendation 1. For those

recommendations that cannot be accommodated, including the recommendations of the task force described in the Recommendation 1 response, a supplemental budget for these years will be prepared.

There are a number of ongoing activities which the Department considers as meeting some of the concerns expressed by the Board:

A 5-Year Plan was developed for the recruitment, training and professional development of technically trained individuals to staff the Department's line and oversight offices at all levels of the Department. This initiative has established the framework to upgrade the training and qualification of the Federal staff and, as previously mentioned, will be revised to include similar information on contractor training and qualification programs.

A new Department of Energy Federal Training Special Interest Group within the Department-managed Training Resources and Data Exchange network, administered for the Department through the Oak Ridge Institute for Science and Education, has recently been established with the aim to strengthen the operations office ability to deal with the challenge of upgrading and standardizing the approach to training and qualification. This Group will facilitate the sharing of resources and the joint development of training materials among Headquarters, Operations Office and Area Office Federal training personnel.

The Office of Professional and Technical Training and Development has coordinated a project to analyze and describe mission critical work activities and to identify associated knowledge and skill requirements to support broad-based training activities for the Federal staff. The information will be assembled in a Directory of Environmental, Safety, Health and Nuclear Work Activities with work descriptions, associated knowledge and skills, mandatory training requirements and internal sources of training for each work activity. This product, to be completed this calendar year, will be a key tool in planning and developing training and qualification courses for the Department's Federal staff.

Through the existing Department of Energy-managed Training Coordination and Accreditation Program activities, a series of conferences, workshops and courses for Federal and contractor staff were held. Their purpose was to improve the understanding of performance-based training, accreditation, selection and qualification requirements, and the development and review of plans for both Orders 5480.18A and 5480.20. Several examples of these recent efforts include:

- A workshop hosted by Westinghouse Savannah River Company to address the sharing and development of standardized training for chemistry technicians.
- A workshop hosted by Westinghouse Hanford Company to address the sharing and development of standardized waste tank farm training programs.

- A workshop hosted by EG&G Rocky Flats, Incorporated, to address the development and review of Training Implementation Matrices required by Order 5480.20.
- Two separate workshops hosted by Martin Marietta Energy Systems and Westinghouse Savannah River company for senior line management and senior training management to discuss the critical role of line management in training.
- Six training courses similar to commercial nuclear training programs have been developed for the Department and its operating contractors. These courses include: Basic Instructor Training, On-The-Job Training, Analysis and Design, Instructional Development, Testing Employee Performance, and Performance Evaluation and Corrective Action. These courses are available to Federal personnel and are being transferred to contractors for incorporation in their training programs.

As a result of the establishment of centralized training organizations in the field, there has been an increase in the development of sitewide training policies, procedures and requirements, as well as the development of generic fundamentals training and qualification programs in areas such as radiation protection and general employee training, that have sitewide applicability. The number of operating contractor training staff and the amount of facility space dedicated to training has also increased significantly at the Department's sites. The following are a few examples that demonstrate the increased emphasis given to the importance of training:

- At Savannah River the contractor training staff has increased from 30 in 1980 to 580 in 1991. The space dedicated to training (in square feet) has increased from 6,200 in 1980 to 84,000 in 1991 with an additional 60,000 planned.
- At Richland the contractor training staff has increased from 34 in 1980 to 169 in 1991. The space dedicated to training has increased from 8,920 in 1980 to 77,680 in 1991 with an additional 65,000 planned.
- At Rocky Flats the contractor training staff has increased from 39 in 1989 to 160 in 1990.

While complete data have not been compiled for each operating contractor, these data are considered representative of actions being taken across the Department. Presently there are more than 3,000 personnel across the Department who are directly involved to some degree in training. These data are also very comparable to the increase in staffing and training facilities that occurred in the commercial nuclear power industry as they adopted performance-based training. In response to Recommendation 2, the task force will evaluate previous reports, conduct onsite surveys and provide assistance to program and Operations Offices to accelerate their progress toward meeting stated goals.

Order 3410.1B, Training addresses Federal employee development and training programs. A comprehensive review of the Order has commenced to assure that the underlying principles of performance-based training are integrated into its tenets.

The Special Interest Group, referred to above, has the specific aim of strengthening the Federal Training Managers' ability to deal with upgrading and standardizing the approach to training and qualification. The methods that have been successful at the Savannah River Site are being offered to all participants.

Deliverables:

June 28, 1993 - Commence site visits by the Office of Professional and Technical Training and Development, to be completed by September 1, 1993.

October 15, 1993 - The Office of Professional and Technical Training and Development will convene a meeting of Operations Offices training managers to review the results of the site visits and publish a plan for developing a technical curriculum for Federal employees.

November 15, 1993 - The Office of Professional and Technical Training and Development will provide the Technical Training Executive Committee the results and recommendations which emerge from the site visits and the meeting of the Operations Office and headquarters training officers.

December 31, 1993 - Completion of a Directory of Environmental, Safety, Health and Nuclear Work Activities for the Federal staff.

March 31, 1994 - Based on the task force survey results from the response to Recommendation 1, and the site visits discussed above, develop Fiscal Years 1994 and 1995 supplemental budget requests to begin remediation of activities.

March 31, 1994 - Prepare budget guidance for Fiscal Year 1996 and beyond to complete enhancement of technical training and qualification throughout the defense nuclear facility complex.

June 1, 1994 - Promulgate revision to Order 3410.1B.

Recommendation 3 states:

"The Department accelerate efforts internal to DOE to improve training and qualification programs of operations, maintenance, and technical support personnel at defense nuclear facilities. An integral part of this effort should be an assessment of the roles and effectiveness of technical oversight groups to ensure that these groups' reviews, at all organizations and levels within the defense nuclear facilities complex, appropriately recognize the importance of training and qualification to public health and safety. The Department's program should also consider restructuring onsite technical oversight groups to ensure that training and qualification are afforded adequate attention and team members possess the technical expertise necessary to effectively evaluate training and qualification programs of operations, maintenance, and technical support personnel."

Course of Action:

The Department agrees that one of the preferred ways to accelerate the improvement of training and qualification programs is to ensure that the technical oversight groups are technically proficient and recognize the role and importance of training and qualification in protecting public health and safety. Technical oversight groups must also possess the ability to adequately assess the quality of training programs as part of their facility and operations oversight responsibilities.

An integral part of the response to Recommendation 2 will be to assess the potential to accelerate efforts to improve the training and qualification programs of oversight groups at all levels and within all functional areas of the Department's defense nuclear facilities. This will include Federal personnel at the Operations and Area Offices whose principal responsibility is direct oversight of the contractor organizations.

The Assistant Secretary for Environment, Safety and Health will conduct a review of the oversight staffs in that organization at both Headquarters and the field. This review will evaluate the technical expertise of the oversight organizations to oversee contractor training and the implementation of all environment, safety and health orders. It will also identify any needed training of Office of Environment, Safety and Health oversight personnel in the area of their technical disciplines and their ability to oversee contractor training and qualification programs.

The task force surveys discussed in Recommendation 1 will also examine, in conjunction with the Operations Office management, the organizational structure and technical expertise of internal oversight groups to determine if they can effectively evaluate training and qualification programs of operations, maintenance and technical support personnel. Upon completion of the surveys, shortfalls will be identified, responsibilities assigned and the action tracked in the status report identified in Recommendation 1.

Ongoing activities in this area, toward meeting the goals of the Board's Recommendations 2 and 3 are:

Training courses have been developed for personnel who monitor and evaluate contractor radiation protection activities at the Department's sites to improve the consistency of such training and to promote excellence. This training consists of two courses relating to the conduct of radiological operations: a 2-week course including health physics theory and practices, inspection techniques and an overview of the Department's Radiation Control Manual; and a 2-day course for supervisors and managers covering the same material.

In July 1992, a training course entitled, Management and Oversight of Performance-Based Training Programs, directed primarily at Federal and contractor line management and oversight personnel was developed by the Department. It is based on a recognized deficiency in the ability of organizational units at Headquarters, Operations Offices, Area Offices and contractors to adequately understand and carry out their responsibilities for assessing, reviewing and approving contractor plans for development of training programs necessary to meet Orders 5480.18A and 5480.20.

- This new course was first delivered at the Savannah River Site in August 1992, to take advantage of the experiences at the site in implementing Board Recommendation 90-1. The course:
 - o explains the requirements of Orders 5480.18A and 5480.20,
 - o explains the roles and responsibilities of technical monitors and program managers for Orders 5480.18A and 5480.20,
 - o provides background in performance-based training and the review and approval of contractor training plans and training programs,
 - o provides practice in comparing training programs to criteria in the Department's Orders, and
 - o provides practice using job aids for tracking progress of training and qualification programs meeting the Department's Orders.

Federal personnel in the Department's Headquarters, Operations, and Area Office staffs, as well as the Department's internal independent oversight organizations, who must ensure that certain training and qualification programs meet and maintain the requirements of Orders 5480.18A and 5480.20, will be required to attend the Management and Oversight of Performance-Based Training Programs course. This will be conveyed in the July 30, 1993, Secretary's policy statement as a deliverable in Recommendation 1.

Deliverables:

July 1, 1993 - The task force discussed in Recommendation 1, will also examine, in conjunction with the Operations Office management, the organizational structure and technical expertise of internal oversight groups to determine if they can effectively evaluate training and qualification programs of operations, maintenance and technical support personnel.

September 30, 1993 - The Assistant Secretary for Environment, Safety and Health will begin an evaluation of that organization's assignments and capabilities for overseeing contractor technical training, qualification, policy development and technical support.

December 31, 1993 - The Assistant Secretary for Environment, Safety and Health will a complete review of oversight capabilities of that organization and, as necessary, will develop plans for upgrading training of those personnel who have responsibility for overseeing Federal and/or contractor operations and their related training programs. Incorporating the oversight enhancements within the current budget resource constraints of the Department will also begin.

January 3, 1994 - The Assistant Secretary for Environment, Safety and Health will evaluate the task force survey results (see Recommendation 1) along with the results of the site visits conducted by the Office of Professional and Technical Training and Development (see Recommendation 2) and begin implementation of changes in that organization that can be accommodated within the Fiscal Years 1994 and 1995 budgets. These include such things as organizational realignments, minor redirection of existing training programs, utilization of additional offsite education and training opportunities and development of new or modified policy or guidance. All identified actions will become part of the training activities and status report discussed in Recommendation 1.

Continuing - The Assistant Secretary for Environment, Safety and Health will continue to conduct the training course Management and Oversight of Performance-Based Training Programs to provide line and oversight personnel the understanding to carry out their responsibility to assess contractor training programs.

Recommendation 4 states:

"The Department and its contractors establish and implement measures to improve training and qualification programs of operations, maintenance and technical support personnel at defense nuclear facilities that embody the principles applied at the Savannah River Site K-reactor in response to Board Recommendation 90-1. These measures, adjusted commensurate with the risk associated with operating each specific facility, should include considerations of elements such as:

- "a. Incorporation of appropriate applicable guidance on training and qualification comparable with trade, professional, and industry standards for reactor and non-reactor facilities. While the Board does not necessarily endorse all guidance contained in these standards, it believes they are important sources of information which can be productively used by DOE in identifying improvements for the DOE's programs.
- "b. Identification of differences between current requirements and applicable trade, professional, and industry standards and implementation of supplemental measures necessary to compensate for the differences identified until training and qualification programs at defense nuclear facilities achieve a level at least equal to trade, professional, and industry standards.
- "c. Extension of the performance-based training principles described in DOE Order 5480.18A to all defense nuclear facilities. Particularly the requirements to: 1) determine the current level of knowledge of appropriate personnel, supervisors, and managers of technical activities by means of written, oral, and practical examinations covering job specific process knowledge requirements as well as fundamentals concepts required to perform a job in a manner that protects the safety of the worker and the public; 2) delineate the training necessary to ensure that these personnel achieve and maintain the qualifications of their respective positions; and 3) evaluate individuals' knowledge level and training curriculum to ensure that the training program effectively prepares these personnel to safely operate, maintain, or support the facility to which they are assigned.
- "d. Extension of current continuing training, retention testing, and periodic requalification programs to require these personnel to demonstrate continued improvement with increasing experience.
- "e. Maintenance of readily accessible, auditable records to identify required training and objectively verify training received by these personnel and supervisors including the degree of success achieved."

Course of Action:

As noted in the Department's acceptance letter of Recommendation 92-7, dated January 19, 1993, this Recommendation is consistent with the Department's ongoing efforts to provide direction for a training and qualification program that is at least the equivalent of industry standards. In that context, there are only a limited number of measures required to meet this Recommendation.

The Department is committed to training policies, standards and guidance based on extensive industry experience. Its training requirements and processes compare favorably with the applicable trade, professional and industry standards. Specifically, as documented in a 1991 report comparing the Department's training requirements with existing commercial and professional performance-based training standards, the Department's requirements for its various defense nuclear facilities parallel, and in most cases exceed, Nuclear Regulatory Commission requirements and guidance for licensees of comparable types of commercial nuclear facilities. The Department's training requirements are contained in Order 5480.20, which references several other Departmental Orders as well as the following commercial guidance and standards:

- Nuclear Regulatory Commission Regulatory Guide 1.134 (Revision 2), Medical Evaluation of Nuclear Power Plant Personnel Requiring Operator Licenses, of April 1987, which contains medical certification guidance for operators at commercial nuclear power plants.
- Nuclear Regulatory Commission Regulatory Guide 1.149 (Revision 1), Nuclear Power Plant Simulation Facilities for use in Operator Licensing Examinations, of April 1987, which contains guidance for simulator training at commercial nuclear power plants.
- American National Standard, ANSI/ANS 3.1 - 1981, Selection, Qualification and Training of Personnel for Nuclear Power Plants, which contains selection, qualification and training requirements for commercial nuclear power plant operators.
- American National Standard, ANSI/ANS 3.4 - 1983, Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants, which contains requirements for medical examinations.
- American National Standard, ANSI/ANS 3.5 - 1985, Nuclear Power Plant Simulators for Use in Operator Training, which contains minimum simulator performance and configuration criteria necessary for effective training.
- American National Standard, ANSI/ANS 15.4 - 1988, Selection and Training of Personnel for Research Reactors, which contains the minimum requirements for the selection and training of personnel at research reactors.
- American National Standard, ANSI/ANS 18.1 - 1971, Selection and Training of Nuclear Power Plant Personnel, which contains the minimum

requirements for the selection and training of personnel at commercial nuclear reactors.

Sustaining effective and multiple work relationships with standards bodies and numerous other industry groups has enabled the Department to remain abreast of industry standards, experiences and lessons learned.

During the development of its training and qualification program for technical and supervisory personnel in defense nuclear facilities, the Department has been focused on the implementation of performance-based training principles. Particular attention has been paid to the experience and lessons-learned by the commercial nuclear industry and the nuclear Navy. Reviews of the Department's guidance and practices relative to principles of performance-based training as well as industry standards, experiences and lessons-learned, indicate that the Department's Orders and guidelines are consistent with these criteria.

Subrecommendations 4a and 4b:

The combination of the two Department of Energy training Orders, 5480.18A and 5480.20, represents a complete and comprehensive set of policy and requirements relative to training and qualification programs for the Department's nuclear facilities. As noted above, the requested comparison was documented in a 1991 Department report and has been previously provided to the Board in response to its Recommendation 90-2.

In addition to these Orders, 17 standards were developed and issued in 1991 and 1992 (see Table 1) and 3 more standards will be completed in 1993. These standards directly support the compliance requirements of Orders 5480.18A and 5480.20, and are modeled directly after commercial industry standards. Each of these standards is based on the 12 years of experience that the Institute for Nuclear Power Operations has had and shared with the Department. In researching the development and maintenance of the Orders and technical standards, all known trade, industry and professional materials were reviewed for relevance.

In order to remain abreast of industry standards, experiences, and lessons learned, the Department maintains a working relationship with standards bodies, the Institute for Nuclear Power Operations and numerous other industry groups. For example, in addition to a Memorandum of Agreement with the Institute for Nuclear Power Operations, the Department has maintained since 1989 a working relationship with several commercial nuclear utility training groups. These groups include the Mid-Atlantic Nuclear Training Group, the North-East Training Association, the Mid-West Nuclear Training Association, the Southern States Nuclear Training Association, and the Nuclear Regulatory Commission Region 5 Nuclear Training Group. The Department is involved on a quarterly basis with activities sponsored by one or more of these training organizations to maintain currency with trends and experiences that have been gained by the participating nuclear utilities.

Table 1 - Department of Energy Training Standards Issued

Number	Title	Number	Title
DOE-NE-STD-1001-91	Guide to Good Practices for Training and Qualification of Instructors	DOE-STD-1011-92	Guide to Good Practices for the Design, Development, and Implementation of Examinations
DOE-NE-STD-1002-91	Guide to Good Practices for Training and Qualification of Chemical Operators	DOE-STD-1012-92	Guide to Good Practices for On-the Job Training
DOE-NE-STD-1003-91	Guide to Good Practices for Training and Qualification of Maintenance Personnel	DOE-STD-1056-93	Guide to Good Practices for Line and Training Manager Activities related to Training and Qualification
DOE-STD-1005-92	Guide to Good Practices for Developing Learning Objectives	DOE-STD-1057	Guide to Good Practices for the Selection, Training, and Qualification of Shift Technical Advisors
DOE-STD-1006-92	Guide to Good Practices: Evaluation Instrument Examples	DOE-STD-1058-93	Guide to Good Practices for Developing and Conducting Case Studies
DOE-STD-1007-92	Guide to Good Practices for Teamwork Training and Diagnostic Skills Development	DOE-STD-1059-93	Guide to Good Practices for Maintenance Supervisor Selection and Development
DOE-STD-1008-92	Guide to Good Practices for Training of Technical Staff and Managers	DOE-STD-1060-93	Guide to Good Practices for Continuing Training
DOE-STD-1009-92	Guide to Good Practices for the Development of Test Items	DOE-STD-1061-93	Guide to Good Practices for the Selection, Training, and Qualification of Shift Supervisors
DOE-STD-1010-92	Guide to Good Practices for Incorporating Operating Experiences		

Together with the standards completed, the three to be issued by December 31, 1993, and the existing, in-place program to maintain Departmental standards, actions are now fully responsive to Subrecommendations 4a and 4b. The Department's commitment to pursue the implementation of and compliance with the Orders is addressed in the response to Recommendation 1.

Subrecommendation 4c:

The Department acknowledges the effectiveness of institutionalizing the systematic approach to training prescribed by Order 5480.18A. In February 1991, to extend this approach to all nuclear facilities, the Department issued Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities. This Order embodies and endorses the principles of performance-based training and goes further to incorporate the content of nuclear industry standards. Additionally the modification of Order 3410.1B, discussed in Recommendation 2, will extend the performance based training principles to the training of the employees of the Department.

By August 31, 1993, correspondence will be issued which clarifies the applicability of performance-based training principles to all defense nuclear facilities.

Subrecommendation 4d:

The Department has established the requirements and criteria for a continuing training program in Order 5480.20. The initiatives stated in the response to Recommendations 1, 2 and 3 will assure effective implementation of the prescribed measures. The specific actions to complete this will be tracked in the status report identified in Recommendation 1.

Subrecommendation 4e:

The Department has established the requirement for training records in Order 5480.20 relating to both individual training records and training program records. Its requirements include auditable records of attendance, results of medical evaluations, qualifications attained and other data to provide assurance of an individual's training and qualification status.

The actions committed to in response to Recommendations 1, 2 and 3 will initiate actions to implement this key element of Order 5480.20.

Deliverables:

August 31, 1993 - Correspondence will be issued which clarifies the applicability of performance based training principles to all defense nuclear facilities.

December 31, 1993 - Three standards as additional guidance to support training programs will be issued. They are:

- Guide for Table Top Analysis
- Guide for Oral Examinations
- Guide for Program Evaluation and Corrective Action

Fundamentals Training and Examinations

The Board has already been advised of standardized fundamentals training that is being developed in the area of radiation protection, which is one of the primary areas where the Board and its staff have noted concerns. While this standardized training will improve the level of knowledge in radiation protection, the Board should also be aware that the Department has initiated improvement of training and qualification programs for operations, maintenance and technical support personnel at defense nuclear facilities through development of Fundamentals Handbooks for use by reactor and non-reactor nuclear facilities.

To aid in implementation and consistency of fundamentals training programs, the Department recently issued the first five in a series of ten Fundamentals Handbooks (Tables 1 and 2) on topics that have been identified by the industry as necessary to support the basic concepts of nuclear operations. In addition to the Fundamentals Handbooks, primers on individual topics and components are in the development stage, and will be distributed to the complex as they are completed. The remaining five Fundamentals Handbooks will be completed and distributed during fiscal year 1993.

Table 1 - Fundamentals Handbooks Issued

Number	Title	Number	Title
DOE-HDBK-1010-92	Classical Physics	DOE-HDBK-1013-92	Instrumentation and Controls
DOE-HDBK-1011-92	Electrical Science	DOE-HDBK-1014-92	Mathematics
DOE-HDBK-1012-92	Thermodynamics, Heat Transfer, and Fluid Flow		

Table 2 - Fundamentals Handbooks to be Issued

Number	Title	Number	Title
DOE-HDBK-1015-92	Chemistry	DOE-HDBK-1018-92	Mechanical Science
DOE-HDBK-1016-92	Engineering Symbology, Prints and Drawings	DOE-HDBK-1019-92	Nuclear Physics and Reactor Theory
DOE-HDBK-1017-92	Material Science		

The Department's Fundamentals Handbooks listed in Table 1 were distributed to Federal and contractor training representatives throughout the complex. They contain information designed to improve the fundamental knowledge of personnel at all the Department's nuclear facilities. The information in these Handbooks is presented in a format that is consistent with a systematic approach to training and is supported by an examination bank of questions that test each learning objective in several formats.

These Handbooks were developed by training and technical professionals from all of the Department's major nuclear facilities. It is significant to note that the Handbook that addresses Thermodynamics, Heat Transfer and Fluid Flow was compared to the Institute for Nuclear Power Operations Guideline document

on the same subject for content prior to being issued. That Guideline document sets the industry standard for Thermodynamics, Heat Transfer and Fluid Flow. The comparison verified that all of the subject matter that is recommended by the Institute's Guideline document was addressed and discussed in the Handbook. Further, a set of Handbooks was supplied to the Institute. Immediately after receiving the set, the Institute requested 75 additional sets for further distribution to member utilities. In that correspondence, the Institute complimented the Department on its achievement with regard to these "quality documents" and referred to them as a "valuable training resource for the U.S. nuclear power industry."

In addition to the Handbooks, the Department has also recently developed two standards to improve the design and development of examinations. These standards were based on industry good practices and Nuclear Regulatory Commission publication, NUREG 1021, Operator Licensing Examiner Standards, and Nuclear Regulatory Commission publication, NUREG BR-0122, Examiners Handbook for Developing Operator Licensing Written Examinations. The standards, DOE-STD-1009-92, Guide to Good Practices for Development of Test Items and DOE-STD-1010-92, Guide to Good Practices for the Design, Development, and Administration of Examinations, were developed because of similar concerns with the quality of examinations that have been identified by the Department.

Engineering Fundamentals Training for Federal Employees

Engineering fundamentals training is being developed for Federal personnel. The current working model of engineering fundamentals training is structured in three distinct stages, as follows:

Stage 1 - Engineering Fundamentals

This course is made up of modules constructed to be a review for incumbents and an introduction for interns and new-hires. The modules perform a diagnostic function to document an individual's qualified knowledge of engineering disciplines and to highlight areas of knowledge that need further emphasis. Subjects covered include:

- Department of Energy Complex Overview
- Basic Nuclear Physics as applied to the Department of Energy Process
- Overview of Nuclear Instrumentation and Radiation Monitoring used at Department of Energy Facilities
- Basic Chemistry/Corrosion Review
- Department of Energy Chemical Processing Overview
- Engineering for Environment, Safety, and Health Concerns of the Department of Energy Complex
- Review of Thermodynamics, Heat Transfer, and Turbine Operation
- Overview of Piping and Valves used at Department of Energy Processing Facilities
- Overview of Heating, Ventilation and A/C used at Department of Energy Facilities
- Review of Electrical Engineering Principles
- Review of Electrical Motors and Generators

- Overview of Controllers used at Department of Energy Processing Facilities
- Overview of Electrical Distribution Equipment
- Overview of Process Instrumentation used at Department of Energy Facilities

Much of the source material for the lesson modules was derived from the Department's Engineering Fundamentals Handbooks, mentioned earlier. Other sources included the field, universities, Institute for Nuclear Power Operations documents, classical instructional texts and commercial data. Delivery of this training has begun. A pilot session was held in Albuquerque, May 3-14, 1993. Another session is scheduled for Headquarters in July.

Stage 2 - Individual Courses in the Technical Disciplines Described Above

These courses are in much greater depth of understanding with the specific intent to develop knowledge an incumbent requires, or to provide an intern or new-hire with sufficient knowledge base to proceed in their development. Some of these courses are nearing completion and will soon be offered to the Operations Offices and Headquarters personnel.

Stage 3 - Case Study and Scenario Workshops

These courses are the capstone to the curriculum. These ultimately immerse the students in the environment within which they can develop creative problem-solving skills and more disciplined trouble-shooting techniques. These are being structured into series and challenge levels. A series describes the types of problems and environments that the teams of students are addressing. The method of scenarios will be to force the students outside of their typical classroom training paradigm into one which encourages teamwork and intuitive thinking and investigation techniques.

The development of this concept involved substantial field participation both in content and delivery. In keeping with that process, the Office of Professional and Technical Training and Development is obtaining Headquarters and field input to calibrate the structure of the curriculum, and optimize it for field use during the site visits.