[DNFSB LETTERHEAD]

March 25, 1994

The Honorable Victor H. Reis
Assistant Secretary for Defense Programs
U.S. Department of Energy
Washington, D.C. 20585

Dear Dr. Reis:

The Defense Nuclear Facilities Safety Board (Board) and its staff conducted a six-month review of the training, qualification, and conduct of operations programs at the Y-12 Plant in Oak Ridge, Tennessee. In general, the Board has observed slow implementation of Department of Energy (DOE) Orders concerning training, qualification, and conduct of operations and a failure to adhere to the implementation plans for these Orders.

In February 1994, the Secretary of Energy issued a memorandum to department heads at Headquarters and field elements that stated: 1) departmental compliance with environment, safety, and health requirements is of utmost importance; and, 2) it is unacceptable that some facilities have yet to achieve, or even demonstrate the status of, compliance with the DOE's environment, safety, and health orders.

The Board's staff advises that the Order Compliance Self-Assessment Program at Y-12 has improved since mid-1993, and has increased DOE's and Martin Marietta Energy System's (MMES's) knowledge of the status of compliance with DOE Orders at the Y-12 Plant. However, the Board notes that this increased awareness has not resulted in improved implementation of the requirements of DOE Order 5480.19 (i.e., conduct of operations) and DOE Order 5480.20 (i.e., training and qualification). In the past, MMES has developed, and DOE has approved, plans to address these Orders, but these previous plans have not been completed. Current plans will take about four years to accomplish and do not presently include technically adequate compensatory measures for the interim. A compilation of the findings concerning training, qualification, and conduct of operations from the Board's staff review is enclosed.

It would appear that insufficient resources and expertise are being applied to correct known deficiencies and to implement departmental guidance at a pace consistent with your goals and DOE's commitments to the Board. The Board understands that, based on discussions between our staff and yours (both at Headquarters and Oak Ridge), the DOE Oak Ridge Operations Office is taking action on a number of the deficiencies described in the attached report and that MMES is revising the implementation plans for achieving compliance with DOE Order 5480.20 and DOE Order 5480.19. The Board is forwarding the enclosed report to you for use by the Oak Ridge Operations Office during their review of MMES's revised implementation plans. The Board also expects you and your staff to consider the systemic problems that are evident from the attached report during your

assessment of the larger process of achieving compliance with all DOE safety Orders at the Oak Ridge Y-12 Plant.

Mr. Steve Krahn of the Board's staff will be available to provide any interpretive assistance required. If you need any further information, please let me know.

Sincerely,

John T. Conway
Chairman

Enclosures

c: The Honorable Tara O'Toole, EH-1
RADM Charles Beers, Jr., DP-20
Mr. Mark Whitaker, Acting EH-6
Mr. Joe LaGrone, DOE-OR

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 16, 1994

MEMORANDUM FOR: G.W. Cunningham, Technical Director

COPIES: Board Members

FROM: J. J. McConnell, Program Manager, Oak Ridge

SUBJECT: Staff Review of Order Compliance, Training, and Qualification Review Conducted at the Oak Ridge Y-12 Plant.

1. Purpose: This staff report forwards information gained during an extended review of the Oak Ridge Y-12 Plant (Y-12) from August 1993 through January 1994 which included evaluation of conduct of operations, training, and qualification.

2. Summary: Significant problems involving training and conduct of operations at the Y-12 Plant persist. MMES has identified most of these deficiencies and has produced corrective action plans to address them. However, the contractor has failed to complete many previous action plans, and most of the current plans will take a long time to accomplish with few near-term results. In the interim, MMES has not implemented, and DOE-OR has not required, technically adequate compensatory measures. It appears that conditions contributing to this lack of progress are: insufficient involvement of senior managers in correcting problems; lack of understanding of the key elements of a good program by workers, supervisors, and managers; and lack of comprehension of the significance of the current deficiencies by site personnel at all levels. Detailed discussions of conduct of operations and training, qualification, and certification are in attachments (1) and (2) respectively.

3. Discussion:

   a. Conduct of Operations:

      (1) Progress at Y-12 in upgrading operating procedures has been slow. Most procedures in Building 9212 (over 120) require upgrading before they can be followed step-by-step to control complex and potentially hazardous evolutions. These procedures are being corrected at the rate of only about 25 per year. The entire process to improve procedures, just in Building 9212, may take up to five years.

      (2) Tagouts are not performed in accordance with DOE guidance and a

recently implemented independent verification program has proven to be ineffective.

(3) Progress on providing validated system diagrams for operations, tagouts and training has been slow.

(4) MMES recently arranged to have six experienced, company-level performance evaluators provide two months of effort to assess conduct of operations. These evaluators have similar experience and training as the mentors used to assist in implementing conduct of operations at other DOE sites such as Rocky Flats, Savannah River, and Los Alamos. While this is a good start, these evaluators are not permanently assigned to the site, and the completion of their task is not currently tied to any compliance objective i.e., MMES does not consider their presence as compensation for any inadequacies in conduct of operations.

b. Training and Qualification:

(1) MMES currently has an informal qualification program based on "compliance" training (i.e., training specifically required by laws and DOE Orders) and On-the-Job Training (OJT) evaluations. There has been no system for designating personnel qualified or certified, and no formal list of requirements defined qualifications for a given position.

(2) In about October 1993 MMES allowed the qualification system in place at Building 9212 to lapse. The biennial performance of OJT evaluations was discontinued while efforts were focused on a new qualification program and upgrading OJT evaluation documentation. This means the qualification status is expiring for approximately 150 fissionable material handlers in Building 9212. Additionally, interviews of supervisors revealed a lack of knowledge of qualification requirements and an inability to use training records to determine qualification status. As a result, personnel not meeting current requirements are assigned.fissionable nuclear handler and supervisor duties.

(3) By the end of February, Y-12 intends to implement an improved training and qualification program for one job assignment in Building 9212 (five fissionable material handlers but not the supervisor). MMES believes this program will comply with DOE requirements for training and qualification. Implementation for the remaining job tasks in Building 9212 will take about two years. However, through their Order compliance assessment program,

MMES concluded that Building 9212 has achieved programmatic compliance with the DOE Orders on training and qualification because adequate site-level procedures to generate a program exist. Therefore, despite the long delay in qualifying all fissionable material handlers to current DOE standards, MMES has concluded that no additional compensatory measures are required to address the majority of fissionable material handlers who do not have a defined qualification program and are not maintaining the current, limited requirements.

(4) The dates in the Training Implementation Matrix (TIM), which was approved in October 1993, significantly exceed commitments made by the Manager, DOE-OR in the August 1993 DNFSB Public Hearing, the DOE Implementation Plan for DNFSB Recommendation 91-6, and the target for implementing DOE Order 5480.20 in the DOE Implementation Plan for DNFSB Recommendation 93-3.

c. DOE Involvement:DOE is taking some steps to address the problems. The DOE Y-12 Site Office (YSO) Manager sent a letter to MMES on November 19, 1993 detailing deficiencies in conduct of operations. The Manager required MMES to submit a new Implementation Plan focusing on procedures and training which is to identify adequate resources to meet current expectations in 12 to 18 months. YSO assessments of the contractor in the areas of training and qualification appear to be quite limited. The new DOE-OR centralized training function (formed in September 1993) is still being staffed and developing a review plan. The acting manager of the DOE-OR centralized training function has stated that the Y-12 TIM will be revised (at least to adjust some completion dates). It would appear that as a basis for review of these new plans, evaluations similar to the ones listed below should be considered:

(1) Evaluation of the current conduct of operations practices at the Y-12 Plant.

(2) Evaluation of the plans for reaching adherence to DOE guidance concerning training, qualification, and conduct of operation.

(3) Evaluation of the availability of properly trained and experienced DOE-OR and MMES personnel resources and their use in correcting the noted deficiencies and attaining the required adherence

4. Future Actions:

a. E-Wing Casting Operators Training Prototype: The staff will evaluate the implementation of the new MMES training and qualification system starting with the Building 9212 E-Wing Casting Operators and will track efforts to extend the process to other areas and positions particularly supervisors.

b. Revised Conduct of Operations Implementation Plan: The staff will review the revised implementation plan to ensure it satisfies the requirements of a RFA as specified in the Department of Energy Standards/Requirements Implementation Assessment Instruction, section 7.0. The staff will assess the progress at Y-12 toward implementing this plan.

c. MMES Performance Evaluation Group: The staff will review the charter and follow the activities and findings of the six MMES Performance Evaluators (mentors). If this group has a charter comparable to similar groups used throughout the complex, they should have a significant impact in explaining the fundamental requirements and importance of good training and conduct of operations. The staff will follow actions taken to implement the mentors' recommendations.

d. MMES Qualification Improvement Commitments: As a result of questions to DOE, YSO and MMES made commitments to DOE-OR concerning correction of noted deficiencies. The staff will monitor accomplishment of these commitments, which are in attachment 3.

Attachments

Attachment 1

Conduct of Operations

A. Lack of Prompt Corrective Actions/Inadequate Compensatory Measures:

1. The DOE investigation of the January 1992 hydrogen fluoride spill at Building 9212 identified inadequate procedures and failure to use procedures as root causes. In a May 1992 corrective action plan, MMES committed to produce a policy to explain expectations on the use of procedures. A policy was not written until November 15, 1993 after the DNFSB staff inquired about the subject. The new policy now clearly defines management expectations concerning use of procedures but it does not go into effect until March 1994 in Buildings 9212 and 9720-5 and until October 1994 for the rest of the site. The procedures for most operations involving fissile material do not support this policy because they cannot be followed in a step-by-step fashion. High priority procedures will be upgraded to "verbatim compliance" level by February 25, 1994 but the plan for remaining upgrades (about 120 procedures for Enriched Uranium Operations) is not well-defined and, at the planned rate of about 25 revisions per year, could take five years to complete.

2. In the disassembly area (one of the operations currently requiring procedure use), the staff has observed steps performed out of allowable sequence, and two operators performing sequential steps simultaneously. These procedural violations were observed during a tour conducted by the DNFSB staff and managers from both DOE and MMES. The same violations of good conduct of operations occurred again the following day. The MMES managers and DOE personnel took no action concerning these failures to comply with procedural requirements and during later discussions some of them stated that they had not recognized the errors.

3. Problems were identified during 1993 visits with lockout/tagout performance and the lack of independent verification of tagouts. A review of a recent tagout in January revealed numerous deficiencies in the application of locks and the extent of the tagout. A recent change to facility procedures instituted verification of tagouts; however, an interview with the verifier of this recent tag disclosed that the verification was not independent, and did not include verification of the tagout thoroughness as required by DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities, Chapter X, Section C.3.a and DOE Standard Guide to Good Practices for Independent Verification (DOE-STD-1036-93), Section 4.3.

B. Key Elements of a Good Program Not Understood:

1. Observations during several visits indicate that personnel at nearly every level from operator to organizational manager have an inadequate understanding of the fundamentals of conduct of operations. Violations of procedural compliance frequently were noted during events monitored, but were not recognized as such by the operators doing the work, the first-line supervisors, nor the managers escorting the Board's team. Violations of electrical safety precautions also went unrecognized by several levels of managers present while the team observed maintenance work on a laser welder. Specific examples include:

    a. During the December trip, the staff observed startup of the gas-fired low-level waste furnace. A safety-significant prerequisite was not checked prior to the operation and after DNFSB staff questioning was determined not to be satisfied. During the operation, steps in the procedure were omitted, and discrepancies were not noted and addressed. These conditions were not identified by senior DOE and MMES personnel present with the tour.

    b. Maintenance on 440 volt and 115 volt cabinets was monitored during the October visit. An engineer and two maintenance personnel were observed not complying with electrical safety instructions contained in Appendix C of Site directive Y70-527 concerning lockout/tagout (LO/TO). The maintenance personnel did not have the area barricaded to prevent access; no protective mat was used on the steel work platform or inside energized panels; exposed 440 and 115 volt circuitry was left unattended while technical information was reviewed at some distance from the work area; and personnel did not wear gloves of appropriate insulating capability when practicable. Senior supervisors in the area did not address these conditions.

    c. In July, the DNFSB Staff observed the startup of an evaporator by an experienced operator. This worker had operated the evaporator earlier in the shift and had left it in an unspecified shutdown condition. The operator did not refer to an operating procedure, and did not perform all steps of the procedure. Two throttled valves used to control the process were not shown in the procedure to be throttled. Limiting operating parameters described by the operator were not included in the procedure. The abbreviated shutdown and startup procedures were not in the procedure. Supervisory personnel conducting the staff tour did not take any action while observing this operation.

2. The staff observed problems during a walkdown of an improved (but not completely revised) operating procedure. The procedure was improved by

adding a valve lineup sheet to provide the initial lineup for an existing procedure which did not meet current standards. The new lineup sheet was missing six valves installed in the system, and at least one valve label did not match the description of the valve on the sheet. During the walkdown the operators were questioned about valve position verification techniques. Both operators stated that the valve positions of the swing- type valve found in this system would be verified by observing the position of the valve handles. This technique is not in accordance with DOE Order 5480.19, Chapter X, section C.3 and DOE-STD-1063-93, Section 4.3. MMES has not provided the operators a reference document to explain the method for verifying component positions contrary to the same section of the DOE Order as noted above.

C. Significance of Deficiencies Not Appreciated

1. The two areas with the most significant conduct of operations deficiencies observed concern operating procedures and LO/TO performance and directives. Operating procedures do not meet the guidance of DOE Order 5480.19 and must be rewritten. Few procedures contain abnormal condition alarm response actions and the current effort to rewrite procedures does not include an assessment of the need for these types of procedures. Numerous deficiencies were noted in LO/TO performance and records. Multiple tag type are in use and confusion exists as to the correct tag to use in many circumstances. The site LO/TO directive is not consistent with DOE Order 5480.19. The little progress noted during this extended review on these two issues is indicative of a lack of appreciation of their importance to operations and training by senior management.

2. MMES has developed a methodology to classify operations into three classes for establishing guidance concerning the availability and use of procedures when the operation is performed. Procedures are required to be immediately accessible to the operator (Class I), available for reference (Class II), or not required to be present at the work station (Class III). The categorization is based on difficulty of the activity, potential consequences of the operation, and of performance. Use of the flow diagram developed for determining a procedure's category results in procedures with the potential for significant consequences being assigned any of the three categories based on frequency and difficulty of the operation. This does not conform to the guidance of DOE Order 5480.19, Chapter XVI, section C.7 which requires reference to a procedure "during infrequent or unusual evolutions when the operator is not intimately familiar with the procedure requirements or when errors could cause significant adverse impact to the facility" [emphasis added]. It also does not conform to the revised Y-12 Plant Procedure Y12-001 which states that Class I Procedures are "those procedures for which failure to comply fully could result in a significant

health, safety or environmental impact on the employee and/or public." The failure to ensure that all procedures meeting Class I conditions are updated in a timely manner is another indication of senior management's lack of understanding of the importance of operating procedures in ensuring safe operations.

3. Completion of accurate system diagrams and proper labeling of components is a key to effective training and the proper accomplishment of LO/TO procedures, valve lineups, procedure performance, and independent verification. MMES has begun to develop as-built drawings of systems in Buildings 9720-5 and 9212. Site personnel stated that the drawings of vaults and vault-like rooms, smear hoods, and arrays in building 9720-5 would be complete by September 30, 1994. No date exists for completion of this effort in Building 9212.

Attachment 2
Training and Qualification

A. Lack of Prompt Corrective Action/Inadequate Compensatory Measures:

1. MMES is working on a program to develop qualification requirements and records that meet the standards set forth in DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities. One job assignment with five operators (but not their supervisor) has been selected as a pilot. The definition of requirements, the development of qualification records, and completion of qualification for these personnel is planned to be completed by the end of February. During the January visit a review of qualification records revealed that the existing qualification maintenance requirements for the other (approximately 150) fissionable material handlers in Building 9212 were not being accomplished reportedly because of the effort focused on the pilot program and a program to upgrade On-the-Job Training (OJT) documentation.

2. Through their Order compliance self-assessment process, MMES concluded that Building 9212 is largely in programmatic compliance with the DOE Order on training and qualification. MMES references a site-level procedure which promulgates the requirements to create a program (described above). This determination is not consistent with the definition of programmatic compliance given in MMES Immediate Action Directive Y10-158, "Performing A Compliance Assessment for 9212 and 9720-5" which states, "If [the Subject Matter Expert] is aware of any systemic failure to implement these policies, programs, procedures, or practices, then programmatic compliance does not exist." There is a systemic problem because fissionable material handlers in Building 9212 do not have a formally defined training and qualification program and have not been

designated as qualified/certified.

3. MMES is currently reviewing a set of improved OJT evaluation documents (Performance Documentation Checklists or PDCs) created by a contractor (Bechtel) to serve as the new basis for required operational evaluations of fissionable material handlers and supervisors. These new PDCs were expected to replace the existing MMES-produced PDCs which do not satisfy the requirements of DOE Order 54~0.20. For the last three months, while awaiting these revised PDCs and while anticipating the new qualification program being piloted for batch make-up operators, the operators in Building 9212 have stopped performing the existing MMES-generated PDCs. Because of this, operator qualifications are lapsing.

4. No record of increased depth of training for supervisors exists in the records of Disassembly and Special Materials and Maintenance Organizations. Essentially no courses are provided in the area of their technical expertise. The Enriched Uranium Organization has recently started to develop a supervisor training course, but the project has no completion date. The program director has been assigned tasks concerning workplace instruction, thus causing delays in implementation of the program. At the August 1993 DNFSB Public Hearing, the DOE Operations Office Manager committed to show significant improvement in the area of supervisor training within one year. Despite this commitment, the TIM (approved by DOE-OR in October) projects that supervisor training in Building 9212 will be less than 20% implemented at the end of 1994.

5. The TIM also establishes dates for completing major elements of the training and qualification program by the end of 1996, and has many items which will not complete until January 1998. This timing is counter to the statement made by MMES in the August 1993 Public Meeting that the training and qualification programs would be implemented in accordance with DOE directives within two years of plan approval. The DOE Implementation Plan for DNFSB Recommendation 91-6 stated that core training portions of the DOE Radiological Control Manual would be implemented for radiation workers and technicians by the end of 1994, and all other training by the end of 1996. The TIM schedules completion of this training as January 1997 for workers, and January 1998 for their supervisors. These dates are also beyond the target for complete implementation of DOE Order 5480.20 stated in the DOE Implementation Plan for Recommendation 93-3. That target date is fourth quarter 1995.

B. Key Elements of a Good Program Not Understood:

1. As described above, the biennial performance of OJT evaluations is not

being performed so that the current, limited qualification requirements are not being maintained. Additionally, there is no formal documented system to qualify or certify fissionable material handlers in Building 9212, and the set of PDCs necessary to be considered qualified or certified (under the existing program) has not been defined. The need to define a qualification basis and to periodically validate qualification was not recognized by line/training management personnel. Although it was recognized as early as August 1993 that a list of training requirements and a process for designating operators as qualified did not exist, no definition of requirements (based on existing training) has been developed during the intervening five months.

2. The existing training database and training records do not provide sufficient evidence to support the qualification status of assigned operators and supervisors. Training records were recently placed in a central repository. Some data required to be in these records have not been transferred to the central training organization. This central group did not consider it their responsibility to monitor qualification status even though the training database printout was known to have a large number of errors.

3. Line supervisors and managers in Building 9212 could not explain the significance of data in the training database printout concerning expired training. Most supervisors could not access the training database, and had no effective method to determine the training status of their workers prior to assigning tasks. When assigning people to operating positions, one supervisor used the criteria of whether an individual previously had performed a task successfully without reference to qualification status. The supervisors did not appreciate the importance of maintaining qualifications current.

4. The slow pace of upgrading facility procedures, providing verified system drawings, and labeling systems demonstrates a failure of management to understand the essential linkage of these conduct of operations program elements to producing an effective training and qualification program.

C. Significance of Deficiencies Not Appreciated:

1. The qualification program for most fissionable material handlers in Building 9212 (before it was allowed to lapse) consisted of compliance training and OJT evaluations. Qualification was maintained by periodic attendance of some compliance training and biennial performance of OJT evaluations. The exact requirements needed to qualify at a given operator or supervisor position are not defined. The program lacks requirements for prerequisites, basic fundamental training, and oral examination/operational evaluation. No management official designates personnel as qualified or certified.

MMES has made essentially no progress towards correcting or compensating for these deficient program elements during the three years since DOE Order 5480.20 was promulgated.

2. Management knew that there was a lack of guidance as to what constituted required training and OJT evaluation for considering personnel qualified. Management did not consider this lack of guidance significant enough to promulgate an instruction over a greater than five month period. As a result, personnel have continued to be assigned tasks as fissionable material handlers and supervisors despite not meeting the limited requirements stated by management during the various visits.

Attachment 3

Qualification Commitments

A. Background: In response to questions raised during the staff's January 18-21, 1994 visit to Y-12, DOE-OR reviewed their programs and implemented some corrective actions. DOE described these corrective actions in a fax to the staff dated February 14, 1994 which provided answers to the staff's questions. That fax contained commitments made by MMES and YSO to DOE-OR described below.

B. Commitments:

1. Include oral exams in Building 9212 Performance Documentation Checklists (PDC) for Class I procedures by March 1, 1994.

2. Include an oral exam in the one Building 9720-5 PDC for a Class I procedure prior to July 31, 1994 which is the next anticipated use of the procedure.

3. Implement a single integrated database system for supervisors to track worker qualification status in Building 9212 by March 15, 1994.

4. Complete the E-Wing Batch Make-Up Operators upgraded qualification program by February 25, 1994.

5. Complete Building 9212 Supervisor training on Class I procedures by March 1, 1994.

6. Complete Building 9212 Supervisor training on Class II active procedures by April 1, 1994.

7. Complete Building 9720-5 Supervisor training on ali active procedures by March 1, 1994.

8. Define and develop implementation plan for supervisor qualification elements for next higher level by April 15, 1994.

9. Require that only trained workers with current PDCs execute Class I procedures as of March 1, 1994.

10. Allow only personnel with minimum access training unescorted access into Buildings 9212 and 9720-5 Material Access Areas after February 16, 1994.

11. PDCs have been reinstated as a requirement to maintain qualification in Building 9212.

12. The following commitments were made without a date:

- Develop associated PDCs, lesson guides and lesson plans as procedures are developed.

- Establish compensatory measures as needed for the requirements not found to be in adherence compliance during the order compliance assessment.

- Accelerate development of the E-Wing Qualification Program by the assignment of additional program developers and increased management attention.

- Re-evaluate access requirements, determine cost effective training means to meet requirements, and implement action plans for each requirement.