Department of Energy
National Nuclear Security Administration
Washington, DC 20585

November 3, 2000

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004-2901

Dear Mr. Chairman:

In a June 5, 2000, letter, the Board forwarded a report on the review of the Chemical Safety Program and various chemical safety issues at the Y-12 Plant. The enclosed memorandum dated September 26, 2000, details the Department's actions to date and the planned path forward on issues raised by the Board's staff.

It is our understanding that the Board staff conducted a follow-up review of the Chemical Safety Program at the Y-12 Plant on October 11-12, 2000. The Department shares the Board's concerns in regard to the continuous improvement of this safety program at the site.

If there are questions, please contact me or have your staff contact Xavier Ascanio of my staff at 301-903-3757.

Sincerely,

Madelyn R. Creedon
Deputy Administrator
for Defense Programs

Enclosure

cc w/enclosure:
M. Whitaker, S-3.1

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United States Government **Department of Energy**

Oak Ridge Operations Office

memorandum

DATE: September 26, 2000

REPLY TO ATTN OF: NADP-68:Rhyne

SUBJECT: **DEPARTMENT OF ENERGY OAK RIDGE OPERATIONS OFFICE CHEMICAL SAFETY ACTION PLAN AND Y-12 PLANT CHEMICAL SAFETY ISSUES**

TO: Xavier Ascanio, Director of Site Operations, DP-24, GTN

The Defense Nuclear Facilities Safety Board's letter of June 5, 2000, transmitted a Staff Issue Report for their review of Chemical Safety at Oak Ridge. Attached are responses to the issues raised by the Board.

Any questions may be directed to Ken Rhyne at (865) 576-9901.

William J. Brumley
Assistant Manager for
Defense Programs

Attachment

cc w/attachment:
Phil Aiken, DP-24, GTN

RESPONSE TO DNFSB LETTER DATED JUNE 5, 2000,
REGARDING OAK RIDGE OPERATIONS CHEMICAL SAFETY ISSUES

Comment: DOE has made progress in implementing the chemical management program, however, efforts would be more effective if the contractors were provided additional guidance on the program, particularly the vulnerability assessment, and the prioritization of vulnerabilities.

Response: The DOE Oak Ridge Operations (DOE-ORO) Chemical Safety Working Group (CSWG) was chartered in November 1999, by the Manager, DOE-ORO, to facilitate completion of the commitments listed in the DOE-ORO Chemical Safety Action Plan. Each line DOE-ORO Assistant Manager provided a representative to the DOE-ORO CSWG. The first action of the DOE-ORO CSWG was to generate the DOE-ORO CSWG Plan which provided specific actions to achieve the commitments in the DOE-ORO Chemical Safety Action Plan. The DOE-ORO CSWG Plan was issued by the Manager, DOE-ORO, on January 25, 2000.

In accordance with Integrated Safety Management principles, responsibility for field implementation of the various actions lies with the DOE-ORO line organizations. The DOE-ORO CSWG maintained and tracked the status of individual actions and provided guidance documents to assist DOE-ORO line management when the need was identified. To date, the DOE-ORO CSWG has issued three guidance documents:

(1) *The Chemical Safety Program Description*, December 13, 1999;
(2) *The Chemical Vulnerability Determination Guidance Document*, February 22, 2000; and
(3) ORO O 420, Chapter XI, AUTHORIZATION AGREEMENTS, April 4, 2000.

The DOE-ORO line organizations and prime contractors participated in the development process for each of these documents to ensure that all parties understood the expectations. The issued guidance documents provide the general requirements in the stated areas. Any specific requirements for implementation are provided by the DOE-ORO line organizations. The guidance documents and any specific requirements have been communicated to the Y-12 contractor by the National Nuclear Security Administration (NNSA), Y-12 Office of Defense Programs (YODP; formerly known as the Y-12 Site Office) via letters, e-mails, and meeting discussions. The YODP has provided oversight of the process by fully participating in the DOE-ORO CSWG activities and by assisting in the tracking of actions listed in the DOE-ORO Chemical Safety Action Plan.

On July 11, 2000, the Leader of the DOE-ORO CSWG proposed to the DOE-ORO Senior Board that the DOE-ORO CSWG be disbanded because it had performed its assigned charter. There are still some actions that have not been completed, but the DOE-ORO line organizations have responsibility for ensuring their completion.

Comment: Recent chemical safety incidents at Y-12 indicate inadequacies in the methodology for hazard identification and analyses. A substantial change in the way the contractor conducts such activities may be necessary.

Response: At the facility level, Lockheed Martin Energy Systems (LMES) procedure Y74-801INS, *Hazard Identification*, has been revised (effective March 31, 2000) to delineate requirements for preparing, approving, and revising Hazard Identification Documents. These Hazard Identification Documents provide the bases for facility classification and subsequent Safety Authorization Basis (AB) documents, Emergency Management Hazards Assessments (EMHA) and Emergency Planning, and Fire Hazard Analyses. The Hazard Identification Documents provide a standardized format for line management to establish, as limits, the Maximum Anticipated Quantities of radioactive and hazardous materials for each facility. This process ensures that hazards are identified in a systematic process such that the information supports a variety of needs by support organizations (Emergency Management, Facility Safety, Fire Protection, etc.).

At the activity level, LMES procedure Y15-012, *Hazard Identification Planning*, has been revised (effective June 30, 2000) to address corrective action responses from the DOE Type A Accident Investigation of the December 8, 1999, sodium-potassium explosion in Building 9201-5. The revision includes requirements to:

- Review the Lessons Learned Database for applicable information;
- Consider relevant technical information including Material Safety Data Sheets, drawings, operating procedures, and safety authorization basis documents as appropriate;
- Document evaluation of hazards for new jobs using existing Job Hazard Identification (JHI);
- JHI screening for the production, processing, handling, or storage of reactive metals; and
- JHI review of "welding-like" hazards for the system or equipment involved.

The YODP will assess the effectiveness of these procedures in fiscal year 2001.

Comment: Y-12 line management should examine the staffing of the various safety analysis groups at the site to ensure the appropriate mix of expertise and level of competence to reduce the likelihood of chemical incidents.

Response: The LMES Facility Safety Division is staffed with individuals qualified to prepare and review facility safety documentation regarding chemical hazards. However, this organization is presently underfunded and understaffed, necessitating difficult decisions to devote resources to maintaining the present safety authorization basis requirements, primarily pertaining to nuclear facilities. Consequently, many new activities such as the identification and preparation of safety documentation for chemically hazardous facilities have been slowed.

The YODP fiscal year 2001 goal is to increase staffing from 58 to 72 full-time equivalents. An individual has recently been selected to serve in an Excepted Service Position as the Senior Safety

Authorization Basis Engineer. Additionally, three Facility Representative positions have recently been filled, and staffing requests have been submitted for additional engineers. Critical needs are being defined, and with the help of the Office of Personnel Management, position descriptions are being developed. Disciplines being considered for recruitment include emergency management, HVAC, project management, metallurgical, electrical, mechanical, civil, and chemical engineers. Many of these new positions, when filled, will be involved with safety analysis and chemical safety issues.

Comment: Current vulnerabilities at Y-12 include more chemical safety issues than were presented during the staff review (9206, recent incidents, USQDs, and CAPs). It is not clear whether DOE-ORO or Y-12 has made an attempt to identify the highest priority vulnerabilities and risks at the site. Neither Y-12 nor ORO has any methodology for prioritizing vulnerabilities or risks, as discussed above with regard to the ORO Chemical Safety Working Group.

Response: At the time of the DNFSB visit, LMES was in the process of identifying potential chemical vulnerabilities at Y-12 based on the broad definition of a chemical vulnerability per the guidance from the DOE-ORO CSWG. LMES initially identified 28 potential chemical vulnerabilities. This list of potential chemical vulnerabilities has been the subject of further discussion and review with the conclusion being that only two of the 28 potential chemical vulnerabilities are considered to be vulnerabilities. The YODP provided further guidance to LMES to assist in making the final determination of a vulnerability based on "imminent or potentially imminent physical (worker) threat." These two vulnerabilities involve potential shock sensitive materials located in buildings 9201-5 and 9202. Appropriate controls have been implemented for these vulnerabilities. The remaining 26 potential chemical vulnerabilities were redefined and determined to be chemical safety-related issues. The 26 chemical safety-related issues are being worked by LMES in accordance with their approved description of the LMES Chemical Safety Management Program to prevent these chemical safety-related issues from becoming chemical vulnerabilities. New chemical safety-related issues that may develop in the future will be processed via the LMES issues management process as described in LMES procedure Y60-312, *Issues Management.*

LMES uses a number of risk ranking tools. For example, major ES&H issues are summarized, and budget information and risk management conclusions are documented annually in the DOE ES&H Management Planning Process. LMES procedure, Y30-603, *Capital Work Identification Process*, prioritizes projects that are to be funded from the capital budget. LMES procedure, Y30-604, *Y-12 Infrastructure Management Process*, identifies and prioritizes projects for maintaining, improving, and upgrading as well as replacement of the physical infrastructure of the Y-12 Plant which is over and above routine maintenance activities. In addition, LMES procedure Y30-600, *Work Plan Preparation and Administration*, defines the process that resource managers utilize in identifying and establishing specific work scope for services. Work scope is prioritized by ESS-MS-131, *Integrated Resource Management System*. As programmatic requirements and compliance regulations change or fiscal and personnel resources become limited, re-prioritization of work activities may be required. Unresolved items arising as the result of re-prioritizing items are elevated to senior management (i.e., the Executive Steering Group) for resolution.

To assist the DOE-ORO Facility Representatives as well as the DOE-ORO line organization safety personnel, DOE-ORO is developing a 16-hour training course, *Managing Chemical Safety Vulnerabilities*. This training course will demonstrate how to apply the DOE-ORO *Chemical Vulnerability Determination Guidance Document* to contractor oversight activities, assist in the recognition of significant elements of chemical safety vulnerabilities, discuss potential factors possibly used in prioritizing chemical vulnerabilities, and provide tips to analyze a given activity involving chemical hazards to identify potential safety issues and determine appropriate response actions. The training course will include a discussion of information on chemicals found on the DOE-ORO sites and focus on ways to manage potential vulnerabilities that may be associated with the various chemicals. Line management implementation of the various skills presented in this training course will assist in determining the adequacy of a contractor's review and response to suspected chemical vulnerabilities.

Comment: Although the dibutylcarbitol (DBC)/peroxide Unreviewed Safety Question Determination (USQD) was negative, there is still enough uncertainty to warrant initiation of a sampling plan.

Response: LMES sampled several process columns in Buildings 9206 and 9212, and additionally sampled a statistically designed collection of safe bottles (seven safe bottles in Building 9206 and 17 safe bottles in Building 9212). These safe bottles represent the oldest materials on hand (e.g., stored for the longest period of time). Several samples did not yield meaningful analysis results due to chemical interferences with the analytical technique used. Therefore, additional samples were taken to complete the statistical sampling sets from other source bottles generated during the same time period. The final sampling analysis results showed less than six ppm peroxide in all of the samples. The sampling analysis results indicate that no discernible peroxide formation occurred while the materials have been stored. "Aging" of the material for up to 11 years has not produced peroxide levels of concern (greater than the 30 ppm initial level of concern), and may even indicate that the storage conditions inhibit the formation of peroxides. The uniformly low peroxide levels (even lower than the 15 ppm maximum stated in the manufacturer's product specification), indicating no discernible peroxide formation, are consistent with the descriptions and analyses performed in the applicable Basis for Interim Operations (BIO). Thus, LMES has determined that no modifications to the BIO or the previously submitted USQD will be necessary. However, the YODP will ensure that a semi-annual sampling program is initiated to ensure results remain acceptable.

Comment: One corrective action of the NaK explosion CAP is to provide guidance and training to the Operational Safety Boards (OSBs) for improving hazard identification and analysis for the facilities. The staff is concerned that the staffing of the OSBs may not be optimum for this task.

Response: As a result, LMES procedure Y15-636, *Integrated Safety Management Program*, was revised and states that OSBs are to involve the appropriate expertise and subject matter experts, as needed, for work planning, control, and authorization. An OSB may include a wide range of disciplines who, depending on the activity, are called upon to participate in work planning, development of documentation, hazards identification and analysis, or safety and technical

reviews. However, the recent Integrated Safety Management System (ISMS) Verification Review documented concerns with OSB effectiveness. Thus, more emphasis is necessary to ensure the effective implementation of the revised procedure. The corrective action plan for the ISMS Verification Review is presently being developed. A corrective action dealing with OSB issues will be included.

Comment: The latest schedule for formal, structured hazard analyses for operations involving special material indicates completion for all high-hazard operations by August 2000.

Response: Hazard evaluations were scheduled for the nine high hazard operations. Six of nine hazard evaluations are complete and final reports have been issued. Final reports are in production for two other high hazard operations. For the final hazard evaluation involving special material (the pressure vessels), the required supporting documentation has been gathered and the meeting portion of the review is scheduled to begin in September 2000, and be completed before the end of the fiscal year.

Comment: At Building 9206, hazardous materials and combustibles have been removed, but excess equipment and additional combustibles remain. A plan has been formulated to remove and treat the pyrophoric material, and a hazard evaluation study has been completed; however, no schedule for the removal was provided to the staff.

Response: Disposition of the pyrophoric material dissolution process is being planned and is funded for FY 2001. These issues were discussed further at the Board's review of Building 9206 in September 2000. A summary of the status information is as follows:

- Pyrophorics
  - Argon glove box refurbished (new oxygen analyzer, relief devices, calibrated gages, certified HEPA filters).
  - Pre-operational test complete with minor maintenance items identified.
  - Pursuing thermal decomposition option (off the shelf technology) versus dissolution. Development has proven the process. ORR planned for February 2001.
  - Potential DOE programmatic use would result in repackaging and shipping effort.

- Excess Chemicals
  - Continuing removal of excess chemicals.
  - Targeting Room 100E area first.
  - Over 250 individual items removed and transferred to the waste management organization this year.

- General Combustibles at 9206
  - Maintaining combustible waste removal paths.
  - Significant progress made in Rooms 14, 19, and 22.
  - All excess propane cylinders transferred to the waste management organization.
  - Combustible control program issued and being implemented.

- Plant Combustible Drum Issues
  - Short Term – Pursue wasting of drums less than 0.2 weight percent. Utilize existing capability for greater than 0.2 weight percent (sort out highly contaminated articles, burn in Holden Gas Furnace, recount low contaminated articles).
  - Long Term – Continue deactivation plans for 9206 Recovery Furnace. Re-evaluate 9212 recovery furnace after existing capability established.

Comment: According to the Center for Chemical Process Safety in its *Plant Guidelines for Technical Management Chemical Process Safety*, identification of the hazards inherent in chemical processes should be done by process teams that include experts from various disciplines appropriate to the system. If experienced personnel are not available, they could be brought in from outside Y-12 to survey high hazard facilities.

Response: The hazard analysis requirements manifested in the LMES Facility Safety Command Media are modeled after guidelines developed by the Center for Chemical Process Safety as published in *Plant Guidelines for Technical Management of Chemical Process Safety* and *Hazard Evaluation Procedures*. Requirements include hazard analysis to be performed by a team with expertise in engineering, process, operations, and safety management (e.g., industrial health and safety, fire protection, etc., as applicable). The team shall include at least one operator who has experience and knowledge specific to the process being evaluated. Also, one member of the team shall be knowledgeable in the specific process hazard analysis methodology being used. Other personnel familiar with specific aspects of the operations, such as maintenance, inspection, and testing of equipment, shall be available to support the hazard analysis team as needed. For hazards in scope of the safety analysis, controls are identified by the team and conflicting requirements are resolved. Day-to-day planning of jobs in facilities subject to safety authorization basis documents follow established LMES procedures (Y15-012, *Job Hazard Identification*; Y74-043, *Job Hazard Analysis*; and Y15-187, *Integrated Safety and Change Control Process*) to ensure identification of applicable hazards (whether within or outside the scope of the safety authorization basis document) and appropriate controls for specific activities.

While not specifically addressed in the LMES Command Media, team leaders of hazard evaluation studies are experienced to know when to call for specific technical expertise outside the core team. A person qualified in chemical hazards would be included when necessary.

Comment: With regard to the Lithium Hydride Production Facility fire, the staff suggested that the facility manager attempt to locate and determine the storage conditions of all lithium hydride materials on-site to prevent future surprises.

Response: In the specific incident that prompted the comment, the LMES Special Materials Organization (SMO) had received, from another organization, lithium hydride (LiH) material that was more reactive than the LiH material SMO normally handles. As a corrective measure, appropriate procedures have been revised that require lithium materials from organizations other than those scheduled in the work stream to be evaluated and approved for transfer (LMES SMO procedure Y20-NM-18-57-012, Appendix - *Approval for Lithium Compounds Returned to the*

Special Materials Organization for Recycle). Location and storage conditions of all LiH on site has been verified by LMES Organizations owning LiH and it was determined that this material is contained in eight facilities. LMES discovered no material of which it wasn't aware. Storage of LiH materials at Y-12 is governed by the safety authorization basis documents for those facilities storing the material. In conclusion, LMES has taken the initiative to review all facilities for the presence of reactive materials and the need for controls.