

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 16, 1994

MEMORANDUM

FOR:

G. W. Cunningham, Technical Director

COPIES:

Board Members

FROM:

James W. Troan

SUBJECT:

Report on the Radiation Protection Program at the Nevada Test Site

1. **Purpose:** This memorandum documents the Defense Nuclear Facilities Safety Board (DNFSB) technical staff and outside expert assessment of the Radiation Protection Program at the Nevada Test Site (NTS). The review was conducted May 16-19, 1994.
2. **Summary:** The radiation protection program at the NTS was reviewed at the site and facility level for three specific areas: Area 5, Radioactive Waste Management Operations; Area 27, Device Assembly Operations; and Post Shot Drilling Operations. Based on the site and document reviews, the program was considered marginally satisfactory. The following highlights the program's strengths and weaknesses: 1) the organization is structured in a manner that will support implementation of an effective radiation protection program; 2) implementation of the DOE Radiological Control Manual is planned to be complete in 1995, ahead of the Recommendation 91-6 Implementation Plan commitment date of October 1996; 3) the NTS compliance assessment process used for the Radiological Control Manual did not follow the DP-AP-202 methodology, and the NTS Order assessment process did not address laboratory users or all contractors; 4) field implementation of radiological work practices does not consistently support implementation of the DOE Radiological Control Manual; 5) access controls to some High Radiation Areas were not established in accordance with the Radiological Control Manual's requirements; 6) visitor and radiological worker training does not meet the Manual's requirements; and 7) the use of qualified Radiological Control Technicians is not consistent.
3. **Background:** DOE Order 5480.11, *Radiation Protection for Occupational Workers* DOE Notice 5480.6, *Radiological Control (Radiological Control Manual)*, and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, establish the requirements for radiation protection for workers, the public and the environment, and provided the basis for the radiation protection review at the NTS. The review was conducted by: James Troan and Larry Zull, DNFSB staff; and Ned Dietrich and Ted Quale, DNFSB outside experts.
4. **Discussion/Observations:**
 - a. Topical Observations:
 1. Organization - The organization at the NTS is structured in a manner that supports the implementation of an effective radiation protection program. A Joint Test Organization has been formed. However, consolidated

procedures have not yet been completed.

2. Radiological Control Manual Implementation - NTS contractors are progressing towards implementing the requirements of the Radiological Control Manual (Manual). Full compliance is planned to be achieved in 1995. Overall, the NTS's plan to accomplish Manual radiological control training is consistent with the DOE Implementation Plan for DNFSB Recommendation 91-6. The status of the implementation of the Manual is given in Figure (1).
3. DOE Order Compliance - Compliance with the DOE Manual and related DOE Orders appears to be marginally acceptable. The following are examples of weaknesses: 1) in some of the Manual's Implementation Plans, the technical justification for "compensatory measures" and "not applicable" item(s) were not always provided, or did not appear to adequately address the non-compliance(s); 2) the Site Specific Manual deviates from some DOE Manual requirements; 3) a systematic and integrated method for assessing adherence based compliance with the requirements of the DOE Manual has not been implemented; 4) the Manual is not contractually invoked; however, Reynolds Electrical and Engineering Company (REECo) does have a funded work package for its implementation; 5) Order(s) are not levied on some contractors or organizations; 6) the Order assessment process does not address laboratory users or all contractors; 7) the compliance assessment process did not follow DP-AP-202 methodology; and 8) although DOE Order 5400.5 was reported as not having non-compliances or deficiencies, it was noted during the review that guidelines for residual concentrations of select radionuclides in soil, as determined by pathway analysis, had not been completed.
4. ALARA Program - Personnel in all of the site organizations were aware of ALARA concepts and most organizations had ALARA elements incorporated in their operating procedures. However, none of the organizations had a formal, documented ALARA program that currently satisfies the requirements of the Manual. REECo has issued a draft ALARA Policy for review, but has not issued an ALARA Program Manual that incorporates the requirements of the Radiological Control Manual, Article 312, *Planning for Maintenance Operations and Modifications*. During reviews of the ALARA programs at three operations areas, the staff noted the absence of many elements of an effective ALARA program, including no implementing procedures; lack of independent reviews; lack of ALARA considerations in the initial stages of work planning; and a lack of personnel with specialized training in methods to achieve ALARA.
5. Radiological Control Training - DOE Nevada Operations Office (NVOO) personnel reported that DNFSB Recommendation 91-6 training requirements for General Employees and Radiological Workers were

complete; and that Radiological Control Technician (RCT) training is completed to some extent and under development in some areas. RCT training is expected to be complete by December 1994. Some training areas appeared to lead the complex; however, there were instances where local policies and procedure may result in training below the Manual's standards. The training and qualification program for DOE-NVOO Health Physics Department (HPD) appears to be ahead and independent of work done by Headquarters (HQs) in response to the Recommendation 91-6 Implementation Plan.

6. Interviews - Twenty people were selected for interviews from the General Employee, Radiological Worker, Radiological Control Technician, and Radiological Technician Supervisor categories. RCTs and Radiological Control Technician Supervisors (RCTS) appeared to have the level of theoretical knowledge expected of an RCT. RCTs interviewed exhibited a weak knowledge of proper responses to emergency events such as fire in a controlled area. General weaknesses were noted in areas where RCTs's depth of knowledge should exceed that of an RCT. The Radiological Workers I and II that were interviewed demonstrated an acceptable knowledge of the characteristics of radiation, the effects of radiation on the body, and the ALARA principles to apply for the reduction of radiation exposure. The General Employees that were interviewed appeared to have an acceptable level of knowledge concerning the types of radiation and effects of radiation on the body.
7. Field Adherence to Requirements - Highlights include: 1) control of high radiation areas was found to be unsatisfactory. At the Area 5 Transuranic (TRU) Waste Storage Pad, sub-contracted construction workers were allowed access to an area that contained a high radiation area. Additionally, at the NTS Radiation Instrument Calibration Laboratory (Building CP-50), a radioactive source capable of producing a high radiation area was not positively controlled in accordance with the Manual, Appendix 3B requirements. The site-specific Manual did not include all of the DOE Manual, Appendix 3B requirements, nor was it apparent that a rigorous process was used to assess compliance; 2) REECo has not yet established that all of the NTS's radiation detection equipment has the capability to detect contamination at the limits specified by the Manual's Table 2-2. REECo personnel noted that they have acquired a limited number of instruments that meet the requirements, but that the total quantity of radiation detection equipment necessary to meet the needs at NTS has not been assessed; and 3) a sound and comprehensive technical basis for airborne radioactivity monitoring was not presented.

b. Area/Operation-Specific Observations

1. AREA 27 - Review and tour of the Device Assembly Facility, Area 27,

Able Site were conducted. Highlights include: 1) radiation areas resulting from Special Nuclear Material (SNM) are not, or are not planned to be posted in accordance with the Manual; 2) Building 5100 contained radioactive material (sealed sources), but was not properly posted on all sides of the building. A building adjacent to Building 5100 contained a box marked as LSA (Low Specific Activity). The building was not posted as containing radioactive material; and 3) technical information to support the rationale for the design and the implementation of the air monitoring program was not evident.

2. AREA 5 - A review and tour of the Radioactive Waste Management Complex (RWMC) were conducted. Highlights include: 1) the High Radiation Area, that contained only one box of waste was located within the Area 5 TRU Waste Storage Pad. The High Radiation Area was properly posted, but was simply identified by a rope attached to sawhorses and did not have the access controls as required by the Manual, Appendix 3B. Consequently, construction personnel erecting the TRU Waste Storage Building had unrestricted access to this area. Following the review, the REECo Radiation Protection Manager issued a letter stating that the non-compliance should be corrected by June 23, 1994, or waste operations terminated; and 2) a domed translucent fabric enclosure for the storage of TRU waste drums is being constructed over a concrete pad. The staff observed that the enclosure did not have lightning protection or a mechanism to provide fire protection. When fire protection was discussed, the staff was initially told that it was not necessary because the value of the building did not exceed a specified amount. In response to questions concerning the worker health and safety aspects of not having any apparent fire protection for this waste facility, it was later indicated that the need for fire protection would be re-evaluated.
3. AREA 3 - A tour of an Area 3 yard used for storage and maintenance of potentially contaminated equipment was conducted. Highlights include: 1) technical work documents such as procedures or work packages did not appear to be used to control hands on work with radioactive material (i.e., potentially contaminated equipment); and 2) the radioactive material area used for storage at Area 3 was not properly posted and maintained. Some posting deficiencies were noted in March 1994, but had not yet been resolved.
4. Drilling Operations - A review of drilling operations was conducted. Highlights include: 1) NTS personnel described the process of releasing vehicles from Contamination Areas; the survey process covered the generally accessible areas, but did not appear to address inaccessible surfaces; 2) drinking water is permitted per a special procedure in the Post-Shot Drilling Contamination Area and is considered by NTS personnel as necessary year round because of heat stress. The technical justification was limited in details and Procedure HS-IN-7234 dated 16 August 1991 had not been updated to include all aspects of the Manual's

Article 342.11 requirements; and 3) smoking and drinking in a "break area" while wearing anticontamination coveralls were discussed; however, documented justification for smoking and drinking coffee in a break area was not provided during the review.

5. **Future Staff Actions:** The following items should be considered for additional review by the Staff, DOE or the contractor: 1) review the Radiation Protection Training Program; 2) review radiography activities and their integration with the Radiation Protection Program; 3) review select air monitoring systems and programs; 4) review field implementation of the Manual in select areas (i.e., physical access controls for high and very high radiation areas; 5) observe Operational Readiness Reviews at Area 27, if used, before interim operation, and at Area 5 TRU Waste Pad; 6) review the ALARA Program; and 7) review the requirements and as-built configuration for the Area 5 TRU Waste Pad domed fabric enclosure.