

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 20, 1994

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director

**COPIES:** Board Members

**FROM:** J. W. Troan

**SUBJECT:** Report on the Radiation Protection Training and Qualification Program at the Savannah River Site

- 1. Purpose:** This memorandum documents the Defense Nuclear Facilities Safety Board (DNFSB) technical staff (Staff) and outside expert assessment of the Radiation Protection Training and Qualification Program at the Savannah River Site (SRS). This assessment is based on an on-site review at the SRS conducted on March 15-18, 1994, and subsequent document reviews.
- 2. Summary:** The SRS training organization has developed a sound radiation protection training and qualification program that is structured upon proven performance-based training concepts, and uses available DOE standardized core course training material. It is evident that individuals in the training organization have worked hard, and that substantial advances have been made in achieving a quality of training programs that rivals those of the commercial nuclear industry. The SRS training staff is generally well qualified, however, the training staff may be overextended based on current commitments. This situation should not impact the current lessons being taught, but may be affecting the staff's ability to meet the training requirements outside the classroom, such as development and implementation of new or revised training curricula.

The current General Employee Radiological Training, Radiological Worker (Worker I and Worker II, and Radiological Control Technician (Technician) Training and Qualification Program appeared to meet DOE Radiological Control Manual (Manual) requirements, and progress is being made towards satisfying other DOE Order requirements. For example, the SRS Radiological Control Inspector (synonymous with (Technician)) Training and Qualification Program has successfully achieved major milestones towards program accreditation. Although the current programs are considered adequate, the Staff believes the programs that have been put in place to upgrade incumbent Technicians and their First-Line Supervisors (Supervisors) may not produce equivalent results. An uncertainty of the depth of knowledge of some incumbents is likely to persist for some time since Supervisors are not subject to a comprehensive written examination, but are expected to have oral examination boards in the Spring of 1996.

The overall effectiveness of the radiation protection program was examined through field observations. Radiological control practices in the field were observed, and included training demonstrations, evolutions and personnel interviews. Personnel interviewed expressed a positive attitude toward radiological safety, the need and appreciation for training, the concepts of as low as reasonably achievable (ALARA), and the individual worker's responsibility for ensuring radiological safety. Field observations at the F-Canyon and FB-Line revealed many weaknesses in the application of proper radiological control principles and procedures. For example: pre-job briefings varied in effectiveness, and in some cases were inadequate; safety precautions were not taken during a routine evolution, as prescribed by procedure; a person, after reading a Radiation Work Permit (RWP) was not aware of the radiological conditions to be expected in the work area; and supervisory personnel in the vicinity of an unexpected occurrence during a planned maintenance evolution did not take charge or seem to know what should be done. Some of these examples of poor field practices are analogous to the Westinghouse Savannah River Corporation (WSRC) post-training evaluation results for Worker I and Worker II which may indicate a potential problem with workers' retention of knowledge and field application of acquired skills.

Facility specific radiation protection training programs are at various degrees of maturity. Neither F-Canyon or FB-Line have clearly defined and formally implemented specific qualification requirements for the Supervisor; nor have they developed a drill program, or a continuing training program as required by DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*. Presently, personnel in the SRS training organization are developing site level Supervisor radiation protection training and qualification requirements. This is expected to further upgrade these Supervisors' knowledge, skills and abilities. However, it will take time and may require further definition and implementation of facility specific radiation protection training and qualification requirements.

- 3. Background:** The Staff has been performing ongoing reviews of the SRS radiation protection program since 1990. Major programmatic reviews were conducted in 1991 and 1992. Review of facility radiation protection programs including training and qualification have been performed at K-Reactor, HB-Line, and Replacement Tritium Facility since 1990. This review was conducted to assess the overall site's radiation protection training and qualification program as a follow-up to the earlier reviews; and to assess the implementation at the SRS, of the applicable DOE Orders and Manual radiation protection training and qualification program requirements. James Troan, Staff; Ulrich Behling and Douglas Volgenau, Outside Experts conducted this review at the SRS during March 15-18, 1994. Various aspects of the radiation protection training and qualification program were examined, including: organization, responsibilities, selection criteria and qualifications requirements for the trainers, training and qualification program development and implementation for general employees, Radiological Workers, Radiological Control Technicians, and Radiological Control Technician Supervisors; other radiation protection training development and implementation, training evolutions and radiological work practices in the field; and personnel knowledge.

- 4. Discussion/Observations:** Overall, the SRS training staff is generally well qualified with regard to educational and professional experience, and the training organization has developed a sound program that is structured upon the proven performance-based training concept.

Following major comments are noted where both positive results and weaknesses were observed. Further details can be provided by the Staff.

- a. The current training staff may be overextended based on current commitments involving initial, continuing and requalification training.
- b. DOE standardized core course training materials as well as site-specific information is being used in the various Radiation Protection Training Programs.
- c. General Employee Radiological Training at the SRS is adequate and meets DOE requirements.
- d. The current Worker I and II training programs contain the essential elements for preparing workers assigned to radiological work environments. However, observations of radiological work practices in the field, conducted by members of the WSRC Training Department responsible for Radiological Worker training have indicated a disconnect between what is taught in the classroom and what is actually practiced in the field .
- e. The current Technician Training and Qualification Program is a sound program that meets DOE and industry standards. This is evidenced by the fact that the program has successfully achieved major milestones towards program accreditation. However, several potential weaknesses were noted. For example, an attempt has been made to raise the knowledge level of pre-1990 Technician incumbents to current standards by means of Topic 1 through 9 Training (Topic Training). Topic Training was supposedly based on a systematic evaluation of pre-1990 training programs to the current program. It is uncertain, whether training documentation and records from the 1960's, 1970's, or even 1980's were sufficiently detailed or complete to allow such an objective evaluation. This impression is supported by comments supplied by incumbents interviewed and by their response to technical questions posed during the interview. The significance of this concern is highlighted by the fact that about 280 of the current staff of 480 Technicians are pre-1990 incumbents.
- f. WSRC does not expect to meet the DOE Implementation Plan commitment for Board Recommendation 91-6 to have completed standardized core training for Technicians by December 1994. However, WSRC has proposed an alternative approach, and is planning to complete this training requirement in early 1995.

- g. The current staff of 78 Supervisors at the SRS were all Technician qualified before 1990 and are, therefore, a product of training and qualification standards that are considered well below current technical training and qualification standards. Although Topic Training may have reduced the gap between incumbent and current standards, it is questionable that this current generation of Supervisors' depth of knowledge in technical matters can be expected to exceed that of Technician qualified after 1990. This uncertainty is likely to persist since Supervisors were not subjected to a comprehensive written examination as part of the "compensatory" training (i.e., Topic Training) nor is a comprehensive written examination a requirement for future Supervisor biennial requalification.
- h. SRS management has taken the initiative to develop and implement their own training in select "Other Radiological Training" and "Training for Special Application" areas, while standardized versions of the training material for these articles are currently in various stages of development through DOE Headquarters. It is anticipated that curricula for selected topics will be in place by the summer 1994. Impacts of DOE's "Other Radiological Training" schedule changes are not known, nor are they considered in the scope of the site's implementation plan.
- i. Facility-specific radiation protection training programs are at various degrees of maturity. At the Replacement Tritium Facility (RTF), Supervisors are required to qualify to the same Tritium Specific Health Protection Qualification Standard that the Technicians are held to, while at the F-Canyon and FB-Line, the qualification requirements for Supervisors requires further definition and improvement. Neither F-Canyon and FB-Line have a specific qualification card for the Supervisor; the specific training for these individuals is not clearly defined; and there is confusion as to whether Supervisors will be required to maintain qualification as a Technician. In addition, neither F-Canyon or FB-Line have developed a drill program, or developed a continuing training program as required by DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*.
- j. Radiological control evolutions were observed in the field. Pre-job briefings were observed and varied in effectiveness, and in some cases were inadequate. The following highlights some of the poor work practices that were observed: a Technician wore her personal dosimetry inside the inner layer of protective clothing, a Technician frequently touched the protective clothing and touched the shoe of the operator during personal monitoring prior to exit of the Contamination Area, and the operator did not know either the radiation or contamination levels to be expected in the room or in the vicinity of the maintenance to be performed. The planned replacement of a flange Teflon gasket in a nitric acid line, with radiological implications, was observed. The work planning efforts for this evolution and the actions taken during an unexpected occurrence were not considered adequate. One of the more significant deficiencies noted was that although several supervisory level people were witnessing the actions being taken at the scene

during an unexpected occurrence, none took charge or seemed to know what should be done.

- k. Two randomly selected training instructors were observed presenting a previously given student classroom session. One instructor demonstrated excellent classroom demeanor and was an accomplished instructor, while the other was much less effective. In addition, a field training coordinator was observed while conducting an On-the-Job Training (Training) session. The Training session was considered only minimally adequate, and failed to reinforce the previously learned material. Other source check operating procedures were not used and safety precautions associated with the potential radiation hazards, while using a source check device, were not emphasized. Subsequent to this demonstration, a similar evolution was observed in the field where an operator demonstrated disregard for safety precautions (e.g., although approved beta eye protection was present, the Technician did not wear the eye protection while conducting the check as required by the source check procedure). During the Training Session, it was revealed that the training group was creating its own technical procedures for Training since they had found the in-place procedures lacking. Review indicated that the On-the-Job Training Guide (Guide) was more complete and accurate than the procedure (e.g., the procedure lacked an important technical note that was included in the Guide). A Training exercise covering a newly received source check device for an X-ray and gamma survey instrument was also observed as an evolution. In contrast to the training session discussed earlier, the instructor was very thorough and completed the Training in a professional manner. The trainee was very responsive.
- l. Interviews were conducted in group sessions of randomly chosen individuals that had received the following training and qualification: General Employee Radiological Training, Worker I and II; Technician; and Supervisor. The interviews were used to assess: individual attitudes towards radiological safety and practices, functional relationship among the four groups as well as with line management, and technical knowledge related to their past training and current job qualification.

Without exception, interviewees expressed a positive attitude toward radiological safety as evidenced by responses to questions relative to procedure compliance, the need and appreciation for training, ALARA, and the individual worker's responsibility for ensuring radiological safety. Individuals demonstrated a clear understanding of the relational responsibilities and functional roles of trained personnel toward one another. This was particularly evidenced by Worker II and Technicians responses on each group's role regarding pre-job briefings, job-coverage, ALARA reviews, stop-work orders, and procedure compliance.

Responses to technical questions demonstrated some weaknesses. This was particularly true for Technicians and Supervisors most of whom had only recently completed Topic Training. Technical questions focused on fundamental radiological topics covered in the

Phase I Core Academic Training for Technicians. It is unclear whether this reflects a weakness in the classroom instructional approach or a lack of reinforcement of classroom acquired knowledge during training and job performance.

5. **Future Staff Actions:** Staff actions are expected to include the following:
  - a. Monitor radiological work practices at the SRS.
  - b. Monitor the implementation of Supervisors training at the SRS.
  - c. Monitor the implementation of additional standardized core courses at the SRS.