DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 18, 1993

MEMORANDUM FOR: G. W. Cunningham, Technical Director
A. Stadnik, Assistant Technical Director for Materials Processing and Environmental Restoration

FROM: Ralph Arcaro

THROUGH: P. Gubanc, Savannah River Site Program Manager

SUBJECT: Savannah River Site K-Reactor, Operator Recertification and Requalification Program

1. **Purpose:** This memo provides a report on the DNFSB staff's continuing review of operator training and qualification at the Savannah River Site (SRS) K-Reactor.

2. **Background:** Operators at the K-Reactor are due for their biennial recertification and requalification prior to the currently planned K-Reactor demonstration run. To ensure the K-reactor training program continues to improve following DOE's implementation of Board Recommendation 90-1, two members of the DNFSB staff, Paul Gubanc and Dan Ogg, and outside experts John Drain and Dave Cruden conducted a review of operator training at the SRS K-Reactor during March 2 - 4, 1993. The recertification and requalification status and plans for training on major plant modifications were the focus of this review. The review consisted of a presentation of the program by the Reactor Training and Procedures (RTAP) manager, observation of Job Performance Measures (JPMs), and observation of evaluated training scenarios in the simulator. The DNFSB review team also received presentations regarding the planned training on the cooling tower modification.

3. **Discussion:** The DNFSB review team found that the K-Reactor recertification and requalification program is performed in accordance with DOE Orders and encompasses the requirements of the major industry standard regarding certification of reactor operators. However, weaknesses were noted both in the performance and level of formality exhibited by the recertifying operators. The attached report from the DNFSB's Outside Expert provides specific comment on the review conducted by the DNFSB team. A summary of conclusions is provided here:

   a. The K-Reactor training programs for initial certification of Central Control Room Operator (CCRO), Central Control Room Supervisor (CCRS), Shift Manager (SM), and qualification of the Reactor Building Supervisor (RBS) and Reactor Building Operator (RBO), and the biennial recertification/requalification are in compliance with DOE Orders 5480.20,

Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities and 5700.6C, *Quality Assurance*, Criterion 2 and are consistent with commercial industry standard NUREG 1021, *Operator Licensing Examining Standard*. Management involvement is consistent with Criterion 10 of DOE Order 5700.6C.

b. In general, the level of knowledge and proficiency of certified operators and supervisors has increased. Performance by a number of individuals observed in JPMs or in the simulator was disappointing.

c. The conduct of the JPMs was generally consistent and formal. The peer evaluators included a representative from RTAP, Reactor Operations and DOE.

d. Adequate numbers of operators and supervisors will complete recertification/requalification to support reactor startup in May 1993 or later.

e. The level of formality in operations has decreased since the Power Ascension Program. This decrease may be attributed to the low morale surrounding the K-Reactor's uncertain future.

e. Health Physics Inspector training continues to be a concern to both Operations and RTAP.

f. Training on the cooling tower modifications will include classroom training and written and simulator examinations. This training is scheduled to commence with the training cycle beginning March 15.

List of Attachments

1. Agenda for Requalification/Recertification Review

2. Outside Expert Report: Memorandum, John F. Drain to Defense Nuclear Facilities Safety Board, Report of Trip to Savannah River Site (SRS), K-Reactor Facility, 2-4 March 1993

Copy To:
Board Members
D. Ogg
L. Ettlinger
W. Kornack
S. Krahn
J. Davis
J. Deloach
R. Warther
J. Arcano
J. McConnell
SPC, J. Drain
SPC, D. Cruden

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AGENDA

DNFSB Technical Staff
SRS K-Reactor Visit: 3/2/93 - 3/4/93

Subject: Review of K-Reactor Operator Recertification
Review of Cooling Tower Modification Training

Location: 705-C, Conference Room E

March 2, 1993

Time	Discussion Subject	Presenter
0800	K-Reactor Operator Recertification/Requalification Program	D. Zimmerman

- Recertification/Requalification proccess steps
- Examination development
- Job performance measure development
- Compliance with DOE Order 5480.20 Personnel Selection, Qualification, Facilities and DOE Order 5700.6C, Quality Assurance as it regards training.
- Status and results of recertification/requalification (prior shifts)
- Job Performance Evaluator qualification

Record Review — D.Zimmerman

- Implementing procedures for recertification, JPM's etc.
- Written examinations
- Records to support JPM development
- Maintenance of recertification records

1200 Lunch - 704-C Cafeteria

1300 Cooling Tower Modification Training — D.Zimmerman

- New watchstanding requirements
- Required training
- Training development classroom/simulator/drills
- Schedule
- Simulator training
- Emergency drills — G. Reynolds
- Qualification of instructors — D. Zimmerman

Time	Discussion Subject	Presenter
1500 - 1700	Record Review - Lesson Plans - Examinations - Procedures	D. Zimmerman

Wednesday, 3/3/93

0800 - 1700	Observance of Job Performance Measures (by 3 DNFSB attendees)

Thursday, 3/4/93

0800 - 1700	Observance of simulator evaluation (Up to 3 DNFSB attendees)

SYSTEM PLANNING CORPORATION
1500 Wilson Boulevard • Arlington, Virginia 22209-2454 • (703) 351-8200 Telecopier (703)527-6037

Memorandum For: Defense Nuclear Facilities Safety Board (DNFSB)

Date: 9 March 1993

From: John F. Drain

Subject: Report of Trip to Savannah River Site (SRS), K-Reactor Facility, 2-4 March 1993

System Planning Corporation (SPC), under Contract DNFSB-93-039, is providing engineering technical services to the Defense Nuclear Facilities Safety Board (the Board). On 2 March 1993 Messrs. J.F. Drain (SPC) and D.S. Cruden (consultant to SPC) joined Board Staff members Paul Gubanc (SRS Program Manager) and Dan Ogg in a visit to the K-Reactor Facility at SRS to review biennial recertification training in progress.

GENERAL COMMENTS: The Board's team received briefings on the recertification program in progress covering the written exams, the Job Performance Measures (JPM) checkouts and the simulator exam. This was the 4th week of a 5-week cycle. Spot checks were made of the open and closed book exams and the training records. Brief interviews were conducted with 4 of the instructors-in-training who have been selected as prospective long-term training staff. In-plant JPMs were observed for 8 operators/supervisors (the same set of 4 JPMs was used for each individual). Three simulator drill scenarios were observed over a seven hour period. All facets of the recertification training program require a higher level of knowledge and performance than that observed in initial certification prior to plant restart. Specific observations, comments and conclusions are presented in the following paragraphs.

OBSERVATION: **The K-Reactor training programs for initial certification of Central Control Room Operator (CCRO), Central Control Room Supervisor (CCRS), Shift Manager (SM), and qualification of the Reactor Building Supervisor (RBS) and Reactor Building Operator (RBO), and the biennial recertification/requalification are in compliance with DOE Order 5480.20 and are consistent with commercial industry standard NUREG 1021. Management involvement is consistent with Criterion 10 of DOE Order 5700.6C.**

COMMENTS: As noted in the Staff report of a visit conducted in October 1992, the operator and supervisor certification/qualification and the biennial recertification/requalification

programs contain the required elements of DOE Order 5480.20 and elements of the peer evaluation process used in the commercial nuclear industry as outlined in NUREG 1021.

- The training programs have been upgraded since initial certification or qualification through the preparation of approximately 90 system description manuals which contain more detail than previously available. Operators and supervisors are being held accountable for this increased scope and depth of information during the recertification and requalification processes.

- Operators and supervisors are examined on this higher level of system and procedural knowledge in the revised open and closed book exams. The exams have a good mix of multiple choice and short answer questions. (The WSRC K-Reactor exams exceed industry standards in this regard in that commercial power exams contain only multiple choice questions).

- The quality of the exam questions, JPM and simulator scenarios has improved through participation by the training staff. Each staff member spends 4 hours per week in-plant observing and discussing operations with the operating crew.

- The "peer evaluation" team for JPMs and simulator sessions is staffed with a blend of Reactor Training and Procedures (RTAP) Division senior instructors, K-Reactor Operations Department managers, and DOE representatives (NRC licensing examiners under contract to DOE/SRO). The composition of the team is similar to that used for initial qualification, but two of the members now are currently certified supervisors who have recent K-Reactor operating experience as Shift Manager.

OBSERVATION: **In general, the level of knowledge and proficiency of certified operators and supervisors has increased. Performance by a number of individuals observed in JPMs or in the simulator was disappointing.**

COMMENTS: Although operators and supervisors were provided 2 weeks to review a general listing of the JPMs from which 10 would be selected for evaluated performance, approximately half of the operators observed failed to satisfactorily complete one of the four in-plant JPMs because of unfamiliarity with the system components or inability to locate instruments or to interpret parameters measured. In the opinion of the Board's team members observing these JPMs, lack of motivation or intensity rather than lack of knowledge was the cause. Operators who had mentally reviewed or walked-down each of the JPMs on the list of "possibles" prior to this week were as easy to identify as those who hadn't.

- The team performance of the crew observed in the simulator was less well coordinated than that observed prior to restart and during the test program. Formality of operations was noticeably down, reflecting a lowered expectation at the crew supervisory level which suggested a lower standard being required by plant management. Communications between operators was less crisp and not always positive (i.e., the message didn't get through).

- During a practice session in the simulator on March 3 by this same crew, one of the CCRS certified operators (who was not the CCRS for the event in progress) was observed sitting in a chair with his feet propped up on the supervisor's desk. Different levels of Control Room decorum are now tolerated depending on whether the operators are being watched (i.e., evaluated).

OBSERVATION: **The conduct of the JPMs was generally even-handed and formal. The peer evaluators included a representative from RTAP, Reactor Operations and DOE.**

COMMENTS: Each JPM was conducted in the same manner, using a script that contained initial conditions of the plant or system, the task to be performed, and the procedure to be followed. The quality of the JPMs has been improved by the in-plant participation of the RTAP staff mentioned earlier.

- In most instances, the operator was allowed to work at his own pace, describing or simulating each step of the procedure as he/she performed the JPM. In a few cases, one of the evaluators unnecessarily lead the examinee.

- Little expansion on the procedure or the JPM evaluation sheet was observed. "Faulted JPMs", that is, giving the examinee a condition or instrument reading other than "in the prescribed range", have been discussed within RTAP but have not been implemented or used on a trial basis. As a consequence, the candidate is examined on normal conditions only and routine corrective actions are not discussed.

- The way some JPMs are structured or conducted would have left the system in an abnormal condition if the steps had been performed instead of simulated.
For example, the JPM for raising nitrogen pressure in the SSS system was terminated as soon as the desired pressure was reached. The steps to [simulate] depressurizing the gas addition rig and disconnecting the charging hose were not done.

- These comments were provided informally to the RTAP Operations Training Manager.

OBSERVATION: **Adequate numbers of operators and supervisors will complete recertification/requalification to support reactor startup in May 1993 or later.**

COMMENTS: A number of operating personnel have left the shift crews since the plant was shutdown for the cooling tower modification. Replacement operators and supervisors will have completed all requirements except operation at power for the prescribed number of hours. Previous operators or supervisors who have maintained current certified status are available to fill positions until "time-at-power" is obtained for personnel completing training at a new position since last summer.

- The most critical position is perhaps the CCRO where there are only enough candidates (25) recertifying or completing initial certification to fill the positions in the five crews. Several marginal candidates have been identified and are being closely scrutinized.

- The RBO position also has only enough qualified operators (30) to fill the required positions. However, there are another 30 candidates in training. One or more have progressed well enough to fill any unexpected openings.

- The uncertainty of future operation of the K-Reactor is having an adverse effect on crew morale, as evidenced by the lackluster performance of some of the operators during JPMs and simulator training. Unexpected vacancies may occur if operators elect to take positions elsewhere at SRS or leave WSRC. This problem would have the most adverse effect on certified operator ranks - the CCRS and CCRO.

OBSERVATION: Health Physics Inspector (HPI) training continues to be a concern to both Operations and RTAP.

COMMENTS: No actual performance of HPIs was observed. Conversation with RTAP staff and crew supervisors suggest the problems noted in other visits persist.

- The HPIs receive "core training" from their own HP organization. The users, such as K-Reactor, must then tailor additional site specific training and qualification for HPIs that will work in the facility.

- Commitment of the same HPIs for long periods of operation is based on a "gentlemen's agreement" between Facility Managers. Any complaints seem to be resolved at the same level.

FUTURE EVENTS:

- Training of the operating crews on the changes to procedures, Technical Specifications, plant response, etc., resulting from the cooling tower modification has not yet been completed. The training cycle that begins 15 March will include classroom, written and simulator examination on this material. In essence, this will be operator certification on this major plant modification. Additional DNFSB review of this program may be necessary if operation of the K-Reactor is to occur.

CONCLUSIONS: The training program documentation for SRS K-Reactor operators contains all the required elements. The program in practice requires a higher level of knowledge and performance for initial qualification or certification today and for biennial recertification/requalification than was required at plant restart. The majority of the individuals observed during this visit performed at these higher levels. The standards being used by the peer evaluators in JPM checkouts and in the simulator are uniformly high. Senior management, both

in Reactor Operations and DOE/SRO are involved. Although the crew observed in the simulator did not perform at a level that was expected or desired, no unsafe individual or team performance was noted by the evaluators. (The Board's team left the site before the deliberations of the evaluators occurred, so the final grade for the training week had not been determined.) The conclusion reached from all observations is that the K-Reactor training program satisfies Criterion 2 of DOE Order 5700.6C.

REFERENCES:

- DOE Order 5480.20 - *"Personnel Selection Qualification, Training and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities."*
- DOE Order 5700.6C - *"Quality Assurance"*
- Nuclear Regulator Commission NUREG-1021 - *"Operator Licensing Examiner Standards"*
- WSRC Manual RD-1 Procedure RDP 6.01 (Rev. 1) - *"Reactor Personnel Selection, Qualification, and Training"*
- WSRC Reactor Restart Division Administrative Manual R6.2 - *"Peer Evaluation Standard"*
- DOE/NE0101T - *"TAP 1 Training Program Manual in support of the Training Accreditation Program"*
- DOE/NE-0102T - *"TAP 2 Performance-Based Training Manual in support of the Training Accreditation Program"*
- DOE/NE-0103T - *"TAP 3 Training Program Support Manual in support of the Training Accreditation Program"*