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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 7, 1992

The Honorable James D. Watkins
Secretary of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

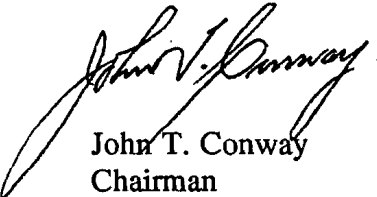
Dear Mr. Secretary:

A group comprised of nine Board staff members and outside experts recently carried out an assessment of defense nuclear facility operator training and qualification programs at the Hanford Site. A copy of their report is enclosed.

The report identifies numerous deficiencies at four facilities including, most importantly, those at the High Level Waste Tank Farms.

This report is being provided to you for whatever actions you may deem necessary.

Sincerely,



John T. Conway
Chairman

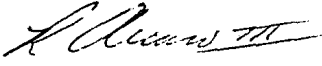
Enclosure

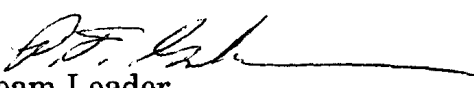
c:
Hon. Richard A. Claytor, DP-1
Hon. Leo. P Duffy, EM-1
Mr. Steven M. Blush, NS-1
Mr. Victor Stello, Jr., DP-6

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 6, 1992

MEMORANDUM FOR: Board Members
G. W. Cunningham, Technical Director

FROM: Ralph Arcaro 
Hanford Training Review Team Leader

VIA: Paul Gubanc 
Hanford Site Team Leader

SUBJECT: Trip Report - Hanford Site Training and Qualification
Review, June 15 - 18, 1992

Purpose: This memorandum provides comments and observations made by the Defense Nuclear Facilities Safety Board (DNFSB) Technical Staff during a visit to the Hanford Site to review operator training and qualification.

Background: During several past DNFSB Technical Staff visits to the Hanford Site, numerous comments had been made regarding deficiencies in training at various facilities. These comments precipitated a concern by the Board as to whether training and qualification at the Hanford Site was ensuring that operators were sufficiently proficient to perform in a manner that adequately protects the public health and safety. To evaluate the training status and plans for future improvement, a team of DNFSB representatives conducted a visit to the Hanford Site on June 15 - 18, 1992. The team consisted of Technical Staff members Paul Gubanc, Ralph Arcaro, Timothy Dwyer, Matthew Moury, and James Troan; Outside Experts David Boyd, Ned Dietrich, and Douglas Volgenau; and the DNFSB Hanford Site representative John Straub. In order to gain an impression of training and qualification across the site, the DNFSB review team received presentations on site-wide training and facility-specific training at the Tank Farms, Plutonium Finishing Plant, Grout Waste Treatment, and K-Basins Facilities. At the four selected facilities, the team reviewed training records and interviewed operators to determine level of knowledge and training effectiveness. Individual members of the review team observed training lectures and On-the-Job Training Evaluations. The review team also conducted a round table discussion with representatives from the Department of Energy - Richland Field Office (DOE-RL) to review the Field Office's responsibility and commitment to the training at the Hanford Site.

Although not specifically evaluated as part of this review, the Technical Staff members of the team suggests that a review of DOE Headquarters' involvement with training at the Hanford Site be conducted. The staff considers this necessary to develop a complete understanding of the training situation at the Hanford Site.

Summary: The DNFSB review team found the training at the Hanford Site in serious need of improvement. The Westinghouse Hanford Company (WHC) centralized Training and Education organization and various site facilities have identified many needed improvements and are making strides toward a better training program. However, DOE-RL has provided little guidance as the contractor attempts these improvements. The following general comments can be drawn from the review:

1. WHC has identified several needed improvements in training and qualification, however, has progressed with training performance and improvements without direct involvement from DOE-RL. There is no person or organization within DOE-RL primarily assigned responsibility for monitoring and evaluating the contractor's operator training and qualification. This lack of direction by DOE has contributed to the contractor conducting training and qualification with little enforcement of the DOE Order 5480.20, *Personnel Selection, Qualification, Training and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*. Additionally, it is not evident that the principles of Board Recommendation 90-1, which outlines a methodology to upgrade operator training and qualification prior to restarting a nuclear facility, are being incorporated by DOE-RL where appropriate.
2. Operator level of knowledge was deficient at most facilities with major weaknesses noted in the areas of radiation hazards, conduct of operations, and the hazards associated with routine processes and handling of hazardous materials.
3. In some instances, proposed training improvements must be negotiated with the Oil, Chemical, and Atomic Worker's Bargaining Unit representing the operators' union, specifically those involving conditions for employment. The training acceptance criteria for the Bargaining Unit are unknown, and it is not assured the requirements of DOE Order 5480.20 will be embraced by the union position. The review team is concerned the negotiations may result in lessening the rigor of the proposed training program.
4. Training records are not auditable. All records are kept off-site and those older than one year are stored in Seattle to meet Quality Assurance document storage requirements. Neither WHC nor DOE-RL retains duplicates for administrative purposes. Even if access to the records is obtained, they are not cataloged in a system that allows easy verification of an operator's qualification.

Discussion: An outline of the discussion section is provided below:

1. DOE Richland Field Office (DOE-RL)
 - a. Background
 - b. Summary

2. Site-Wide Training
 - a. Background
 - b. Summary
 - c. Discussion
 - Training Organization
 - Personnel Selection
 - Training Program Status
 - Training Upgrades
 - Training Records and Documentation
 - Observed Training

3. Tank Farms
 - a. Background
 - b. Summary
 - c. Discussion
 - Training Organization
 - DOE-RL Interface
 - Training Program Status
 - Training Upgrades
 - Training Records and Documentation
 - Operator Interviews

4. Plutonium Finishing Plant
 - a. Background
 - b. Summary
 - c. Discussion
 - Training Organization
 - DOE-RL Interface
 - Training Program Status
 - Exceptions
 - Training Records and Documentation
 - Operator Interviews
 - Observed Training

5. Grout Waste Treatment Facility
 - a. Background
 - b. Summary

- c. Discussion
 - Training Organization
 - DOE-RL Interface
 - Training Program Status
 - Training Upgrades
 - Training Records and Documentation
 - Operator Interviews
 - Observed Training

- 6. K-Basins
 - a. Background
 - b. Summary
 - c. Discussion
 - Training Organization
 - Training Program Status
 - Training Upgrades
 - Training Records and Documentation
 - Training Accreditation
 - Operator Interviews

1. DOE Richland Field Office:

a. Background:

DOE-Richland (DOE-RL) is the DOE Field Office solely responsible for managing the operation of the Hanford Site and providing guidance and direction to the site prime contractors. DOE-RL contains approximately 450 Federal employees and receives additional staff support from Stone and Webster Engineering (SWEC) and the site prime contractors. The site prime contractors consist of WHC (the site M&O contractor), Battelle Pacific Northwest Laboratory, Kaiser Engineers Hanford, and the Hanford Environmental Health Foundation and between them employ approximately 15,000 personnel.

DOE-RL's role in Hanford training was included as an integral part of reviewing each major facility's training program. In addition, a round table discussion with representatives from DOE-RL was held to review the Field Office's responsibility, involvement and commitment to the training at the Hanford Site. The observations relative to DOE-RL responsibility and involvement from each of the major areas reviewed are compiled below.

b. Summary:

DOE-RL has no individual or organization assigned as primarily responsible for oversight of the contractor's training operations. An Office of Primary Responsibility (OPR) is assigned to each DOE Order, however, there are no clearly defined responsibilities for these OPR's other than to assure the Order for which they are responsible is contractually imposed on the site contractors. A DOE-RL Subject Matter Expert (SME) is responsible for detailed knowledge of the requirements contained in the DOE Orders, but the SME is not responsible for tracking implementation of the order. Ensuring implementation of the order is the responsibility of the individual DOE-RL Facility Representatives. Although some facilities' training improvement plans fully attempt to embody the requirements of the DOE Orders 5480.18A, *Accreditation of Performance-Based Training for Category A Reactors and Nuclear Facilities*, and 5480.20, *Personnel Selection, Qualification, Training and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*, a lack of direction to the Facility Representatives has resulted in varying degrees of success in ensuring the requirements of the orders are met. The following observations are provided:

- DOE has effectively vitiated the requirements of DOE Orders 5480.18A and 5480.20. Facility-specific Training Implementation Matrices (TIMs) required of WHC by DOE Order 5480.20 were submitted to DOE-RL for review in November 1991. No one present at the DNFSB/DOE-RL round table meeting could report on the status of review of the TIMs. In follow-up, it was determined that the TIMs remain at DOE-RL, and no action has been taken on them. Similarly, DOE-Headquarters has not acted on the Training Program Accreditation Plan (TPAP) submitted by the Tank Farm facility in September 1991 in accordance with DOE Order 5480.18A.
- No Training Implementation Matrix has been submitted for the UO₃ Facility. As stated in the "Application" section of DOE Order 5480.20, "This order applies to operable DOE-owned Category A and B reactors and non-reactor nuclear facilities." A Training Implementation Matrix was required to be submitted by November 1991. No reason could be given for why the UO₃ Facility did not meet this requirement.
- A periodic review of operator certifications by the Site Field Office is required by Section 8.e.6 of DOE Order 5480.20. A DOE-RL review of the Plutonium Finishing Plant's compliance with DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, was conducted in late 1991 and evaluated the status of training at PFP. As "periodic" is not defined in DOE Order 5480.20, DOE-RL has taken credit for the required review of PFP operator certification via the 1991 Conduct of Operations assessment.

DOE-RL has therefore tacitly assumed that a "periodic" review can occur as seldom as every six months. Outside of this arguable exception, no DOE-RL representative has conducted a review of operator certifications at any of the Hanford facilities reviewed. With the possible exception of the Fast Flux Test Facility (FFTF), DOE-RL has not established processes and initiated actions to carry out responsibilities assigned to the Field Office by DOE Order 5480.20.

(The review team acknowledges that the DOE-RL Operations Division is planning in the near future to conduct extensive audits of several facilities against DOE Order 5480.20. These reviews, however, are being conducted as part of DOE-RL's activities on Order compliance in response to DNFSB Recommendation 90-2. In addition, these audits are oriented at contractor Order compliance.)

- Following a Tiger Team assessment of training in 1990, WHC is developing an improved training plan with scheduled milestone commitments to DOE-RL. Despite WHC being several months behind in meeting these milestones, there have been no repercussions from DOE-RL to drive WHC toward achieving the goals of the improved training plan.
- The DOE-RL Operations Division member responsible for PFP had not read DOE Order 5480.20. He assumed it was just recently issued when in fact it was available February 1991. This individual also believed it was unreasonable to expect any DOE-RL Facility Representative to meet the monitoring requirements of DOE Order 5480.20 due to the Facility Representative's many other priorities.
- The function of DOE-RL Facility Representative for the Grout Waste Treatment Facility is performed by a DOE-RL contractor (i.e., SWEC). As additional oversight, a DOE-RL cognizant engineer is assigned to the facility. The contractor had only reviewed training in preparation for the DNFSB visit. The DOE-RL engineer has received no formal training or guidance from DOE-RL regarding facility oversight, and had last visited the facility in February, 1992.

2. Site-Wide Training:

a. Background:

The WHC Training and Education organization has overall responsibility for site-wide training at the Hanford Site. This central organization provides training to all operators prior to qualification at a particular facility. This

organization also teaches a wide variety of training courses which facilities may utilize to keep their operators qualifications current (e.g., biennial requalification as a radiological worker). Lastly, to the level deemed necessary by the facility, the WHC Training and Education organization provides matrix training support. As a result, some facilities maintain their own training organizations (e.g., Tank Farms), and some depend on this matrix support for all of their training needs (e.g., FFTF and PUREX).

Review of Site-Wide training consisted primarily of a briefing from and discussions with the WHC manager for the Training and Education organization.

b. Summary:

A WHC self-assessment of the training process conducted in 1988 identified several areas requiring improvement. As a result of this assessment, WHC is developing and implementing a revised training program based on "Pay for Performance." This improved training program fully attempts to satisfy the requirements of DOE Order 5480.20, however, some deficiencies were identified by the DNFSB review team:

- The upgraded training program is only applicable to facilities in the 200 Area. It is not clear if WHC recognizes a need for improved training at facilities such as K-Basins or others not directly reviewed by the DNFSB team.
- The fundamental change in the training program is the "Pay for Performance" feature. As this improvement directly affects the operators' job security, it is the subject of negotiations with the labor Bargaining Unit. The review team is concerned that resulting administrative issues may affect the rigor designed into the upgraded program.
- A list of required training for each position has not been developed. WHC representatives indicated that this would be accomplished by use of a computer-based matrix system. Currently, an ad hoc process exists whereby each facility develops its own matrix of required training.
- The new Site Training Manual is not complete, and the previous version of the training manual has already been cancelled. WHC has indicated it will reissue applicable portions of the old manual until the new manual is complete.

c. Discussion:

Training Organization: Site-wide training at the Hanford Site is the responsibility of the Training and Education organization of the International Environmental Institute. This organization was discussed with the WHC Executive Vice President, who explained that while other Level 2 line organization VP's and Directors are somewhat autonomous in directing their organizations and report to the Office of the President, the Director of the Institute reports to the WHC Executive VP who gives the organization special attention. The Director of the Institute was not present at any of the briefings for the DNFSB review team and no assessment can be made of how he views his responsibilities for site training. During a briefing on the Training and Education organization, a WHC manager stated that two reasons for placing this function under the Institute were to (1) export training and (2) "jump start" the Institute. These reasons may not be compatible with the vital job of providing effective training for site personnel. It is noted that at the Rocky Flats Plant, the training function is separately organized under an Assistant General Manager at a level comparable to Level 2 line organization VP's and Directors at WHC.

The Training and Education organization, also referred to as Technical Training, is subdivided into separate facility training divisions that provide matrixed support to the individual facilities. The extent of this support is at the discretion of the facility manager. For example, at the Tank Farms and PFP facilities, OJT is conducted by the line organization. At PUREX and FFTF, the OJT is supplied by the Technical Training division responsible for those facilities.

Personnel Selection: Prerequisite requirements for nuclear operators at Hanford are a high school diploma (or equivalent) and successful medical screening. These prerequisites meet the requirements of DOE Order 5480.20 Chapter 2.

Selection of an individual for employment is dependent upon a potential employee's results of a literacy and basic analytical skills test (BOLT Test), a selection interview by management, and successful completion of a Nuclear Process Operator (NPO) Fundamentals Training Course. The NPO Fundamentals Course is taken at a local community college before the employee is hired and is of six months duration. The course includes topics such as basic mathematics, chemistry, and nuclear physics. Following successful completion of the three above requirements, an individual can be selected for hire.

Training Program Status: The document presented as the governing directive for training and qualification at the Hanford Site is the Site Training Manual, WHC-CM-2-15. Review of the manual revealed it actually is applicable to the 200 Area only. Facilities such as K-Basins or others not directly reviewed by the DNFSB team are excluded.

After development for more than a year, the Site Training Manual is only about 70% complete. It is an upgrade from the previous training manual, which was cancelled upon issuance of the as yet incomplete WHC-CM-2-15. It has only recently been realized that this situation has resulted in a number of training areas not being addressed by a governing instruction. Technical Training intends to temporarily resurrect applicable sections of the previous training manual to correct this deficiency. No completion date for this action was identified.

Site-wide training is provided to all operators prior to assignment to an individual facility. In addition to the NPO Fundamentals Course taken before hire, a trainee also receives three weeks of instruction in Process Fundamentals. This course, provided by Technical Training, is an overview of each facility's mission and operations. Following fundamentals training, the trainee is required to take three weeks of Safety and Miscellaneous Training including such topics as Hazardous Materials, General Employee, and Radiation Worker Training. After assignment to a facility, the trainee receives Plant Specific classroom training. Although this curriculum covers design, systems, and processes of the particular facility, it is taught by Technical Training instructors.

At this point the trainee begins OJT. It is through OJT an operator achieves final qualification. No oral boards are given, rather final qualification is determined by an OJT evaluation. The responsibility for administering OJT and OJT Evaluations is determined by the Facility Manager. It can either be provided by the facility personnel or Technical Training.

Technical Training does not have a list of required training for each operating position. It was explained to the DNFSB review team that this task would be accomplished through use of a computer-based tool that would create a matrix specifying all required training for a particular job. Without this support from the centralized training organization, each facility manager is responsible for developing a facility specific required training matrix or equivalent. Currently, this is an ad hoc process.

Training Upgrades: WHC completed a self-assessment of the adequacy of training in 1988. The assessment recommended improvement in 14 areas. Noted deficiencies included:

- Job analyses were not conducted for many positions.
- Training was largely self-study with loosely structured OJT.
- If a certification exam was failed, the same exam was readministered.
- No continuing training program or proficiency requirements existed.
- Operator employment progression was based solely on time, provided two qualifications were maintained.

To correct these deficiencies, WHC plans to implement a revamped training program based on "Pay for Performance." The new program includes improved training material required to implement the requirements of DOE Order 5480.20 as well as a new operator progression structure based on qualification and performance rather than time. This improved training will be applicable only to the 200 Area facilities. Again, facilities such as K-Basins are excluded. It was not clear if WHC recognized the need for improved training at facilities other than those of the 200 Area.

The fundamental basis for the "Pay for Performance" training program is to require the operator to be qualified in successively more senior positions in order to be promoted. This is in contrast to the current system where promotion in the NPO pipeline requires only that over a period of 54 months, the operator maintain two job-specific qualifications and pass a series of five "progress examinations." These exams are typically 60 questions, multiple-choice, are not job or facility specific, and may be taken repeatedly until passed. Advancement in the NPO pipeline cannot be accelerated and is therefore independent of job performance. Under the proposed "Pay for Performance" system, three qualifications are required to reach the top of the Nuclear Operator level. Two additional qualifications are required to reach the top of the Nuclear Process Operator level, and an additional qualification is required to become a Senior Nuclear Process Operator. All operators must at least reach the top of the Nuclear Operator level. Although qualification beyond Nuclear Operator is expected, it is not required to maintain employment. (WHC refers to these qualification as "certifications" although all do not meet the requirements of "certification" as defined in DOE Order 5480.20.)

Because the "Pay for Performance" system involves conditions for advancement, it has become a subject of negotiation with the Oil, Chemical and Atomic Workers (OCAW) Bargaining Unit. Negotiations over the new training material, which is required to meet the intent of DOE Order 5480.20, are also necessary as the new training material represents a condition of

employment. WHC has linked the negotiations over "Pay for Performance" and the new training material together. Currently, negotiations are on hold pending WHC approval of the training material packages. WHC is certain the Bargaining Unit will not prevent the implementation of DOE Order 5480.20. WHC contends the only aspect of the new training program at risk to the negotiations is "Pay for Performance," which is not required by the Order. However, "Pay for Performance" is the fundamental basis of the improved program and provides the necessary incentive for operators to acquire better and more advanced training. Further, subjecting training material to union negotiations certainly puts the material itself at risk of modification by the union. It is not assured that the Bargaining Unit's negotiating position will consider compliance with applicable DOE Orders, specifically DOE Order 5480.20. The situation involving labor negotiations has resulted in the following two major concerns:

- Implementing the requirements of DOE Order 5480.20 may be at least hindered, delayed, or complicated by union negotiations.
- The Bargaining Unit's input to the proposed aggressive training program may lessen the intended rigor of the program.

Partial implementation of the new training system is possible provided the operator's job security is not affected. Some facilities such as PFP and the Grout Waste Treatment Facility are partially implementing the improved system independent of the union negotiations. However, this is not the case at all facilities.

Improvements incorporated into the "Pay for Performance" training program and their implementation status throughout the 200 Area are provided:

Fundamentals Training NPO Fundamentals Process Fundamentals	Implemented
Plant Specific Training Classroom Training Formalized OJT Detailed Job Analysis	Partially Implemented
Continuing Training	Not Implemented
Improved Supervisor Training	Not Implemented
Improved Training Manuals	Partially Implemented

Pay for Performance

Partially Implemented
(On a not-to-affect-job-
security basis)

Improved Training Facilities

Scheduled for 1995

Training Records and Documentation: WHC's system for collecting and maintaining training records does not allow the records to be audited. This is not in compliance with DOE Order 5480.20, Chapter 1, Section 16.a which states, "Qualification and certification of personnel shall be documented in an easily auditable format." Records that are less than three months old are kept at the central training facility which is located off site. After three months the records are moved to storage at the Federal Building in Richland. After one year, the records are shipped to long term storage in Seattle, Washington. This is required to meet Quality Assurance records fire-safe storage requirements of ANSI/ASME NQA-1-1989. Only records less than one year old were available for review. A complete verification of an operator's qualification process could not be produced with the limited records available.

Discussion with the WHC manager in charge of the Training and Education organization revealed that records are not stored in a manner that allows easy auditing. The records are not kept cataloged by operator, but are apparently kept in the order they are received.

Observed Training: To gain first-hand knowledge of the adequacy of training provided on a site-wide level by Technical Training, one member of the DNFSB review team observed two training sessions and another reviewed the Hanford Site General Employee Training. Although the content of the training sessions appeared adequate, some programmatic deficiencies existed.

A refresher course on "Lock and Tag" procedures was observed. The following comments apply:

- The instructor was organized and well-informed in his subject matter but unwilling to respond positively or with further explanation when a student characterized an aspect of the Lock and Tag program as "just another crazy rule." The instructor missed an opportunity to explain the safety basis of the rule as well as an opportunity to challenge the existing culture demonstrated by the student.
- During a conversation between the instructor and a student, it became known that no lock and tag log was kept in his work area. The instructor's response was, "Maybe you should casually mention to someone that you should have one." Another student questioned the use of the word,

"casually" and asked why it was used. The instructor stated he did not want to get anyone in trouble. It is discouraging that the instructor did not take advantage of the identification of this problem to see that it was aggressively corrected.

A basic mathematics course on exponents and scientific notation was observed. The following comments apply:

- The instructor was very competent and knew his subject matter very well. He was patient and very adept at spotting specific problems that individual trainees were having. He invariably fell back to reexplain the basic concepts and used a training aid (lineal scale, calculator) to explain and reinforce the concepts.
- The difficulty of the instructor's task was exacerbated by the diversity of the class. The wide range of mathematics education and experience level made it difficult for the instructor to control the class while he repeated the basic concepts.

A portion of the Hanford Site's General Employee Training (GET) was reviewed. The training is conducted on a computer using semi-interactive video and a touch screen monitor to respond to questions. The areas reviewed were ALARA, Fire Safety, Procedural Compliance, Basic Radiation Health, and Criticality Safety. Incorrect responses to questions prompted more in-depth training on the subject, followed by more extensive questioning. The training is self-paced and takes about four hours for new employees to complete. The training material and exam questions are updated yearly. The training was interesting, sophisticated and complete. The team member considered this a significant improvement over the GET at DOE's Savannah River Site.

3. Tank Farms:

a. Background:

The Hanford High Level Waste Tank Farms consist of 149 single- and 28 double-shell tanks containing approximately 61 million gallons and 224 million curies of radioactive waste. The tank farms are classified as High Hazard facilities. Also managed as part of tank farm operations is the 242-A Evaporator which is designed to concentrate and volume reduce tank farm wastes by removal of excess water. The 242-A Evaporator is classified as a Moderate Hazard facility. Evaporator operation is one of eleven qualifications for tank farm operators although operators assigned to the evaporator work

there full-time. Subsequent references to Tank Farm operators include the 242-A Evaporator operators unless specifically identified otherwise.

The Tank Farm training review included a briefing from the Westinghouse Hanford Company (WHC) Tank Farm Training Manager, a review of applicable training records and technical interviews of eight operators and three supervisors. A WHC representative was present for most of the interviews. Representatives from DOE-Richland (DOE-RL) were invited but did not attend the Tank Farm training review or the majority of the interviews.

b. Summary:

The existing Tank Farm operator training program consists of little more than the passing of "tribal knowledge," both good and bad, from senior operators to junior operators. Interviews of the operators and supervisors found that they were not well versed in tank farm safety issues and could not be depended upon to recognize a potentially hazardous situation (e.g. failure to add water for evaporative cooling). WHC has recognized these shortcomings, but implementation of improvements has been seriously delayed (WHC identified the deficient conditions and developed a 14-point training improvement as early as 1988). The following major comments are drawn from the review:

- In developing an integrated training improvement program, the implementation of DOE Order 5480.20 training requirements and "Pay for Performance" have been linked together. Negotiations with the Labor Bargaining Unit to implement "Pay for Performance" therefore have the potential to influence training requirements which are required to safely operate the Tank Farms.
- DOE-RL has not reviewed or enforced the requirements of DOE Orders 5480.18A and 5480.20 at the Tank Farms. The DOE-RL Branch Chief responsible for the Tank Farms indicated that reviewing training was not one of his highest priorities.
- Operators and Supervisors interviewed were generally deficient in their knowledge of radiological fundamentals and safety issues associated with the Tank Farms.

c. Discussion:

Training Organization: Both the tank farms and the 242-A Evaporator are supported by a dedicated Tank Farms Training group. This group has direct line responsibility for the Tank Farm Operations Training group and provides

technical direction and priorities to the Tank Farms Technical Training group, which is matrixed support from the centralized WHC Training and Education organization. In essence, the Tank Farm Operations Training group implements the existing training program while the Tank Farms Technical Training group develops new and improved training materials and programs.

DOE-RL Interface: In accordance with DOE Order 5480.18A, WHC submitted the TPAP for the Tank Farms for DOE approval in September 1991. DOE-Headquarters (EM-30) has not yet acted on the submittal. DOE Order 5480.18A does not prescribe required or suggested time limits for TPAP approval and implementation. Accreditation is not considered a prerequisite to the conduct of any Tank Farm activity, although WHC anticipates having the Tank Farm training program accredited by 1994.

In accordance with DOE Order 5480.20, WHC submitted the TIM for the Tank Farms for DOE approval in November 1991. DOE-RL has not yet acted on that submittal. DOE Order 5480.20 does not prescribe required or suggested time limits for TIM approval and implementation. Compliance with 5480.20 requirements is not required until DOE approves the Tank Farm TIM, although WHC indicated that they are proceeding on the basis that the TIM will be approved as submitted.

In discussion with the DOE-RL Branch Chief responsible for the Tank Farm Facility Representatives, it was obvious that neither he nor his people were familiar with the requirements of DOE 5480.18 and 5480.20 for either the DOE Field Office or the contractor. In addition, he indicated that reviewing operator training was not a top priority of his. Without an understanding of the Orders or an interest in training, the DOE-RL Tank Farm Facility Representatives are not equipped to enforce these requirements on the contractor.

In summary, DOE-RL oversight of the Tank Farms training program is essentially non-existent. DOE has effectively vitiated the requirements of both DOE Order 5480.18A and 5480.20 by not acting on the WHC proposed Tank Farm TPAP and TIM, respectively.

Training Program Status: Tank Farm and 242-A Evaporator operators at Hanford are classified as Nuclear Process Operators (NPOs) and follow the initial training requirements outlined in the Site-Wide Training section above. Existing practice for new Hanford operators is they are initially assigned to a radiochemical processing plant and through seniority "move up" to the tank farms where the duty is considered less demanding.

Upon arriving at the Tank Farms, an operator is required only to obtain two tank farm qualifications (of the eleven possible) to assure his continued employment although most operators obtain additional qualifications. Qualification is obtained via a written, multiple-choice exam (characterized as "non-challenging" by WHC Tank Farm training personnel) and an on-the-job evaluation by any other operator already holding that qualification. Qualifications are good for up to two years after which the exams must be repeated. (WHC refers to these qualification as "certifications" although they do not meet the requirements of "certification" as defined in DOE Order 5480.20.)

The existing Tank Farm operator training program consists of little more than the passing of "tribal knowledge," both good and bad, from senior operators to junior operators. The promotion pipeline is dependent solely upon time-in-grade, does not support pay-for-performance and provides no incentives for aggressive attainment of job-related qualifications.

Training Upgrades: WHC has made substantial efforts over the last four years to develop an improved NPO and Tank Farm operator training program. Development of the improved training materials for Tank Farm operator certifications are nearly complete (9 of 11 completed) however implementing these improvements has not yet occurred, with the exception of fundamentals training. Process fundamentals training of new and existing Tank Farm operators is underway and should be completed by September 1992. Retraining existing Tank Farm operators using the improved training materials will occur via a scheduled phase-in over the next 1.5 years.

As explained earlier, in developing an integrated training improvement program, the implementation of DOE Order 5480.20 training requirements and "Pay for Performance" have been linked together. Negotiations with the labor Bargaining Unit to implement "Pay for Performance" therefore have the potential to influence training requirements which are required to safely operate the Tank Farms. WHC does not project that agreement will be reached with the Bargaining Unit before the end of this summer.

Development of the new Tank Farm operator certification exam question banks is being conducted with the assistance of several "hand-picked" senior Tank Farm operators to assure the answers correctly reflect actual practice. In reviewing the "Routines" exam bank, the review team had the following observations:

- All questions are multiple-choice and are therefore not as rigorous a measure of operator knowledge as are essay questions.

- The questions, in general, did not focus on fundamental principles or conduct of operations but rather on either rote memorization or minor details; most of which should be available in the procedures.
- Questions did not appear to refer to any procedures.
- Some questions, which were pointed out to the WHC Training and Education Manager, supported the philosophy that procedures are not normally used for evolutions.

The DNFSB staff recognizes that some of the above findings stem from a situation in which most Tank Farm procedures are considered inadequate and configuration management has not been maintained. WHC is recognized to be working on these two fundamental underpinnings of procedural compliance. However, before the exam banks are used, a review of the questions by Tank Farm engineers and management would provide assurance that the new exams will achieve the desired results.

Training Records and Documentation: The only training record available for Tank Farm operators is a computerized list for each operator with a historical listing of the titles of the training he has received, when it was received, and a computer-generated requalification date. These records do not provide objective verification of an operator's qualification, nor are they adequate to assess an individual operator's knowledge level and weaknesses.

Operator Interviews: Nearly every operator and supervisor was not well versed in the collection of safety issues associated with the tank farms. Most could provide only a limited understanding of about two safety issues and very few of these could be quantified as to the risks to the operators. This information would appear necessary for operators and supervisors to understand the hazards they work with and the potential consequences of their actions. (Operator training on workplace hazards is also required by 29 CFR Part 1910, OSHA Hazardous Waste Operations and Emergency Response; Final Rule.) Several operators, as well as supervisors, expressed the sentiment that understanding hazards and consequences was their "management's job." Additional observations from the operator interviews include:

- Operators described various means by which they were informed about tank safety issues. These included monthly tank farm safety meetings (attendance is non-mandatory), required reading, and shift supervisor briefings. A disciplined and universal approach to required reading and briefing attendance for safety and operating issues was not evident for Tank Farms as a whole.

- Nearly every operator and supervisor was weak in his understanding of radiological fundamentals despite their attendance at periodic refresher training. Examples included personnel exposures expressed as "two percent" and "30 whole-bodies." The refresher training does not appear to be effective.
- When queried as to how they would pursue a question they had about safety, most operators and supervisors stated they would ask their next level of supervision although the general sentiment was that 1) they rarely had cause to do this, and 2) "management" was not responsive anyway when operators did ask questions.
- A supervisor explained that his crew of operators had been tasked with the recent addition of water to the "high-heat" tank 106-C. Despite his routine review of tank 106-C temperature and level logs, this supervisor demonstrated no understanding that failure to restore ventilation and add water since January 1992 had allowed tank temperatures to increase and thermally stress the tank.

4. **Plutonium Finishing Plant:**

a. Background:

The Plutonium Finishing Plant (PFP) is classified as a High Hazard Non-Reactor Nuclear Facility. The PFP last operated in 1988 and was historically used for the production of plutonium metal. As a byproduct of previous production campaigns, large quantities of process residues were generated and stored in the Plutonium Reclamation Facility (PRF) line. PFP is in a restart program in preparation for an upcoming PRF and Remote Mechanical "C" (RMC) Line clean-out run to remediate these process residues and convert them to more stable plutonium oxide powder. Processing of the items is required to improve the safety posture of the facility, allow an accurate inventory of special nuclear material, and allow progress on remediation activities to reduce the radioactive material source term. Once the PRF converts the scrap to a concentrated plutonium nitrate solution, the RMC Line will convert the solution to plutonium oxide for storage at PFP. PRF processing will take approximately 40 weeks followed by a 40 week operation to convert the solution to plutonium oxide in the RMC Line. A "cold run" of PRF, planned for September, will allow PFP to use the PRF for OJT and operator certification before the actual run. PRF successfully completed a download of residual material in the PRF line into Product Receiver (PR) cans to allow room for the cold run.

The PFP training review included a briefing from the WHC PFP Restart Manager, a review of applicable training records and technical interviews of eight operators and four supervisors. A WHC and a DOE representative were present at each interview.

b. Summary:

Although there is obvious progress in the training program and qualification of operators at PFP, it is not clear the direction PFP is heading with their training program is in complete accord with the direction DOE wants the program to follow. Lack of guidance and monitoring by DOE-RL is interpreted as tacit approval by WHC for their plans. This was evidenced by the lack of pro-active involvement by DOE-RL in assessing the technical adequacy of the training program and further shown by WHC failure to fully implement the training requirements of DOE Order 5480.20, or to use the guidance provided by DOE in *Guide to Good Practices for Training and Qualification of Instructors, DOE-NE-STD-1001-91*; *Guide to Good Practices for Training and Qualification of Chemical Operators, DOE-NE-STD-1002-91*; or *Guide to Good Practices for On-the-Job Training, DOE-STD-1012-92 (Draft, to be issued)*, to develop their program. In addition, the following comments are provided as a result of the review:

- Formal training is not provided to OJT instructors or classroom instructors, and no instructor certification program exists.
- DOE-RL is not an integral part of the qualification of Supervisors and Fissionable Material Handlers as required by DOE Order 5480.20.
- Because training records are in long term storage in Seattle, Washington, records review is very difficult. Records are not being maintained "in an easily auditable format" as required by DOE Order 5480.20. Available records do not allow verification of an operator's qualification.
- On a positive note, operator interviews showed a sophisticated level of process knowledge and personal safety issue awareness with only minor deficiencies noted in knowledge of exposure limits, conduct of operations, and plutonium non-destructive analysis (NDA).

c. Discussion:

Training Organization: The PFP Training organization is divided into two groups. The OJT Evaluators are part of the line organization and report directly to the PFP Training Manager who reports to the Facilities and Operations Assurance Manager. All OJT Evaluators have previous campaign

experience and are senior operators. The second portion of the training group is the matrix support provided by WHC Technical Training. This group has seen a large influx of personnel to support the ramp-up in training for the prospective campaign.

There is no evidence that a formal training or certification program exists for instructors in the two groups as outlined in guidance provided by DOE in *Guide to Good Practices for Training and Qualification of Instructors*. Some instructors receive training on being an instructor, but no training on specific facility knowledge; others have facility knowledge (OJT instructors), but receive no specific instructor-related training. In addition, there is no documentation or record of instructor training and certification.

DOE-RL Interface: DOE-RL line management has limited involvement with the PFP training organization and plays no role in providing direction to the PFP training program. As described by the DOE-RL PFP representative, oversight of the training program, including operator interviews and procedure walkdowns, are left to the DOE-ORR team or audit groups outside the line organization.

DOE-RL is not involved in the qualification of supervisors and Fissionable Material Handlers. The only involvement to date is the DOE-RL PFP Representative attending the training in a student capacity, and two reviews conducted in 1991. Outside of a 1991 Conduct of Operations assessment that included training, DOE-RL has not periodically reviewed the certification and recertification of shift supervisors and fissionable materials handlers as required by DOE Order 5480.20.

There is no process in place that allows DOE-RL to participate as a co-evaluator in an oral examination to determine a candidate's suitability for certification. DOE-RL is invited by WHC to attend the oral board but is a non-voting member of the board.

Training Program Status: The facility has not yet defined the training requirements for each operator. This is a site-wide problem. Currently each facility is trying to develop a facility-specific matrix and the matrix will then be approved by the plant manager. Today it is an ad hoc process. For the upcoming campaign all operators and shift supervisors will be certified/recertified to the new standard prior to restart. PFP, as a first step, is building current training materials. The process is proceeding slowly. At this time approximately half the material is drafted, but only about 25% is formally approved.

A continuing training program for PFP has not been developed as required by DOE Order 5480.20. The need for this is not entirely understood or appreciated by PFP management.

Exceptions: WHC submitted a request for a long term (greater than one year) temporary exception from the requirements of DOE Order 5480.18A. The justification for the request is that the facility will be placed in a standby status following the upcoming clean-out campaign. Full accreditation could not be completed before standby status, when it will not be required to be in compliance. In addition, the cost for accreditation of the training program was quoted at approximately \$7 million. WHC representatives state in the request that, "Compliance with DOE Order 5480.20 insures that the PFP has a properly trained operating staff which will insure the PFP will be operated safely and efficiently." Additionally, although performance-based training is not required by DOE Order 5480.20, WHC has committed PFP to employ this training system. DOE-RL forwarded the request to DOE Headquarters on March 18, 1992; to date it has not been acted upon.

Training Records and Documentation: The degree of compliance with DOE Order 5480.20 is difficult to measure because the training, qualification, and certification records are not easy to audit. Some records are kept at the facility, but most are transferred after about three months to local storage (one year) and then long-term remote storage in Seattle, Washington. Records are stored in Seattle to meet the requirements of NQA-1 for protection of vital records. The following comments are provided from the review of the limited records available:

- There was little evidence that existing near-term records were reviewed by either contractor management or persons from DOE-RL. There was no evidence that longer term records (beyond about three months) were reviewed.
- There was no evidence that PFP is maintaining unofficial or "field" training records for all plant specific training as specified in Westinghouse Administrative Procedure WHC-CM-5-8.
- The completed PFP OC-Routines checklists for five operators were reviewed. The checklist includes 21 pages of task elements where the candidate is to discuss, perform or simulate. The evaluator chooses which method to use. On three of the five checklists reviewed, the evaluation of each task element was performed on the same day and the majority were completed by discussions. Few examples of actually performing the task were noted.

- PFP has a drill scenario file that covers several plausible emergency/abnormal conditions. The program is modeled after the FFTF drill program. The formal outline is effective if fully utilized. However, most are limited in scope and don't appear to provide an opportunity for the operating crew to demonstrate the ability to respond to normal, alarm, abnormal and emergency conditions. Simulation methodology requires improvement (techniques are not realistic and are unsophisticated).

Operator Interviews: The review team interviewed four supervisors and eight operators to discern their level of knowledge on safety related aspects of their jobs. A WHC and a DOE representative were present at each interview. Interviews revealed that most supervisors and operators were knowledgeable and showed genuine enthusiasm for their work. Significant strengths were shown in the areas of criticality safety and radiation hazards. Specific weaknesses were:

- Six operators and one supervisor were weak in their knowledge of personal exposure limits, methods to reduce exposure, and personal hazards of radiation. Operators did not know exposure limits to the extremities or the basis for the limits.
- Two operators and one supervisor demonstrated weakness in areas of the Conduct of Operations.
- One supervisor and one operator were below average in their knowledge of emergency shutdown actions.
- One supervisor did not know his personal requirements for qualification and recertification before facility restart.
- One supervisor could not explain his actions for abnormal conditions.
- One operator demonstrated poor knowledge of proper decontamination techniques.
- A lead nuclear process operator qualified in non-destructive analysis (NDA) was deficient in knowledge related to NDA:
 - The operator could not state the reasons for performing NDA beyond determining plutonium content.
 - The operator could not describe the advantages and disadvantages of each method of NDA.

- The operator could not list all the methods of NDA used at the facility.
- The operator could not describe the unique hazards associated with use of the Multi-Energy Gamma Assay System NDA method.

Observed Training: A DNFSB review team member observed a lecture covering modules of PFP Routines certification process/knowledge. The instructor had little direct and detailed knowledge of facility operations and his demeanor was nervous and apologetic. The instructor frequently read paragraphs verbatim from the study text, rather than teaching and challenging the student. The students could have easily completed the study guide sheets through a review of the text material provided. However, the instructor provided the answers for each question on the study guide sheets provided for student use with each module. This methodology removed incentive for the student to do individual work that would aid retention of important material.

5. Grout Waste Treatment Facility:

a. Background:

The Grout Waste Treatment Facility (or simply the Grout Facility) is defined as a Moderate Hazard facility designed to combine low-level liquid radioactive mixed waste with cement-based material to form a grout slurry. The grout slurry is pumped to underground concrete vaults, where it hardens. The vaults, designed to meet Washington State Department of Ecology (WDOE) and U.S. Environmental Protection Agency (EPA) hazardous waste disposal requirements, will provide the final resting place for the low-level radioactive mixed waste that is presently stored in the double-shell tanks in the 200 Areas.

An initial campaign at the Grout Facility was conducted from August 1988 to July 1989, filling one vault. Core samples have been drawn from this vault and are now being analyzed. Four new vaults are currently in the final phases of construction (numbers 102 through 105) for the next four campaigns, and the Grout Mixing Module is continuing with upgrades, including modification of the control room computers. Restart of the facility has been delayed, however, from the planned startup in October 1992 to October 1993. The deferment is driven by the Grout Facility's Performance Assessment, which failed peer review, and is currently being rewritten to include modeling out to 140,000 years (required to examine the immobilization of low-level waste through all radioactive decay product peaks).

The Grout Facility training review included a briefing from the WHC Grout Operations Manager, a review of applicable training records and technical interviews of five operators and one supervisor. A WHC and a DOE representative were present at each interview.

b. Summary:

There has been obvious progress in the quality of the Grout Facility training program and the rigor with which facility operators are qualified. Grout Facility requirements for new training modules will contain no "grandfather" clauses. All operators will receive upgraded training prior to facility operation. All Grout Facility operators have agreed to begin using the new training and certification modules as they become available, as opposed to predicating implementation on formal agreement by the operators' Bargaining Unit. However, failure to complete the upgraded training will not jeopardize the operators' position until formal agreement with the Bargaining Unit is reached.

It was readily apparent that the training program (both as it stands now, and as it is intended to exist in the future) is not in complete accord with the training requirements of DOE Order 5480.20, nor is the guidance provided by DOE in *Guide to Good Practices for Training and Qualification of Instructors*, and *Guide to Good Practices for On-the-Job Training* being applied. In particular:

- The training program for the Grout Facility is neither well-planned nor documented.
- The qualifications of training program instructors and OJT mentors are inadequate.
- Training, qualification, and certification program records are essentially unauditible, with the exception of those associated with the Tank Farm Operator Fundamentals Training (Core Training).
- New training materials are being developed and implemented as they become available, but the associated examination question banks lack any modicum of quality control.

Contributing to the deficiencies observed with regard to training, DOE-RL oversight of the Grout Facility training program is non-existent. Specifically:

- A DOE-RL support contractor (i.e., SWEC) is currently functioning as the DOE-RL Facility Representative; his first inspection of facility training

occurred in the week prior to the DNFSB staff site visit, after DOE-RL was apprised by the DNFSB staff of the tentative agenda.

- DOE-RL has assigned a Program Engineer to the Grout Facility. However, in the year since the Program Engineer has been assigned, DOE-RL management has provided neither appropriate training nor direction with regard to his responsibilities to the facility. As a result, his oversight of Grout Facility training activities has been inadequate; the last time he was physically in the facility itself was February 1992.

c. Discussion:

Training Organization: The Grout Facility has undergone significant changes in the past six months. Until approximately the first of this year, this facility was considered a part of the Tank Farms Organization; since that time, it has been an administratively separate organization. As a result, the Grout Facility organizations, including the Training Organization, are still in their infancy.

Training for Grout Facility operators falls into two categories: Fundamentals and Certification. Fundamentals training consists of Tank Farm Operator Fundamentals Training (Core Training), obtained through a working arrangement with the Tank Farms Training Group, and Conduct of Operations Training, obtained from an outside contractor on a site-wide basis. Certification Training consists of both classroom and OJT specific to the Grout Facility. The classroom instruction falls under the purview of a Grout Training Manager and three instructors (two of whom have just been added to this program), within the central WHC Training and Education Organization. The Grout Training Manager accepts input from the Grout Operations Manager with regard to course content and operator training requirements. The Grout Operations Manager also directs a Grout Training coordinator and two shift managers in the performance of OJT.

DOE-RL Interface: A DOE-RL support contractor is currently functioning as the DOE-RL Facility Representative, as the former DOE-RL Facility Representative has been promoted to Branch Chief. The first inspections of facility training by these two individuals occurred during the week prior to the DNFSB staff site visit, after DOE-RL was apprised by the DNFSB staff of the tentative agenda. Of note, a letter summary of one of the inspections states, "Unless the DNFSB explores areas other than you and I discussed, I feel that the Grout Training Program is where it should be at this time. The Provisional Certification Program, *when documented*, is an example of good training management." [emphasis added]

Additionally, DOE-RL has assigned a Program Engineer to the Grout Facility. (A Project Engineer is also in the process of being assigned.) However, in the year since the Program Engineer has been assigned, DOE-RL management has provided neither appropriate training nor direction with regard to his responsibilities to the facility. As a result, his oversight of Grout Facility training activities has been inadequate. The last time the Program Engineer was physically in the facility itself was February 1992.

It is further evident that DOE-RL review of the status of training through monitoring of reports submitted by the contractor is not effective: informal discussions with Grout Facility personnel revealed that no significant paperwork concerning Grout Facility training has passed through DOE-RL in 18 months.

Training Program Status: No formal, written training plan or training requirements document exists for the Grout Facility. In spite of this, training/certification packages are being developed. In fact, it was initially reported to the review team that completion of the training and certification of operators was to occur *prior to* completing facility physical upgrades and operating, abnormal condition, emergency, and drill procedures. This scenario would have precluded complete training of operators prior to facility restart. When questioned about this, the DOE-RL Branch Chief for the Grout Facility agreed the schedule would require adjustments.

Each training/certification package is based upon a formal Job Task Analysis, and it is possible, although not necessarily a straight-forward exercise, to trace the analyses through the training packages to specific OJT signature requirements. Upon review, the classroom and OJT documents for the Dry Materials Facility Certification Package appeared to be conscientiously constructed, but the completeness and effectiveness of the package could not be determined because the various procedures for the upgraded Grout Facility are not due to be completed until March 1993.

It was not apparent that any of the training/certification packages either being developed or already completed had been reviewed, commented upon, or approved by DOE-RL. Two of the packages, Grout Disposal Facility (Vault) and Phase III Supervisor, are not considered restart requirements by WHC; no comment on this disposition was offered by DOE-RL.

Grout Facility requirements for new training modules will contain no "grandfather" clauses. Facility management is requiring all operators participating in the restart to complete the new training/certification packages. Of note, all Grout Facility operators have agreed to begin using the new training and certification modules as they come available, as opposed to

predicating implementation on formal agreement by the Oil, Chemical, and Atomic Workers Bargaining Unit. However, failure to complete the upgraded training will not jeopardize the operators' position until formal agreement with the Bargaining Unit is reached. Classroom and OJT training/certification using the first available module, Dry Materials Facility (DMF), is currently in progress.

Three of five operator certification training packages are completely developed, with the remaining two packages in draft form, scheduled for completion by September 1992. A Phase III Supervisor certification package is being contemplated, although it has not passed out of the planning stage.

Two new classroom instructors have just been added to the staff. Previous instruction in the first training module (DMF) was conducted by an instructor with no operator experience; the instructor relied heavily upon participation by the students qualified under the 1989 campaign to conduct the class. To ensure instructors are trained to a higher standard, it is intended that all instructors be required to complete the operator certification packages with an examination grade of 80% or greater, although no documentation to that effect was available. Operators require a grade of 70% or greater.

OJT is conducted using documented knowledge and skill requirements, with completion verified by signature. This documentation for the DMF appeared to be conscientiously constructed, but the completeness and effectiveness could not be determined because procedure development is not complete, as previously discussed.

Authority to sign OJT documentation is not specified in writing. Facility policy, orally conveyed, grants such authority to any operator who (1) has completed the OJT instructor short course offered by the Tank Farms Training Group, and (2) held the certification in question *for the 1989 Grout campaign*. Note that operators holding this "old" certification were qualified on equipment that has since been upgraded and training materials that have since been completely rewritten. These personnel are therefore inadequately prepared to conduct OJT.

Final certification of an operator requires an OJT Evaluation (in lieu of an oral board, as allowed per DOE Order 5480.20). Authority to conduct the OJT Evaluation resides in the Grout Operations Manager, the Grout Training Coordinator, and two Grout Shift Managers (operator supervisory position). This authority is documented in an electronic mail (CC-MAIL) memo from the Grout Operations Manager to the Grout Training Organization.

Neither documented guidance nor informal policy exists concerning the conduct of OJT Evaluations, particularly: the criteria that constitute passing or failing; methods of handling incorrect responses; and the desired ratio of PERFORMED to SIMULATED skill requirements.

DOE Order 5480.18A does not apply to this facility. Submission of the TIM required per DOE Order 5480.20 is scheduled to occur in June 1992. This facility was originally considered a part of the Tank Farms Organization, and therefore fell within the sphere of the original Tank Farms TIM submitted before the November 1991 deadline. Upon administrative separation of the Grout Facility from Tank Farms, DOE Order 5480.20 was individually invoked, and a new TIM was required for submission within six months.

Training Upgrades: Tank Farms Administrative Procedures are no longer applicable to this facility, and administrative procedures specific to the Grout Facility are still being finalized. Procedures that will specify the review and modification requirements for training program materials, examination banks, and procedures were therefore not available for evaluation.

Training Records and Documentation: The degree of compliance with DOE Order 5480.20 is difficult to measure, as the training, qualification, and certification records are not "easy to audit," as required by the order. No records are kept at the facility, with the exception of a computer-generated listing of operators versus training/certification completion/expiration dates. Completed training could not be independently verified, as the associated records were greater than one year old and had been shipped to Seattle.

An exception to this scheme was the handling of the records from Core Training. Although the completed and graded tests for each Core Training module are forwarded as described above, a summary sheet consisting of operator names, individual and class average grades for each module, and dates of completion are maintained by the Tank Farms Training Group on site. As verified by the records, six of eleven Grout Treatment Facility operators have completed Core Training, with 100% completion scheduled for December 1992.

The quality of qualification examinations is questionable. For example, several examinations in emergency procedures and abnormal plant conditions were reviewed. These examinations consisted of multiple choice, true/false, and one- or two-word fill-in-the-blank questions randomly drawn from a question bank. Many errors were found to exist in both questions and answers; frequently resulting in questions being discarded from examinations *after the exams were administered*. An instructor indicated that if more than 10% of the questions

were discarded, the examination would be voided and readministered, but no documentation of this procedure was available.

A Required Reading/Lessons Learned book is maintained in the Grout Facility Control Room for operator use. Upon review, this book was found to be unorganized and out of date. There is no apparent mechanism to monitor operator reading of the material.

There was no evidence that existing records were reviewed by either contractor management or persons from DOE-RL.

Operator Interviews: The review team interviewed one supervisor and five operators to discern their level of knowledge on safety related aspects of their jobs. A WHC and a DOE representative were present at each interview. Interviews revealed that most personnel were familiar with facility equipment and operations, but clearly deficient regarding radiation hazards and exposure limits. This is of particular concern considering the Grout Facility has been upgraded from a Low to a Moderate Hazard facility based solely upon the source terms of the process liquid. Specific weaknesses included:

- The supervisor was not aware of any lessons learned at other facilities as they applied to the Grout Facility.
- All operators demonstrated only limited knowledge of personal exposure limits, methods to reduce exposure, and personal hazards of radiation.
- One operator demonstrated significant weakness in the area of Conduct of Operations.
- The supervisor demonstrated significant weakness regarding the facility Safety Analysis Report.
- Two operators demonstrated weakness regarding Grout Mixing Module shutdown requirements.

Observed Training: Members of the review team observed two OJT Evaluations at the DMF. The evaluations were conducted using the OJT signature documentation as a guide. Overall, both the evaluators and the candidates appeared knowledgeable regarding the DMF and associated operating procedures. Specific weaknesses noted include:

- Neither documented guidance nor informal policy exists concerning the methods of handling incorrect responses by the candidate. In all cases, errors were corrected on the spot by the evaluator. (The review team

discussed with Grout Facility management an alternative whereby incorrect responses require the student to research the question and be retested later.)

- Neither documented guidance nor informal policy exists concerning the desired ratio of PERFORMED to SIMULATED skill requirements. Most skill requirements were therefore simulated.
- One evaluator did not pursue several lines of questioning in depth during the OJT Evaluation. He later stated that, through personal observation, he knew the candidate already knew the answer.

6. **K-Basins:**

a. Background:

The K-Basins is located in the 100 Area at the Hanford Site. The facility consists of the K-East (KE) and K-West (KW) Basins, and is used for the storage of irradiated fuel. KE Basin contains fuel that is in direct contact with the water in the pool. The integrity of some fuel in this basin has been lost as a result of fuel element expansion. In contrast, the KW Basin houses fuel in sealed containers. Operations at the K-Basins presently include surveillance, maintenance and fuel monitoring. In addition, preparations for encapsulating the KE-Basin fuel are being made. The K-Basins is classified as a High Hazard facility, and the Fuel Encapsulation effort is classified as a Low Hazard operation.

The K-Basins training review included a briefing from the WHC N-Reactor Manager (who is also responsible for the K-Basins), a review of applicable training records and technical interviews of seven operators and three supervisors. A WHC and a DOE representative were present at each interview.

b. Summary:

The existing K-Basins training program lacks clear definition, documentation and formality as evidenced by the incompleteness of records provided for review, the informal methods of requalification and maintenance of proficiency, and the marginal retention of fundamental level of knowledge demonstrated in operator interviews. Upgrade efforts are planned and are directed towards meeting the requirements of DOE Order 5480.20. However, to-date, minimal, if any, progress has been made towards meeting these objectives.

The following major comments are drawn from the review:

- The K-Basins training program is a remnant of the N-Reactor Training Program which shut down five years ago. Current N-Reactor/K-Basins' training management consists of a single person, who manages the existing program, develops the training necessary for KE Fuel Encapsulation, and develops upgrades necessary to meet the requirements of DOE Order 5480.20. N-Reactor/K-Basins have not added any new operating personnel in the last five years.
- Implementation Plans (schedules) to fully comply with DOE Order 5480.20 are under development, and an action plan is due to be submitted on September 30, 1992. The planned date for full implementation of DOE Order 5480.20 was not available at the time of the briefing.
- Management of training between this 100 Area Facility and the central WHC Training and Education organization for the implementation of DOE Order 5480.20 is not as deliberate or as clearly defined as is the case in the 200 Area.
- Operators demonstrated familiarity with procedural formality but, due to the extended lack of training, could not explain the basis of procedural controls. As a result, requirements may be evolving into "good practice only."

c. Discussion:

Training Organization: K-Basins is managed under the N-Reactor organization. The N-Reactor organization does not have a specific training group and/or training manager, but has assigned the management of training to the N-Facilities Stabilization Relief Shift Manager.

- There is only one qualified Reactor Technical Instructor/Manager supporting the operating personnel for N-Reactor and K-Basins.
- The N-Reactor TIM submitted in accordance with DOE Order 5480.20 noted that due to the change in mission, N-Reactor is transitioning to a non-reactor nuclear facility, and a complete evaluation and redocumentation of the appropriate training program is required and will be accomplished by September 1992. This may result in changes to the existing organization.

Training Program Status: WHC described the current K-Basins training as continuing training necessary for facility surveillance and fuel monitoring. WHC further explained that since there have been no new operators since

1987, they have not trained on fundamentals since 1987. An extensive facility-specific training capability has been disbanded since the N-Reactor was shutdown in 1987, and because no new staff has been added in five-plus years, there is no existing fundamentals/entry level training.

- Facility personnel justified this very limited facility-specific training capability as being acceptable due to the continuing presence of experienced operators and essentially zero turnover of personnel.

Training consists of two categories (1) Site-Wide training, and (2) Facility Specific training. Site-Wide training, as explained earlier, includes topics such as: General Employee Training, Health Physics, Security, etc., and is obtained through WHC's Training and Education organization. Facility Specific training consists of items such as Emergency Response Procedures, Encapsulation Preparation, Criticality Safety, etc. and is accomplished either in-house at the 100 Area, or through the WHC Training and Education organization. In general, the more specific the training, the more likely it is to be an in-house training function (i.e., Encapsulation Training).

K-Basins currently have two types of operators. These are Nuclear Process Operators (NPO) and Operating Engineers (i.e., Power Operators). Past N-Reactor training served the requirements for K-Basins and provided qualification and certification for NPOs and Operating Engineers. The NPOs were trained in the fundamentals, fuel handling and basic plant systems; and the Operating Engineers were trained in the fundamentals, secondary systems, boiler and water treatment plant operation.

From the record reviews and interviews the following observations were made:

- Standards for a requalification program are not applied.
- Standards for maintenance of proficiency and level of knowledge are not applied.

DOE Order 5480.20 defines a Fissionable Material Handler as a person certified to manipulate or handle significant quantities of fissionable materials, or manipulate the controls of equipment used to produce, process, transfer, store, or package significant quantities of such material. The N-Reactor's TIM did not correlate the current or future qualification certification to this type of operator. The Encapsulation Training plans presented did not use this terminology or give evidence that compliance with DOE Order 5480.20 would be achieved.

Training Upgrades: WHC has been working to upgrade training in support of the KE-Basin Fuel Encapsulation effort, as well as long term efforts to meet DOE Order 5480.20 requirements.

- Training for the KE-Basin Fuel Encapsulation effort was described during the WHC briefing. Lesson plans are under development by WHC, and are expected to be complete by mid-July.
- The K-Basins' training upgrade to meet DOE Order 5480.20 was cited as being covered by the N-Reactor's TIM. The TIM was submitted by WHC letter Ser 9102311R1 dated November 8, 1991 in response to DOE Order 5480.20 implementation requirements. DOE-RL has not yet acted on that submittal.

The current validity and applicability of the N-Reactor TIM for the K-Basins is suspect. The following factors are relevant:

- Compliance - The N-Reactor TIM indicated compliance with the DOE Order 5480.20 requirement that training programs be reviewed by management and maintained current. This fact was not evident during the briefing. Specifically:
 - During discussion of the N/K Operations Training Matrix (not to be confused with a TIM), N/K Basin management did not know current operator qualification status. Management is planning to validate this after the N/K Operations Training Matrix is approved.
 - Because no new staff has been added in five-plus years, there is no existing fundamental/entry level training.
 - N-Reactor management admitted that they have not maintained training program documentation current with the changing mission, organization and resources.
 - The N-Reactor TIM stated that the Order requirement that training programs include classroom-type training and on-the-job training is met. However, the last fundamentals training reportedly was conducted was 1987.

In response to DNFSB Recommendation 90-2, a plan has been developed to assess WHC Compliance with DOE safety-related orders including DOE Order 5480.20, and this information will be available in July 1992. This activity will update the compliance assessment of the November 1991 TIM.

Mission and Organization Changes

- The N-Reactor TIM, paragraph II.6, cites the Technical Training Organization and outlines responsibilities and reporting, however the organization is not identified in Figures 1 or 1A. Linkage to other levels of WHC Training Organizations for the purpose of resources or reporting was not apparent. Facility specific administration procedures were not made available, nor was it evident that higher level WHC management procedures would include the 100 Area.

The new compliance assessment, the fact that the TIM (circa November 1991) has not been approved, the changing mission, and the potential impact to the previous compliance position of the original TIM highlight the dynamic and fluid nature of the training program developmental process. This situation makes it extremely difficult to determine the current status of the training, the changes that need to be made, and when they will be achieved. In view of the possibility that the K-Basins may be maintained for as long as 20 years to provide for the safe storage of irradiated fuel until disposition plans are implemented, and also considering that encapsulation of fuel and basin cleanup are significant future operations, the DNFSB review team is concerned the present TIM, which combines the K-Basins with N-Reactor, does not provide for the specialized facility-specific training required of K-Basins' operators.

Training Records and Documentation: Training records provided to the DNFSB Staff consisted of qualification records (Job Performance Measures) for the three levels of qualification (i.e., Nuclear Process Operator, Operating Engineer and Supervisor/Manager). For each level of qualification, three records were given. These records were identical for all qualification levels and consisted of the following: (1) Response to High Radiation Event, Oil Spill, or Hazardous Chemical or Radioactive Release, (2) Loss of Electrical Power, and (3) Chlorine Release. The qualification records consisted of one to two pages of signature checkoffs, followed by one to two page excerpts from the applicable emergency procedure. The scope of this information was inadequate, and would not satisfy DOE Order 5480.20 requirements, nor was there strong evidence that progress was being made to ultimately meet DOE Order 5480.20.

- The emergency response procedure for High Radiation, Oil Spill, or Hazardous Chemical or Radioactive Release only addresses the High Radiation event. The procedure includes steps with vague performance requirements (e.g., verify rate of level loss in basin visually), and asks the operator to make determinations beyond his expertise (if radiation release endangers public ...).

- Of the 51 qualification packages (153 individual records, over 2000 signatures), 39 packages were completed on September 1, 1991.
- Three qualification cards were not signed by the examiner.
- One qualification card was signed as acceptable by the examinee.

With regard to DOE Order 5480.20 documentation requirements, N-Reactor management admitted that they have not maintained training program documentation current with the changing mission, organization and resources. An N/K Operations Training Matrix (not to be confused with a TIM) identifying the mandatory requirements for each personnel category (i.e., management, supervisor, operator, etc.) is only now being assembled. It is in draft form and under review. This matrix reportedly satisfies the requirements of DOE Order 5480.20 for job task analyses of personnel work assignments.

- The Plant Manager was not familiar with the three Emergency Response Qualification records, discussed above, provided to the review team. These three qualifications were not included in the N/K Operations Training Matrix (draft).

Casualty scenario training, not currently planned, is intended for development.

There is no job specific training identified for NPO's and Operating Engineers.

Existing training administration procedures for the 100 Area were not provided for review.

The higher level WHC Training Administration Manual, WHC-CM-2-15 does not address facilities such as K-Basins (100 Area).

Training Accreditation: DOE Order 5480.18A identified the Hanford Site N-Reactor in the Non-Reactor High and Selected Moderate Hazard Level Nuclear Facility Category, and requires Heads of Field Organizations to designate applicability of accreditation. In addition, the Field Organization is required by the Order to submit an exemption for release from the requirements of the Order. WHC processed an exemption for N-Reactor because of its standby status. Because WHC considers K-Basins a part of N-Reactor, the exemption is considered applicable to the K-Basins. During the briefing, WHC said that they would need to reevaluate the need for accreditation for K-Basins. The review team notes that not requiring accreditation of the K-Basins with over 2000 metric tons of irradiated fuel would appear inconsistent with the requirement to accredit the Waste Encapsulation Storage Facility (WESF)

which contains only concentrated fission products. The N-Reactor exemption has been submitted to DOE Headquarters, but has not yet been acted upon.

Operator Interviews: Three Supervisors/Managers and seven Operators were interviewed. The purpose of the interviews was to (1) assess fundamental and facility specific level of knowledge and (2) gain an understanding of the training and qualification environment. The following observations were made:

- Fundamentals knowledge (i.e., nuclear criticality principles, basin water chemistry) retention was poor.
- The K-Basins required reading program does not include N- Reactor personnel who are called upon to stand Patrol at the K-Basins.
- The K-Basins does not have a formal program for Patrol requalification and proficiency.
- Not all personnel had a thorough understanding of K-Basins safety issues.
- Lockout/Tagout procedure authorization/approval can be made by a Lockout custodian. It was not clear whether an on-shift supervisor approval is also required in addition to a on-shift custodian.
- Radiological Hold Point (Circle HP) requirements of the WHC Radiological Protection Manual, WHC-CM-4-10, were not clearly understood by several interviewees. Some interviewees indicated that knowledge was acquired by experience or word of mouth, and not by their most recent annual Radiation Worker Training refresher course.

The following example demonstrates K-Basins personnel perceptions of existing and future training:

- Concerning DOE Order 5480.20 requirements for operator, fissionable material handler and supervisor proficiency, the TIM states that the requirements are not met, adding justification that current practices do not include this requirement due to the change in N-Reactor mission. The end result of this position was evident during the interview of a nuclear process operator who is qualified for assignment to K-Basins patrols but who has not performed this task for the past six months. The operator is not required to maintain proficiency or be requalified in patrol duties prior to his next patrol. The operator considered this satisfactory because the two-man rule is in effect, and he felt that the combined knowledge and proficiency of both individuals should be considered adequate to handle the requirements of the job.