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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 30, 1992

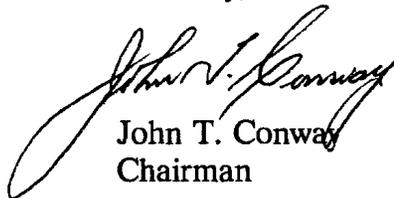
The Honorable James D. Watkins  
Secretary of Energy  
Washington, DC 20585

Dear Mr. Secretary:

Enclosed for your consideration and action, where appropriate, are a number of observations concerning operations, training, and qualification, and the Operational Readiness Review process at the Pantex site in Amarillo, Texas. These observations were developed by the Defense Nuclear Facilities Safety Board (DNFSB) staff, and our outside experts on a visit to Pantex on July 7-9, 1992.

If you need further information, please let me know.

Sincerely,



John T. Conway  
Chairman

Enclosure

Report of Trip Pantex Site, July 7-9, 1992

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

July 24, 1992

MEMORANDUM FOR: Board Members

FROM: Jay A. DeLoach



SUBJECT: Pantex Trip Report: July 7-9, 1992

1. **Purpose:** From July 7-9, representatives of the Defense Nuclear Facilities Safety Board (DNFSB) reviewed operations, training, and qualification, and the Operational Readiness Review process at Pantex Facility. The DOE Amarillo Area Office (DOE/AAO) is responsible this facility which is operated by the Mason & Hanger-Silas Mason Company, Inc. (M&H), with Battelle Pantex (BPX) as a major subcontractor for environmental, safety and health functions. This trip report describes the observations of the DNFSB representatives that included Jay A. DeLoach (DNFSB technical staff), and outside experts John F. Drain and Jack Hagerup.

2. **Summary:** During the visit, the DNFSB review team examined the areas of operator/supervisor training and certification, operator level of knowledge, conduct of operations, and Operational Readiness Reviews (ORR). DOE/AAO and M&H presentations were received, and records review, production work observations, and production technician interviews were conducted. Several general comments can be drawn from our review of the Pantex training program and operations:

- a. Personnel interviews indicate that general radiological fundamental knowledge is deficient in areas such as understanding sources of ionizing radiation and basic dosimetry operation. Operator understanding of the purpose of the Personnel Assurance Program (PAP) is generally weak.
- b. The Training Implementation Matrix (TIM) required to implement *DOE Order 5480.20* has been in draft form since November 1991. Albuquerque Field office (DOE/AL) and DOE/AAO have not devoted the necessary resources toward approving the TIM.
- c. Training and qualification requirements for operators, production technicians, maintenance personnel, explosive safety personnel, and supervisors have not been defined as required by *DOE Orders 5480.5, 5480.20, and 5610.11*.
- d. Supervisors are not trained to a higher standard than operators as required by *DOE Orders 5480.5 and 5480.20*. No additional technical training or examination is required for supervisor qualification. Supervisors are not required to be periodically recertified as required by *DOE Orders 5480.5 and 5480.20*.

- e. The DOE Operational Readiness Review/Evaluation (ORR/ORE) process at Pantex, as briefed to the Board's representatives, does not account for lessons learned from DOE ORRs conducted in response to the *Board's Recommendations 90-4, 91-3, and 91-4*. The DOE ORR/ORE process does not independently assess the readiness of a facility or process to operate in a safe manner while ensuring that public (including worker) health and safety are adequately protected. The DOE ORR/ORE process lacks any review of the DOE/AL or DOE/AAO functions.

### 3. Operator Training and Certification

- a. Summary. The training and certification program at Pantex is in transition from the requirements of *DOE Order 5480.5, "Safety of Nuclear Facilities"* to *DOE Order 5480.20, "Personnel Selection, Qualification, Training and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities."* In addition, the content of the training program is dictated in part by *Chapter II of DOE Order 5610.11, "Nuclear Explosive Safety."* On April 5, 1991, M&H was directed by DOE/AAO to implement *DOE Order 5480.20*. The effect of this change in requirement is to cause M&H to change the structure of operator training and qualification from predominantly on-the-job instruction to "performance-based training (PBT)" that combines elements of classroom training and practical hands-on training. Although moving toward PBT, M&H is not complying with several items common to both 5480 series orders, and implementation of *DOE Order 5480.20* is proceeding very slowly. For clarity and completeness, references to both orders will be made in this report.

- b. Discussion

- Training Program Development. A Training Implementation Matrix (TIM) is required to implement *DOE Order 5480.20*. *DOE Order 5480.20, paragraph 10a* states that this "...matrix shall be submitted to the cognizant field organization by November 8, 1991." The draft TIM submitted by M&H on November 7, 1991 has not been approved by DOE/AL. DOE/AAO forwarded the draft TIM to DOE/AL on November 12, 1991. DOE/AL returned the TIM with comments to DOE/AAO on March 5, 1992. These comments are still being resolved between M&H and DOE/AAO. An approved TIM should have been completed months ago (end of 1991). Most DOE/AL comments are alleged to be an effort to obtain consistency between facilities under DOE/AL cognizance. However, it was observed by the DNFSB representatives that a significant contributor to the delay in resolving field office comments is the failure of DOE/AAO and M&H to devote the necessary resources to expeditiously resolve the comments.

- Training Requirements. A significant deficiency in the existing M&H training/qualification/certification material is the difficulty one encounters when attempting to readily identify the body of training required for a given certified or qualified position. Although an extensive computerized historical database is available that can deliver information on training completed and, where required, due-dates for retraining/recertification, the database could not provide a generic list of (for example) all

training required for a new hire to become a production technician certified to conduct disassemblies and inspections on a typical warhead. It was possible with much effort to derive such a listing by reviewing the database records of courses taken by all production technicians currently holding that certification and manually identifying common training. This shortcoming of the system may be easy to solve with some computer programming, but it is a significant deficiency now since someone reviewing training/certification, such as a M&H or DOE ORR team, would logically start from a requirements list to review the status of staffing and training. The contractor confirmed during the ORR/ORE briefings that this same difficulty has been experienced in early ORR/ORE efforts. A requirements listing would be invaluable to line management in planning training pipeline duration.

*DOE Order 5480.20, paragraph 5a* requires "...written procedures which clearly define qualification requirements for personnel in each functional level..." Additionally, *DOE Order 5480.5, paragraph 10.a.(1)* requires "The elements of the training program to be documented," and *paragraph 10.a.(9)* states "The program shall be auditable by contractor management and by DOE." The DNFSB representatives found the documentation reviewed to be, at best, only marginally in compliance with these Orders.

The problem of defining operator training and certification requirements is compounded by the lack of an approved TIM and the resulting delay in starting Job Task Analyses (JTAs) for certified and qualified operator positions. The draft TIM defines in Appendix I (See Attachment 1) those operator positions by job title at Pantex that M&H considers to be "certified" or "qualified". The terms "certified" and "qualified" are defined in *DOE Order 5480.20, Chapter 1, paragraphs 5 and 6*. The JTA process will identify the training/qualification/certification requirements for each position. In the commercial nuclear industry JTA preparation required about one-half of the 3-year process leading to an accredited training program. M&H has estimated 3 years will be required to complete all critical position JTAs, however, much work (determination of training needs, development of training materials, etc.) has been done and the formal JTA process may become a "reverse engineering" effort based on materials in use, after appropriate validation. If the task is as large as M&H estimates, a priority list could be prepared for JTA development. Of the positions listed in the TIM as "certified" or "qualified", less than half appear to be in jobs that could be given priority in developing JTAs. The importance of the project may dictate application of more resources as well.

Since the JTA development is planned for the next several years, some initial efforts are being made to develop interim training requirements. The Maintenance Department has drafted an interim set of training requirements for their personnel. The Manufacturing Division has begun a similar effort to define its requirements but no definitive schedule or plan has been developed. No comparable effort has begun for the Explosives Technology Division or the Steam Plant Division. DOE/AAO personnel were unable to describe other efforts (such as for Battelle Pantex personnel) that were planned or ongoing to define the training and certification requirements.

- Operator Certification Process. During the Board staff's visit to Pantex in March 1992 an anomaly was identified in the production technician certification process. This anomaly, which still exists, concerns the final signature on the production technician's qualification record that attests to the production supervisor's satisfactory "performance evaluation" of the operator after he/she has worked in a cell/bay area under the supervisor's observation for an unspecified period of time. Although the production technician completes all defined training and is certified for specific categories of operation by the Training Department, and therefore has met all prerequisites to work on a nuclear weapon, a supervisor's "performance validation" signature is considered to be a necessary step in completion of that training record. Based on interviews with five production technicians (operators) and two supervisors, it is quite clear that the present practice regarding final operator certification is as follows:

The Training Department provides to the Manufacturing Division a qualified and certified operator who is fully trained to perform all operations within his/her certification category operation code. (See Attachment 2 for a listing of these category codes) In practice, the new person will be teamed with an experienced operator during this observation period.

Full certification is a determination made by the operator's supervisor after the supervisor has observed the operator work at all positions (certification categories) on which qualified (ie, certified by the Training Department) and has demonstrated adequate proficiency.

When the supervisor is satisfied, he signs off the "performance validation" block of the training record.

That this is a final, formal and integral part of certification is substantiated by the fact that the operator is not eligible for "certification package benefits" (pay differential and eligibility for overtime work) until this final certification occurs, regardless of prior experience on other weapon systems.

The practice of observing a newly qualified and certified (by the Training Department) operator before allowing him/her to work independently is realistic, appropriate, and consistent with industry and military service practices. Furthermore the practice appears to be consistent with the provisions of *DOE Order 5480.20, paragraph 7.c. and 8*, as well as *DOE Order 5480.5 paragraph 10.a.(6)*. However, this practice is not documented as a formal part of the certification process, and there was no policy for a minimum or maximum period of observation by a supervisor in order to achieve "performance validation." The actual practice has not been codified.

An argument could be made that *DOE Order 5610.11* requires training and certification to be performed on non-nuclear or training shapes. *Chapter II, paragraph 1* states, "General. This Chapter establishes the requirements of a program for initial training and qualifying DOE

and DOE contractor employees for assignment to nuclear explosive duties...The technical and operational training requirements established by this Chapter will be satisfied by a program of classroom instruction, observation, oral or written examinations, and/or hands-on training on nonnuclear configurations." However, DOE Order 5480.20 describes the certification process that appears to fit the Pantex practice. Chapter I, paragraph 6 states,

6. CERTIFICATION PROCESS REQUIREMENTS. Certification is the process by which contractor facility management endorses and documents, in writing, the satisfactory achievement of qualification of a person for a position...

b. Certification may be granted only after assuring that all qualification requirements (including written and oral examinations and operational evaluations) and other specified requirements (e.g., medical examination have been satisfactorily completed, and management has assured that the person is capable of safely performing all functions of the position. Satisfactory completion of qualifications which result in certification shall be verified by a person or group other than the person or group that provided the training or the candidate's immediate supervisor.

An equally strong argument can be made in the context of DOE Order 5480.20, Chapter I.6.b., that it is inappropriate for the Training Department to certify a production technician.

#### 4. Supervisor Training, Certification and Recertification

a. Summary. Production Supervisors at Pantex are not trained to a higher technical standard than production technicians (operators) as required by DOE Orders 5480.20 and 5480.5. Once certified as supervisors, no biennial recertification is accomplished.

b. Discussion. The additional training provided to production supervisors consists of course work in management skills. They receive the same technical material as production technicians and, in fact, the basis for supervisor certification may be the training received to achieve operator certification. This is not in compliance with DOE Order 5480.20, Chapter IV.5.c, which states "...training shall be of increased depth to reflect the added responsibility of the supervisor position", and DOE Order 5480.5, paragraph 10.a.(10) which states "...supervisor training shall require an understanding in greater depth than...operator training".

The training database, previously discussed, maintained on production technicians serves as a tickler to advise management of necessary operator retraining/recertification. Each operation category for each weapon carries a minimum level of performance (hours of production work) within a specified time period to retain certification. A weekly status is sent to supervisors advising them of workers' certifications that may soon lapse if performance hours are not accrued, and/or if the periodic retraining/recertification date is

approaching. There is no such time limit for a supervisor's certification, and therefore a supervisor has indefinite certification on all operational categories of all weapons systems once qualified and certified. DOE Order 5480.20, paragraphs 9 and 10 outline the requirements for operator and supervisor periodic recertification:

9. OPERATOR AND SUPERVISOR REEXAMINATION REQUIREMENTS. *Reexaminations for certified and qualified operators and supervisors shall include subjects in which the person is expected to be proficient and emphasize those subjects covered by the continuing training program. The contractor shall administer biennial written and oral examinations and operational evaluations, or administer periodic examinations throughout the cycle that cover all continuing training program subjects/elements. Operational evaluations and oral examinations may be combined for Category B reactor and non-reactor nuclear facility personnel.*
10. REQUALIFICATION REQUIREMENTS. *Employees shall not be allowed to function as qualified/certified operators and supervisors if they have not completed all of the requalification program elements within two years. If an operator or supervisor fails a requalification examination, or shows serious job performance deficiencies which indicate that he or she may perform in an unsafe manner, the person shall be removed from activities requiring qualification...*
  - b. *When a certified operator or supervisor has been absent from certification duties for greater than 3 months, but less than 12 months, selected retraining (including written and oral examinations and operational evaluations) shall be given as deemed necessary prior to reassignment to certification duties. The certification base date remains the same as it was before the absence. However, if the absence is greater than 12 months, comprehensive written and oral examinations and operational evaluations (as required of initial candidates) shall be given to determine weak areas. Retraining and reexamination shall be required in areas of weakness, and upon successful completion, a new certification date may be established.*

DOE Order 5480.5, paragraph 10.a.(7), provides similar, but less detailed requirements:

- 10.a.(7) *Retraining and reexamination shall be required at least annually on all procedures for handling abnormal nuclear facility conditions and emergency situations relative to the employee's assigned responsibilities, and at least every 2 years on all other subjects in which the fissionable materials handler, operator, or supervisor is expected to be proficient.*

Repeated inquiries were made at various levels within the Training Department and the Manufacturing Division, and ultimately during interviews, to confirm that supervisors are not required to recertify on technical aspects of assembly/disassembly operations once certified (whether the certification occurred as an operator or as a supervisor). This fact was further confirmed by obtaining a computer printout of the most recent qualification/certification training for all M&H production supervisors on all weapon systems expected to be worked at Pantex in 1992. A supervisor is considered certified on all weapons programs listed (Attachment 3 is a typical page of the computer listing). The column labeled "Taken" shows the M&H production-day date that training was completed. There are 252 production days in calendar year 1992; the number 5543 equates to 1 January 1992, 5679 equates to 15 July, etc. Using a nominal 250 production days per year, any production date listed in a training record that is lower than 5170 reflects training completed more than 2 years ago. A number lower than 4420 indicates training completed more than 5 years ago, lower than 3170 equates to training complete more than 10 years ago.

The column labeled "Comments" contains letters which signify the category of operation and the method of establishing the "training/certification completed." A "G" to the far right indicates "grandfathering"<sup>1</sup> of training completed, a "T" indicates training done in the Training Department, and "L" signifies local or on-the-job training.

The printout contained the training records for 34 production supervisors of the 38 that are listed on the organization chart for the Manufacturing Division. Each supervisor is certified to work on as few as one warhead type to as many as eleven warhead types. The printout indicates a total of 193 warhead supervisory certifications. Of that total, only 73 certifications have occurred within the last two years, with only about 40% of those occurring through the Training Department process. There are apparently no other records of recertification training, either formal or informal. No one with whom this topic was discussed, either DOE or contractor, offered information to dispute a conclusion that supervisor recertification is not being accomplished in a manner that complies with the requirements of the DOE Orders quoted above. This practice is also not consistent with requirements set forth in *DOE Order 5610.11, Chapter II.2.b*, which states:

*"Individual records will be maintained for each employee trained and qualified for nuclear explosive duty. The record shall include initial qualifications, training received, results of examinations, and evidence of periodic retraining to maintain qualifications."*

##### 5. Level of Knowledge Interviews

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<sup>1</sup> "Grandfathering" typically refers to a certification obtained under an earlier training program which is continued in effect in a current program.

a. Summary. DNFSB representatives interviewed five production technicians and two supervisors from the Manufacturing Division. Significant weaknesses were noted in radiation protection fundamentals and the Personnel Assurance Program.

b. Discussion. Interviewees were questioned on topics such as personal radiation protection, conduct of operations philosophy, qualification/certification and recertification practices, and the Personnel Assurance Program (PAP). The following observations provide examples of deficiencies noted:

- Only one of seven interviewees could describe the principles of operation of a thermoluminescent dosimeter (TLD).
- Five of the seven could not describe the type(s) or level(s) of ionizing radiation to which they may be exposed in their work areas.
- Five of the seven interviewed could not correctly state the ALARA program's annual whole body dose limit of 1 Rem/yr.
- Four production technician had little understanding of the purpose of PAP.

One of the Board's representatives monitored part of the General Employee Training (GET) that was in progress. Based on the student notes handed out in the GET lecture on radiation worker topics, TLD operation may not be adequately explained. The other deficiencies noted in radiation worker training (RWT) for production technicians may have been covered infrequently or in insufficient depth for operator retention. M&H has recognized this training deficiency and developed a new two-day RWT course. Of the seven workers interviewed, only one had completed the two-day course, and the benefit of the expanded training was evident in the responses. This knowledge area will be sampled again during future visits.

## 6. Conduct of Operations

a. Summary. Site-wide, the Conduct of Operations program is immature, although some operating elements have applied the fundamental principles in division level programs for nearly a year.

b. Discussion. M&H is continuing to implement *DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities,"* using both classroom lectures and field work. The audience for this training includes all levels of operations: operators, support personnel, supervisors and management. Briefings were provided by the Manufacturing, Explosives Technology, and Facility Operations (Steam Plant) Divisions on the Conduct of Operations implementation status. As might be expected with a new program of this scope, progress toward implementation varies. The Manufacturing Division shows progress in many areas and is projecting completion by December 1992. The Explosives Technology Division is

farthest behind of the three divisions with major portions of Conduct of Operations to be implemented, such as Communications, Equipment Labeling, Control of On-shift Training, and Independent Verification. The Maintenance Division presented a Formality of Operations approach that integrated elements from the Conduct of Operations and Conduct of Maintenance. These three divisions account for roughly half of the employees at Pantex. Neither M&H nor DOE/AAO was able to provide the status of implementing Conduct of Operations throughout the rest of Pantex. No action has been taken to determine what parts of *DOE Order 5480.19* should be made applicable to that half of the Pantex complex.

## 7. Operational Readiness Review (ORR) Process

a. Summary. Briefings were provided by DOE and by M&H's subcontractor, Battelle Pantex. The guidance being used by both parties in structuring their operational readiness review programs is *DOE/AL Supplemental Directive AL 54XA (Draft), "Operational Readiness Review Program."* A copy of this directive dated November 27, 1991 was received by the Board in mid-July and has been reviewed by the Board's representatives since their return from Pantex. The ORR programs briefed at Pantex do not incorporate relevant elements of the *Board's Recommendations 90-4, 91-3 and 91-4* or the DOE implementation plans prepared in response to these recommendations.

b. Discussion. The M&H program is a two step process, an Operational Readiness (OR) assessment and an Operational Readiness Review (ORR). It appeared from the briefing that the OR would generate a deficiency list which would become a management tool to determine progress toward readiness for the ORR. Consistent with the *DOE/AL Supplemental Directive*, the focus of the assessment would be in three areas: procedures, staffing and training, and facility and hardware. M&H is still developing the scope of the assessment, the composition of the team participants, and the training or guidance to be provided.

The ORR, which would apparently be conducted at a time that would assure reporting all pre-startup corrective actions completed, appeared to be a revalidation of the assessment performed during the OR and assurance that all action items were properly closed out. As suggested in the *DOE/AL Supplemental Directive*, Battelle Pantex has chosen to use the Management Oversight and Risk Tree (MORT) as the methodology for developing the checklists to be used in the ORR and/or as an aid in determining the details to be considered in the review. At this point, Battelle Pantex is still developing the specifics on team composition and most of the specifics of the execution of the actual ORR.

The corresponding DOE process, which DOE/AL refers to as an Operational Readiness Evaluation (ORE), was defined (by the DOE briefer) as a validation of the contractor's ORR. The *DOE/AL Supplemental Directive* provides a broader, although vague, definition:

*"Operational Readiness Evaluation (ORE). The DOE restart/start-up evaluation of activities undertaken by the contractor or line management, including the ORR, to ensure safety of facility operations after restart/start-up."*

Inclusion of the words "*or line management*" could be interpreted to mean a review of the field or area office functions related to the subject of the ORR, however, there was no evidence of any such review in the briefing or subsequent discussions.

There was no suggestion that the ORE was an independent assessment using "criteria and review approaches" (CRAs) of the type developed for other DOE/DP facilities' ORRs. There is no indication in either briefing or the *DOE/AL Supplemental Directive* that operator knowledge will be evaluated through oral examination.

The proposed composition of a typical ORE team lacked objective independence. *One of the key participants of the ORE team was identified as the DOE Facility Representative responsible for the facility being evaluated.* This is consistent with the provisions of the *DOE/AL Directive*. Review of the responsible DOE Facility Representative was not within the scope of the DOE ORE since he was already part of the ORE team. Team member composition included "appropriate technical disciplines" but did not require personnel to be knowledgeable and technically competent in the facility and processes to be reviewed.

Neither the DOE program nor the M&H program reflected review, and incorporation where appropriate, of the key elements of the Board's several Recommendations related to ORRs (*Recommendations 90-4, 91-3, and 91-4*) or the DOE implementation plans that have resulted from these Recommendations. Of the two programs, the contractor's program appears closer to the objectives set out in the Board's recommendations and DOE implementing actions.

The shortcomings in the DOE/AL guidance for conduct of an ORR, and consequently in the Battelle Pantex preparations to date, are dramatically illustrated by comparing the section of *Supplemental Directive AL54XA* on "Elements of an ORR/ORE Plan" to the "Implementation Plan for an Operational Readiness Review of the Safety of Plutonium Operations at the Rocky Flats Plant (Revision 1)" that was forwarded by the Secretary of Energy to the Board in response to the *Board's Recommendation 90-4*. Obviously, the greater scope of the Rocky Flats ORR required more detail, however, the *DOE/AL Supplemental Directive* fails to describe the essential elements such as providing safety objectives. Although acceptance criteria are mentioned in conjunction with a discussion of review checklists in the *DOE/AL Directive*, no examples or references to proven techniques are included.

On the basis of this isolated example of the steep learning curve associated with the ORR process development at Pantex, it does not appear that DOE has made the "case file" for the Rocky Flats ORR Implementation Plan required reading for all field activities and M&O contractors.

## APPENDIX I

## A. CERTIFIED POSITIONS

The following positions in the operating organizations are certified at the Pantex Plant. Not all persons with the following job titles work in Non-Reactor Nuclear Facilities. Only those persons assigned duties in these facilities will require certification.

1. Assembly/Fabrication Supervisor
2. Conductor, Railroad
3. Engineer, Railroad
4. General Clerk
5. Material Handler
6. Physical Distribution Superintendent
7. Production Planning Supervisor
8. Production Stores Warehouse Supervisor
9. Production Technician
10. Senior Clerk
11. Transportation Supervisor

## B. QUALIFIED POSITIONS

Personnel with the following job titles in the operating organizations must be qualified in accordance with the appropriate training program prior to performing any work in a Non-Reactor Nuclear Facility at the Pantex Plant. Not all persons with these job titles work in non-reactor nuclear facilities. Only those persons assigned duties on a regular basis in the facilities will require qualification. Other personnel with the approval of the Non-Reactor Nuclear Facility manager and under continuous escort may perform work in the facility. Some job titles will appear in more than one category. This is caused by more than one division having authorized positions that have the same job title requiring similar qualifications but different job functions. Qualification is by individual needs rather than job title.

## TECHNICIANS AND MAINTENANCE PERSONNEL

1. Area Mechanic
- ~~2.~~ Boilermaker
- ~~3.~~ Carpenter
4. Electrician
5. Electronic Technician
6. Instrument Mechanic
7. Laboratory Technician
8. Machine Tool Maintenance Mechanic
9. Metrology Technician
- ~~10.~~ Painter
- ~~11.~~ Pipefitters
- ~~12.~~ Plastics Mechanic
13. Radiation Protection Monitor
14. Radiation Protection Technician I

APPENDIX I (Cont'd)

TECHNICIANS AND MAINTENANCE PERSONNEL (Cont'd)

15. Radiation Protection Technician II
16. Refrigeration Mechanic
17. Sheetmetal Worker
18. Special Mechanic
19. Utilities Operator

TECHNICAL SUPPORT PERSONNEL

1. Area Safety Engineer
2. Project Associate
3. Project Engineer
4. Project Engineer/Scientist
5. Project Scientist
6. Project Specialist
7. Project Training Specialist
8. Quality Engineering Specialist
9. Safety Engineer
10. Sectional Training Specialist
11. Senior Area Safety Engineer
12. Senior Engineer
13. Senior Training Specialist
14. Training Specialist
15. Training Supervisor

MANAGERS

1. Department Engineer
2. Department Scientist
3. Maintenance Supervisor
4. Property & Services Manager
5. Safety Director
6. Senior Project Engineer
7. Senior Project Leader
8. Training Manager

SUPERVISORS

1. Crafts Supervisor
2. Crafts Supervisor II
3. General Crafts Supervisor II
4. Inspection Supervisor
5. Preventative Maintenance Specialist
6. Production Planning Supervisor
7. Program Coordinator
8. Project Assistant
9. Project Associate
10. Project Engineer
11. Project Leader
12. Project Scientist
13. Project Specialist
14. Quality Analyst

10  
15  
8  
23  
65

SUPERVISORS (cont'd)

15. Safety Engineer
16. Sectional Engineer
17. Sectional Scientist
18. Senior Engineer
19. Senior Scientist
20. Senior Health Physics/Industrial Hygienist
21. Senior Project Engineer
22. Senior Project Scientist
23. Senior Safety Engineer

CERTIFICATION CATEGORY OPERATION CODES

001	HEP	HE
002	MEC	MECHANICAL
003	MQR	MECHANICAL QUANTITY RETIREMENT
004	R&I	RECEIVING & INSPECTION
005	LMT	LIMITED PROCESS
006	NO	NO CERTIFICATION REQUIRED
007	PAL	PAL CAP
008	D&I	DISASSEMBLY & INSPECTION
009	UUP	UU PACKAGE
010	P&B	MANIFOLD PURGE & BACKFILL
011	MPR	MASS PROPERTIES
012	TM	TELEMETRY TESTING
013	NLA	NELA
014	TB	TESTBED
015	FIN	FINAL ACCEPTANCE
016	VAC	VACUUM CHAMBER
017	PNT	PAINT BAY <i>common to all wgnos.</i>
018	SRO	SRO COMPONENT
019	SNM	SNM COMPONENT
020	ORR	SQUASH REMOVAL
021	NVO	NVO LL WASTE COMPACTOR
022	HQR	HE QUANTITY RETIREMENT
023	ORP	OR PACKAGING
024	ORL	OR LEAD REMOVAL
025	CAP	79 CAPPING

BADGE	SP	TYPE	COURSE	DESC	DUE	TAKEN	COMMENT
	SP	RMS	00055.62	62 SP WEAPON CER	3708	3708	HM T
	SP	RMS	00055.62	62 SP WEAPON CER	4494	4494	H DT
	SP	RMS	00055.68	68 SP WEAPON CER	3708	3708	HM T
	SP	RMS	00055.70	70 SP WEAPON CER	3708	3708	H G
	SP	RMS	00055.76	76 SP WEAPON CER	3865	3865	HM T
	SP	RMS	00055.76	76 SP WEAPON CER	4439	4439	DT
	SP	RMS	00055.78	78 SP WEAPON CER	3708	3708	HM G
	SP	RMS	00055.78	78 SP WEAPON CER	4622	4622	DT
	SP	RMS	00055.80	80 SP WEAPON CER	4389	4389	HM DT
	SP	RMS	00055.83	83 SP WEAPON CER	3708	3708	H G
	SP	RMS	00055.83	83 SP WEAPON CER	5313	5313	DL
	SP	RMS	00055.87	87 SP WEAPON CER	4407	4407	DT
	SP	RMS	00055.88	88 SP WEAPON CER	4556	4556	DT