



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

13.2.2 TRAINING FOR NON-LICENSED PLANT STAFF

REVIEW RESPONSIBILITIES

Primary - Licensee Qualifications Branch (LQB)

Secondary - None

I. AREAS OF REVIEW

The applicant's training program for the non-licensed plant staff, as described in the Safety Analysis Report (SAR), is reviewed. This section of the SAR should contain the description and scheduling of the training and re-training programs for the non-licensed plant staff. The program descriptions should include the following:

For the Preliminary Safety Analysis Report (PSAR):

1. The applicant's commitment to meet the guidelines of ANSI/ANS 3.1 for non-licensed personnel.
2. The proposed subject matter of each course, the duration of the course (approximate number of weeks in full-time attendance), the organization teaching the course or supervising instruction, and the position titles for which the course is given.
3. Reactor operations experience training by nuclear power plant simulator that complies with Regulatory Guide 1.149 or assignment to a similar plant, including length of time (weeks), and identity of simulator and similar plant.
4. A commitment to conduct an onsite formal training program and on-the-job training such that the entire plant staff will be qualified before the initial fuel loading.
5. A commitment to meet the requirements of training for shift technical advisors.

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USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

6. A commitment to meet the requirements of training for mitigating core damage.
7. A commitment to conduct an initial fire protection training program including:
 - a. Periodic drills during construction.
 - b. Provisions for indoctrination of construction personnel, as necessary.The initial training shall be completed prior to receipt of fuel at the site.
8. A description of the training program for the individual(s) responsible for the formulation and assurance of the implementation of the fire protection program. The training program should address those items listed in Branch Technical Position CMEB 9.5-1 attached to SRP Section 9.5.1.
9. The applicant shall describe his plans for conducting a position task analysis for all operating personnel, in which the tasks performed by the person in each position are defined, and the training, in conjunction with education and experience, is identified to provide assurance that the tasks can be effectively carried out.
10. The proposed means for evaluating the training program effectiveness for all employees.

This program description should also include a chart to show the schedule of each part of the training program for each position or organizational unit identified in SAR Section 13.1.2. The time should be relative to expected fuel loading and should also display the preoperational test period.

In the Final Safety Analysis Report (FSAR):

1. A detailed description of the training programs for non-licensed personnel to meet the requirements of ANSI/ANS-3.1.
2. A detailed description of the training program for shift technical advisor.
3. A detailed description of the training program for mitigating core damage (13.2.2.4).
4. OL applicants who have provided, during the CP stage, a description of their plans for conducting a position task analysis for all operating personnel, in which the tasks performed by the person in each position are defined, and the training, in conjunction with education and experience, identified to provide assurance that the tasks can be effectively carried out, shall describe the program as completed. All other OL applicants shall describe their plans for conducting the program.
5. The subject matter of each course, including a syllabus or equivalent course description, the duration of the course (approximate number of weeks in full time attendance), the organization teaching the course or supervising instruction, and the position titles for which the course is given. The program should distinguish between classroom training and on-the-job training, before and after the initial fuel loading.

6. Reactor operations experience training by nuclear power plant simulator that complies with Regulatory Guide 1.149 or assignment to a similar plant, including length of time (weeks), and identity of simulator and similar plant.
7. Any difference in the training programs for individuals based on the extent of previous nuclear power plant experience. Experience groups should include the following:
 - a. Individuals with no previous experience.
 - b. Individuals who have had nuclear experience at facilities not subject to licensing.
 - c. Individuals who have had experience at comparable nuclear facilities.
8. A detailed description of the fire protection training and retraining for the initial plant staff and replacement personnel. The program shall describe:
 - a. The training planned for each member of the fire brigade,
 - b. The type and frequency of periodic firefighting drills,
 - c. The training provided for all remaining staff members, including personnel responsible for maintenance and inspection of fire protection equipment,
 - d. The indoctrination and training provided for people temporarily assigned onsite duties during shutdown and maintenance outages, particularly those allowed unescorted access,
 - e. The training provided for the fire protection staff members. The description shall include the course of instruction, the number of hours of each course, and the organization conducting the training.
9. Means for evaluating the training program effectiveness for each employee.

The program description section should also include a chart to show the schedule of each part of the training program for each position or organizational unit identified in FSAR Section 13.1.2. The time scale should be relative to expected fuel loading and should also display the preoperational test period.

The description should delineate clearly the extent to which the training program has been accomplished at the approximate time to submittal of the FSAR. Contingency plans for additional training should be described in the event fuel loading is significantly delayed from the date indicated in the FSAR.

The FSAR should describe the applicant's plans for retraining of plant non-licensed personnel. The FSAR should also identify the additional position categories on the plant staff for which retraining will be provided, and should describe the nature, scope, and frequency of such retraining (13.2.2.2).

In addition, the LQB will coordinate other branches evaluations and reviews that interface with the overall review of training requirements for non-licensed plant staff as follows: The Chemical Engineering Branch (CMEB) for fire protection training as part of its primary review responsibility for SRP Section 9.5.1.

Operator Licensing Branch (OLB) for training for mitigating core damage as part of its primary review responsibility for SRP Section 13.2.1. Emergency Preparedness Licensing Branch (EPLB) for training during emergencies as part of its primary review responsibility for SRP Section 13.3. Physical Security Licensing Branch (PSLB) for training for personnel controlling secured areas as part of its primary review responsibility for SRP Section 13.6.

For those areas of review identified above as being reviewed as part of the primary review responsibility of other branches, the acceptance criteria necessary for the review and their methods of application are contained in the referenced SRP section of the corresponding primary branch.

II. ACCEPTANCE CRITERIA

The SAR should demonstrate that the training provided, or to be provided, for each position on the plant staff will be adequate to provide assurance that all plant staff personnel training requirements will be met at the time needed, i.e., prior to preoperational tests, prior to fuel loading, or prior to appointment or reappointment to the position.

Staff acceptance criteria in this subsection are designed to provide reasonable assurance that an applicant in compliance with these criteria will meet the relevant requirements of the following regulations:

- A. 10 CFR Part 19, K19.12 as it relates to training personnel in the necessary health protection measures associated with exposure to radioactive materials or radiation when entering a restricted area.
- B. 10 CFR Part 50, K50.34(a & b) as it relates to details of training given to non-licensed plant personnel and a schedule for such training.
- C. 10 CFR Part 50, K50.40(b) as it relates to training being an integral part of personnel technical qualifications which contributes to the finding that the applicant is technically qualified to engage in licensing activities.

Specific criteria necessary to meet the relevant requirements of K19.12, K50.34 (a & b), and K50.40(b) are as follows:

1. The non-licensed plant personnel shall be trained in accordance with the guidance of Task Action Plan Item I.A.2.2 of NUREG-0660 and the following:
 - a. ANSI/ANS-3.1, Section 5.1, "General Aspects"; Section 5.3, "Training of Personnel Not Requiring NRC Licenses"; Section 5.4, "General Employee Training"; and Section 5.5, "Retraining..." as endorsed by Regulatory Guide 1.8.
2. Simulators used for training non-licensed plant personnel should meet the guidelines of Regulatory Guide 1.149.
3. Formal segments of the initial training program should be substantially completed when the preoperational test program begins.
4. The number of people for whom training is planned prior to criticality should be sufficient to assure that applicable technical specification conditions with respect to the number of plant personnel can be met from the time of initial fuel loading of the first unit, with due allowance

given for contingencies and the need to avoid planned overtime for supervisory personnel during the startup phase.

5. Refresher training for non-licensed personnel should be periodic and not less frequent than every 2 years and should include, at a minimum, refresher instruction on administrative, radiation protection, emergency, and security procedures.

6. Fire Protection Training

A. Fire Brigade Training

The fire brigade training program shall in general follow the guidelines of BTP CMEB 9.5-1 to ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire-fighting practice, and fire drills as follows:

i. Instruction

a. The initial classroom instruction shall include:

- (1) Indoctrination of the plant fire-fighting plan with specific identification of each individual's responsibilities.
- (2) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.
- (3) The toxic and corrosive characteristics of expected products of combustion.
- (4) Identification of the location of fire-fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.
- (5) The proper use of available fire-fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modifications (welding), and record file fires.
- (6) The proper use of communication, lighting, ventilation, and emergency breathing equipment.
- (7) The proper method for fighting fires inside buildings and confined spaces.
- (8) The direction and coordination of the fire fighting activities (fire brigade leaders only).
- (9) Detailed review of fire-fighting strategies and procedures.
- (10) Review of the latest plant modifications and corresponding changes in fire-fighting plans.

Note--Items (9) and (10) may be deleted from the training of no more than two of the non-operations personnel who may be assigned to the fire brigade.

- b. The instruction shall be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.
- c. Instruction shall be provided to all fire brigade members and fire brigade leaders.
- d. Regular planned meetings shall be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.
- e. Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a two-year period. These sessions may be concurrent with the regular planned meetings.

ii. Practice

Practice sessions shall be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire-fighting. These practice sessions shall be provided at least once per year for each fire brigade member.

iii. Drills

- a. Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.
- b. Drills shall be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year.

A sufficient number of these drills, but not less than one for each shift fire brigade per year, shall be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills shall not be scheduled closer than four weeks.

At least one drill per year shall be performed on a "back shift" for each shift fire brigade.

- c. The drills shall be pre-planned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met.

Unannounced drills shall be planned and critqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members shall be remedied by scheduling additional training for the brigade or members. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.

- d. At 3-year intervals, a randomly selected unannounced drill shall be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals shall be available for NRC review.

- e. Drills shall, as a minimum, include the following:

- (1) Assessment of fire alarm effectiveness, time required to notify and assemble the fire brigade, and selection, placement and use of equipment and fire fighting strategies.
- (2) Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade member's conformance with established plant fire-fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.
- (3) The simulated use of fire-fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should differ from those used in the previous drill so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming the loss of automatic suppression capability.
- (4) Assessment of the brigade leader's direction of the fire-fighting effort as to thoroughness, accuracy, and effectiveness.

Records

Individual records of training provided to each fire brigade member, including drill critiques, shall be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training shall be available for NRC review. Retraining or broadened training for fire-fighting within buildings shall be scheduled for all those brigade members whose performance records show deficiencies.

B. Other Station Employees

i. Instruction

- a. Instruction shall be provided for all employees once a year. It shall be repeated on an annual basis. The instruction shall be given, as appropriate, on (a) the fire protection plan (b) the evacuation routes, and (c) the procedure for reporting a fire.
- b. Instruction shall be provided for security personnel that addresses (a) entry procedures for outside fire departments, (b) crowd control for people exiting the station, and (c) procedures for reporting potential fire hazards observed when touring the facility.
- c. Instruction should be provided to all shift personnel that complements that provided members of the fire brigade.
- d. Instruction shall be provided to temporary employees so that they are familiar with (a) evacuation signals, (b) evacuation routes and (c) the procedure for reporting fires.

ii. Drills

All employees should participate in an annual evacuation drill.

C. Fire Protection Staff

Training for the fire protection staff members shall include courses in:

- i. Design and maintenance of fire detection, suppression and extinguishing systems,
- ii. Fire prevention techniques and procedures,
- iii. Training and manual fire-fighting techniques and procedures for plant personnel and the fire brigade.

6. Shift Technical Advisor (STA)

Each licensee provides an STA to the shift supervisor that should be trained in accordance with TMI Action Plan Item I.A.1.1 of NUREG-0737 and the following:

A. General Technical Education

The technical education of the STA should include basic subjects in engineering and science. The purpose of this education is to permit the STA to advise the shift supervisor and licensed operators in assessing unusual plant situations not explicitly covered in the current operator training and/or plant procedures. The following is a tentative list of areas of knowledge that are considered to be desirable:

Mathematics, including elementary calculus
Reactor physics; chemistry, and materials

Reactor thermodynamics, fluid mechanics, and heat transfer
Electrical engineering, including reactor control theory

These areas of knowledge should be taught at the college level and would be equivalent to about 60 semester hours. Although a college graduate engineer would have many of these subjects and more that would not be essential, some engineers might be deficient in a few of these specific areas, e.g., reactor physics.

B. Training

i. Reactor Operations Training

The STA should be trained in the details of the design, function, arrangement, and operation of the plant systems. This training is necessary to assure that the meaning and significance of instrument readings and the effect of control actions are known. A graduate engineer not previously licensed or trained as an operator or senior characteristic.

ii. Transient and Accident Response Training

In addition to the training in normal operations, anticipated transients, and accidents presently required of operators and senior operators, the shift technical advisor should be trained to recognize and react to a wide range of unusual situations including multiple equipment failures and operator errors. This training should not be limited to written procedures or specific accident scenarios, but should include the recognition of symptoms of accident conditions such as complex transient responses or inadequate core cooling and possible corrective actions. The purpose of this training is to broaden the ability for prompt recognition of and response to unusual events, not to modify the instinctive, rapid procedural response to transients and accidents provided by reactor operators. The training is required in recognition of the fact that real accidents inherently are initiated and accompanied by unusual and unexpected events. The training is also to emphasize the need to focus on the essential parameters that indicate the status of the core and the primary coolant boundary. This additional training would take up to a year to accomplish for a person not already experienced in nuclear plant transient and accident analysis or evaluation. Both inexperienced graduate engineers and currently licensed operators would require additional training to fulfill this characteristic.

C. Absences from STA Duties

People not actively performing the STA functions for a period of 30 days or longer, shall, prior to assuming responsibilities of the position, as a minimum, receive training sufficient to ensure he is aware of facility and procedural changes that occurred during his absence.

7. Training For Mitigating Core Damage

To meet TMI Action Plan Item II.B.4 of NUREG-0737 applicants are required to develop a training program to teach the use of installed equipment and systems to control or mitigate accidents in which the core is severely damaged. They must then implement the training program.

Shift technical advisors and operating personnel from the plant manager through the operations chain to the licensed operators shall receive all the training indicated below.

Managers and technicians in the instrumentation and control (I&C), health physics, and chemistry departments shall receive training commensurate with their responsibilities.

A. Incore Instrumentation

- i. Use of fixed or movable incore detectors to determine the extent of core damage and geometry changes.
- ii. Use of thermocouples in determining peak temperatures; methods for extended range readings; methods for direct readings at terminal junctions.
- iii. Methods for calling up (printing) incore data from the plant computer.

B. Excore Nuclear Instrumentation (NIS)

Use of NIS for determination of void formation; void location basis for NIS response as a function of core temperatures and density changes.

C. Vital Instrumentation

- i. Instrumentation response in an accident environment; failure sequence (time to failure, method of failure); indication reliability (actual vs indicated level).
- ii. Alternative methods for measuring flows, pressures, levels, and temperatures.
 - a. Determination of pressurizer level if all level transmitters fail.
 - b. Determination of letdown flow with a clogged filter (low flow).
 - c. Determination of other reactor coolant system parameters if the primary methods of measurement has failed.

D. Primary Chemistry

- i. Expected chemistry results with severe core damage; consequences of transferring small quantities of liquid outside containment; importance of using leak-tight systems.

- ii. Expected isotopic breakdown for core damage; for clad damage.
- iii. Corrosion effects of extended immersion in primary water; time to failure.

E. Radiation Monitoring

- i. Response of process and area monitors to severe damages; behavior of detectors when saturated; method for detecting radiation readings by direct measurement at detector output (overranged detector); expected accuracy of detectors at different locations; use of detectors to determine extent of core damage.
- ii. Methods of determining dose rate inside containment from measurements taken outside containment.

F. Gas Generation

- i. Methods of hydrogen generation during an accident; other sources of gas (xenon, krypton); techniques for venting or disposal of non-condensibles.
- ii. Hydrogen flammability and explosive limit, sources of oxygen in containment or reactor coolant system.

III. REVIEW PROCEDURES

Preparation for the review of Section 13.2 of the SAR should include familiarization with the documents listed in subsection II.1 of this SRP section. The reviewer may use training course descriptions obtained independently from vendors.

The review procedure for this SRP section consists of:

1. A careful examination of the information submitted to determine that all subject matter identified in subsection I.1 above has been addressed, and
2. A detailed comparison of the information with the acceptance criteria of subsection II above.

The reviewer should ensure that, whenever the applicant has committed to follow the position of a regulatory guide, industry standard or other reference document, the specific revision being referred to is identified. Similarly, whenever the reviewer is using a position in a reference document as a basis for acceptability, the revision being used should be identified.

The reviewer should also ensure that the applicant has committed to a reasonable schedule for the training programs that relates to the fuel loading date. The reviewer may consult with CMEB in the area of fire protection training and with OLB in the area of training for mitigating core damage.

The reviewer then determines, based upon the foregoing, the overall acceptability of the applicant's plant staff training plans.

IV. EVALUATION FINDINGS

The reviewer should verify that the information presented and his review support an evaluation findings statement of the following type, to be used in the staff's safety evaluation report:

1. For a construction permit:

The staff concludes that the training for non-licensed plant staff personnel is acceptable and meets the requirements of 10 CFR Part 19, §19.12; Part 50, §50.34(a and b); and Part 50, §50.40(b). This conclusion is based on the following:

The applicant has described in the PSAR, in accordance with the requirements of 10 CFR Part 50, §50.34(a)(6), a preliminary plan for training of non-licensed plant personnel.

All non-licensed plant personnel will be trained in accordance with the requirements and guidance of ANSI/ANS 3.1 as endorsed by Regulatory Guide 1.8. In addition, specialized training will be given to fire protection personnel, to the shift technical advisors, and to senior plant operating personnel for mitigating core damage.

Simulators used in the training program should meet the guidelines of Regulatory Guide 1.149.

This preliminary plan and commitment provides an acceptable basis for finding that, insofar as the plans for training of non-licensed personnel is concerned, the applicant meets the technical qualification requirements of 10 CFR Part 50, §50.40(b) of the Commission's regulations.

2. For an operating license:

The staff concludes that the training for non-licensed plant staff personnel is acceptable and meets the requirements of 10 CFR Part 19, §19.12; Part 50, §50.34(a & b); and Part 50, §50.40(b). This conclusion is based on the following:

The applicant has described in the FSAR, in accordance with the requirements of 10 CFR Part 50, §50.34(b)(7), the details of the training given to non-licensed plant personnel and a schedule for that training as related to the applicant's presently-scheduled fuel load date.

Training and retraining of non-licensed personnel meets the requirements of ANSI/ANS 3.1 as endorsed by Regulatory Guide 1.8.

Fire brigade personnel will undergo classroom instruction, fire-fighting practice and periodic fire drills.

Shift technical advisors will receive training in the areas of mathematics, reactor physics, thermodynamics, controls, reactor operations, and transient and accident response.

Simulators used in the training program should meet the guidelines of Regulatory Guide 1.149.

Shift technical advisors and other operating personnel will receive training in the mitigation of core damage. This training will concentrate on instrumentation, water chemistry, radiation monitoring, and gas generation during an accident.

All training of the non-licensed plant staff is scheduled to be completed prior to fuel loading.

Meeting the staff's requirements given above provides an acceptable basis for finding that, insofar as the training of non-licensed personnel is concerned, the applicant meets the technical qualification requirements of 10 CFR Part 50, §50.40(b) of the Commission's regulations.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guide and NUREGS.

VI. REFERENCES

1. 10 CFR Part 19, §19.12, "Instruction to Workers."
2. 10 CFR Part 50, §50.34, "Content of Applications; Technical Information" (Paragraph a.6).
3. 10 CFR Part 50, §50.40, "Common Standards" (Paragraph b).
4. Regulatory Guide 1.8, "Personnel Qualifications and Training."
5. Branch Technical Position CMEB 9.5-1, attached to SRP Section 9.5.1, "Fire Protection."
6. ANSI/ANS-3.1, "Selection and Training of Nuclear Power Plant Personnel."
7. NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident."
8. NUREG-0737, "Clarification of TMI Action Plan Requirements."
9. Regulatory Guide 1.149, "Nuclear Power Plant Simulators for use in Operator Training."