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August 14, 1981

Mr. Harold R. Denton
Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton: ULNRC-478

DOCKET NUMBERS 50-483 AND 50-486
CALLAWAY PLANT, UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Transmitted herewith are the Union Electric responses to items resulting from the July 14 - 15, 1981, NRC Management Audit. This information is hereby incorporated into the Callaway Application. This will be incorporated in a future revision to the FSAR.

Very truly yours,

John K. Bryan

John K. Bryan

DJW/afg
Enclosure

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LIMITED
DISTRIBUTION

STATE OF MISSOURI)
) S S
CITY OF ST. LOUIS)

John K. Bryan, of lawful age, being first duly sworn upon oath says that he is Vice President-Nuclear and an officer of Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By John K. Bryan
John K. Bryan
Vice President
Nuclear

SUBSCRIBED and sworn to before me this 14th day of August, 1981

Barbara J. Pfaff

BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1985
ST. LOUIS COUNTY

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NRC MANAGEMENT REVIEW ITEMS

ITEM 1 Radiation Protection Manager Qualifications

Union Electric Response

In the initial staffing of Callaway, the experience requirement for this position will be waived if a Radiation-Chemistry Foreman, Health Physicist, or Chemist has equivalent experience. In the event this experience requirement is not met by any of the above, an individual who meets these requirements will be retained to assist the Asst. Supt. Eng.-Rad/Chem.

This individual will be retained commencing with low power physics testing and continuing for three (3) months after full power operation or six (6) months, whichever is least. This will ensure that the required expertise is available when initially required. The individual satisfying this requirement will have qualifications consisting of a minimum of three years of experience in the health physics area.

It is our position the present staffing meets or exceeds the experience requirements for the Radiation Protection Manager.

ITEM 2 Issues Pertaining to the Emergency Response Plan (NUREG-0654)

Union Electric Response

Union Electric responses to these issues will be included in the next revision of the RERP.

Pages 3 through 47 are intentionally left blank.

ITEM 3 The I&C Department Operating Commercial Experience

Union Electric Response

A change to the FSAR is attached to identify our commitment to have applicable experience in the I&C Department. We currently have an I&C foreman with seven years experience in a nuclear commercial nuclear plant. The resume of this I&C foreman, Kyle Wicks, is attached for your review.

This change will be included in the next revision to the FSAR.

13.1.3.1.10 Instruments and Controls Foreman

1. A total of four years of experience in instrumentation and control. A maximum of two years may be fulfilled by related technical training.

2. High school education or equivalent.

13.1.3.1.11 Superintendent, Maintenance

1. A total of seven years of responsible power plant experience or applicable industrial experience of which one year shall be nuclear power plant experience. A maximum of two years of the remaining six years of power plant or industrial experience may be fulfilled by satisfactory completion of academic or related technical training on a one-for-one basis.

2. Familiarity with nondestructive testing and electrical, pressure vessel, piping, and welding codes.

3. High school education or equivalent.

13.1.3.1.12 Assistant Superintendent, Maintenance

1. A total of seven years of responsible power plant experience or applicable industrial experience of which one year shall be nuclear power plant experience. A maximum of two years of the remaining six years of power plant or industrial experience may be fulfilled by satisfactory completion of academic or related technical training on a one-for-one basis.

2. Familiarity with nondestructive testing and electrical, pressure vessel, piping, and welding codes.

3. High school education or equivalent.

13.1.3.1.13 General Supervisor, Administration

1. A total of six years of administrative experience, preferably in a technical field. Four years of this experience may be fulfilled by a bachelor's degree.

13.1.3.1.14 Superintendent, Training

1. Experience and training normally required for examination by the NRC for a Senior Reactor

Kyle L. Wickes - Instruments and Controls Foreman

EDUCATION

Illinois High School Equivalency Certificate - 1967

RELATED TRAINING

Basic Engineering Principles - U.S.N. - 1967

Engineman A School - U.S.N. - 1967

Solid State Fundamentals - G.E. - 1977

Fundamentals of Process Instrumentation - G.E. -1978

Instrument Maintenance Training Course I - Ceco - 1978

Instrument Maintenance Training Course II - Ceco - 1978

7300 Nuclear Instrumentation - Westinghouse - 1979

Management Effectiveness Utility Supervisors - Modules I, II, III - Ceco -1979

Kepner-Tregoe Rational Manager Training - 1980

Supervising for Results - Ceco - 1980

I & C Engineer Course (12 weeks) - Westinghouse - 1980

Associate in applied Science (Electronic Technician) - Sauk Valley College - 1980

EXPERIENCE

1969-69	U.S.N. Engineman 2nd Class (E-5)
1970-72	Zinkelbach Refrigerators, Clinton, LA - repairman
1972-74	Prescott's, Sterling, IL - refrigerator repairman
11/74-4/76	Commonwealth Edison, Quad Cities Nuclear Power Plant Instrument Mechanic

Kyle L. Wickes

EXPERIENCE (Cont.)

4/76-10/77	Commonwealth Edison, Quad Cities Nuclear Power Plant Instrument Mechanic
10/77-6/79	Commonwealth Edison, Byron Station - Control Systems Technician
6/79-8/81	Commonwealth Edison, Byron Station - Instrument Foreman
8/81-Present	Union Electric, Callaway Plant - I&C Foreman

ITEM 4 Commitment for Experienced Operating Personnel at Callaway

Union Electric Response

Each Union Electric operating shift crew will include at least one individual with a minimum of one year on-shift licensed operations experience in a commercial nuclear plant similar to Callaway. If this requirement cannot be met by members of plant staff, personnel having the necessary qualifications will be retained from outside organizations. This commitment will be for the period from fuel load to attainment of full power operation or one year, whichever occurs first.

ITEM 5 Additional Clarifications of Union Electric Response to NUREG 0737

Union Electric Response

Additional questions raised by the NRC will be addressed in the submittal of Chapter 18, The Site Addendum and Standard Plant Sections.

The draft procedure addressing section I.C.5 of NUREG 0737 is attached for NRC review. This procedure for review of current operating experience will be in use by January 1, 1982.

After the formation of the ISEG, the responsibility for reviewing and recommending implementation of industry operating experience assigned to that group. This action will occur at least ninety (90) days before fuel load. The program will include but not be limited to review of source material mentioned in the attached draft procedure.

The draft procedure for the verification of correct performance of operating activities (I.C.6) is attached for the NRC review.

REVIEW OF CURRENT OPERATING EXPERIENCES

1.0 PURPOSE AND SCOPE

1.1 The purpose of this procedure is to address the review of IE Bulletins, Circulars, Notices, "Nuclear NOTEPAD", and "SEE-IN" for feedback and dissemination of appropriate operating experiences affecting plant operation and training. Information from Nuclear Power Experience Reports will also be reviewed as part of this procedure.

2.0 DEFFINTIONS

2.1 Significant Event Evaluation and Information Network (SEE-IN): a program sponsored by the Institute of Nuclear Power Operations (INPO) and the Nuclear Safety Analysis Center (NSAC) which screens License Event Report generated by all US nuclear power plants, selects the most significant of these and issues Significant Operation Event Reports.

2.2 Nuclear Notepad (NOTPAD): A telecommunications system utilitzing telephone/typewriter terminals to which information on LER's, significant events, NRC rulings, and other issues are voluntarily submitted and received by participating organizations.

2.3 Nuclear Power Experience Reports (NPE): NPE is a program that disseminates information on the operating experience of all large light water nuclear power plants in the USA. It concentrates on equipment malfunctions and operating difficulties.

2.4 Possibly Pertinent Items: Those editied items that in the judgment of the Item Editors are relevant to Callaway.

2.5 Item Editors: The individual(s) designated by the Superintendent, Engineering to be responsible for the initial editing and subsequent sorting of operating experience information per the Item Evaluator's List.

2.6 Item Evaluator: The person(s) responsible for the review of Possibly Pertinent Items transmitted to him by the Item Editors.

2.7 Responsible Individual: As designated by the appropriate Department Superintendents, the person responsible for addressing the action and for responding to the items transmitted.

2.8 Item Evaluator List: A listing of Item Evaluators compiled by the Superintendent, Engineering or his designee (see G-E-3).

2.9 NPE File: Each Callaway System File will have one or more subsections designated for Nuclear Power Experience (NPE) items which are predominantly associated with the respective system and its components. Use of this file for future consideration is detailed in AP-A-1 and AP-(later).

3.0 RESPONSIBILITIES

3.1 The Superintendent, Engineering is responsible for the implementation of this procedure, for selection of the Item Editors, for ensuring that the Item Editors have a copy of the Item Evaluator's List, IE Bulletins, Circulars, Notices, and SEE-IN, access to NOTEPAD, and NRC Exp. Reports.

3.2 Each department superintendent shall be responsible for designating appropriate Item Evaluators for the review of items relevant to their departments, for transmitting a listing of these evaluators to the Superintendent of Engineering, and for designating the appropriate Responsible Individuals within his department.

4.0 PROCEDURE

4.1 The Item Editors shall review materials describing industry operating experience for determination of required response. The Item Editors, using the Item Evaluator's List, shall distribute appropriate materials to the Item Evaluators.

4.2 The Item Editors shall review the operating experience material for possibly pertinent items and distribute the items per the Item Evaluator's List.

4.3 The Item Evaluator(s) shall review each of his items received from the Item Editors. It he deems that a change is needed, he shall forward a description of the change to the Responsible Individual for concurrence and action. Transmittals regarding this change shall be in accordance with G-P-3 except when the Item Evaluator and the Responsible Individual are the same individual.

4.4 If the applicability of an item or appropriate fact action is presently indeterminate because of inadequate and/or insufficient reference material, or because of the operational status of the plant, the Item Evaluator shall annotate this on the item and a copy shall be sent to the appropriate NPE file. During subsequent NPE review activities the Item Evaluator shall review his indeterminate items relative to any new reference material.

4.5 The Responsible Individual shall arrange to incorporate the pertinent item of operating experience utilizing established procedures for changing design, procedures or training. If he disagrees with the requested action, he shall seek to resolve any disagreement with the Item Evaluator.

5.0 REFERENCES

5.1 FSAR Callaway Plant Addendum, Section 14.2.8.

6.0 ATTACHMENTS

None

7.0 RECORDS

None

1.0 PURPOSE

1.1 The purpose of this procedure is to define the requirements for independent verification of correct performance of operating activities. This procedure is applicable to systems important to nuclear safety when such systems are removed from service for maintenance or testing, when temporary modifications are made to such systems, or when such systems are returned to service.

Activities such as removing equipment from service, surveillance testing, and making temporary modifications are conducted in accordance with written procedures which are intended to assure that the activities are performed correctly and that necessary systems and equipment important to nuclear safety are available to perform their safety function in accordance with Technical Specification requirements. In order to provide additional assurance (over and above that provided by the procedural control discussed above) that systems are properly returned to serviced, an independent verification of these activities will be done when functional tests to prove operability cannot be performed. Independent verification will generally not be performed when doing so would result in significant radiation exposure.

2.0 DEFINITIONS

2.1 None required

3.0 RESPONSIBILITIES

3.1 Responsibilities will be delineated in the specific procedures or in applicable procedural requirements.

4.0 PROCEDURE

4.1 Requirements for Independent Verification During Removal from Service for Maintenance or Testing

4.1.1 When systems important to nuclear safety are removed from service for maintenance or testing, independent verification shall be performed to the extent necessary to assure that the proper system has been removed from service, and not some other system or train which is still required to be in service.

4.1.2 Independent verification is normally performed by independently checking the tagging, if applicable, although indirect means such as observation of indicators and status lights may be used.

4.1.3 Independent verification will be done prior to starting work by a qualified person. This person need not be licensed.

4.1.4 Documentation of this verification will be accomplished by the Shift Supervisor entering the name of the person performing the verification and time on the originating document requiring the system to be removed from service. The individual performing the verification is responsible for informing the Shift Supervisor as to when the verification is complete.

4.1.5 Any part or all of the independent verification of the removal of a system from service may be waived by the Operating Supervisor if the verification required an entry into an Excessive Radiation Area that would not otherwise be made. The waiving of the independent verification will be documented by the Operating Supervisor so indicating on the document requiring the system to be removed from service.

4.1.6 Independent verification shall be performed prior to starting a maintenance or testing activity on a nuclear safety system that is removed from service. This verification should be performed as soon as possible after removing the system from service and shall be performed no later than 4 hours after the removal is complete.

4.1.7 The above procedure for independent verification of activities during removal from service of systems important to nuclear safety is in addition to procedural requirements, (example Reference 5.1 or 5.2).

4.2 Requirements for Independent Verification During Temporary Modifications

4.2.1 Temporary modifications are performed and independently verified in accordance with Administrative Procedure AP-A-__. This procedure provides the details of the independent verification for installation and removal of temporary modifications.

4.3 Requirements for Independent Verification When Returning Systems to Service After Maintenance or Testing (other than Surveillance Testing)

4.3.1 When a system important to nuclear safety is returned to service from maintenance, a surveillance test is first performed if a Technical Specification operability requirement is involved. Therefore, the requirement for independent verification when returning a nuclear safety system to service after maintenance or testing is satisfied by the independent verification requirements in Section 4.4 of this procedure (Independent Verification When Returning Equipment to Service Following Surveillance Testing).

4.4 Requirements for Independent Verification When Returning Equipment to Service Following Maintenance or Testing

4.4.1 When a system important to nuclear safety is returned to service following maintenance or testing, the applicable Surveillance Test Procedure will provide the final alignment

requirements and/or required the test personnel to obtain specific alignment requirements from the on-shift Operating Supervisor - Control Room; all of the above alignment requirements must be independently verified. Only those valves, dampers, breakers or switches affected by the test need to be verified. In addition, the removal of jumpers installed in accordance with the Surveillance Test Procedure will be verified.

4.4.2 Independent verification need not be performed if all equipment involved in the activity can be proven to be in their correct alignment by functional testing without adversely affecting the safety of the plant or if the independent verification would require entry into an Excessive Radiation Area. The waiving of the independent verification will be the responsibility of the Shift Supervisor. He will document his waiving of the independent verification.

4.4.3 Independent verifications will be performed by a qualified individual. This individual may be a qualified non-licensed operator, a licensed operator or a certified individual from the group responsible for performing the Surveillance Test Procedure.

4.4.4 Independent verification will be documented by the signature of the qualified individual.

4.4.5 Independent verification should be performed as soon as possible and shall be performed no later than 4 hours after the testing is complete.

4.5 Applicability of Independent Verification Requirements

4.5.1 The independent verification requirements discussed above apply only when the plant is in (or about to enter) an operating mode when the affected nuclear safety system is required to be operable. For example, during an outage, it would not be required to independently verify valving changes on a system which was not required to be operable, provided that the final system alignment was independently verified before the plant was returned to service.

5.0 REFERENCES

5.1 Administrative Procedure - General AP-A-10, Tagging and Protective Barrier System

5.2 Administrative Procedure - AP-A-19, Surveillance Program

ITEM 6 STA Commitment

Union Electric Response

A change to Chapters 13 and 18 of the FSAR will incorporate the STA position. All documentation will be reviewed and updated to reflect this change in commitments. Attached is a copy of the Chapter 18 response.

18.1.1 Shift Technical Advisor Response

Union Electric will have a Shift Technical Advisor (STA) available onsite for each operating shift to report to the Control Room in an advisory capacity when the reactor is in modes 1-4.

The STA will have a bachelor's degree in engineering or related science which includes or is supplemented to include sixty (60) semester hours of college level education in mathematics, reactor physics, chemistry, and reactor control theory or a high school diploma and the foregoing 60 hours educational requirement. The STA shall also have one year of experience at a nuclear power plant including six months onsite at the time the STA is required on shift. Nuclear power plant experience is time associated with: preoperational and startup testing activities; military, non-stationary, propulsion or production nuclear plants; reactor simulator training, or on-the-job training.

The training program for STA's will include: training in plant systems; a course in mitigating core damage; and specific training in the response and analysis of the plant for transients and accidents utilizing a SNUPPS simulator. A retraining and requalificaiton program will be developed ninety (90) days prior to fuel load.

The requirement for the STA to be in addition to the normal shift complement is accepted as an interim NRR staff position. When the Commission's delibrations are concluded and the requirements for eliminating the STA posiiton have been established, we fully expect to eliminate this interim commitment.

ITEM 7 Operations Personnel Participation in Hot Functional Testing

Union Electric Response

Operations personnel will participate in preoperational testing to the maximum extent consistent with completion of necessary training. Not all test manipulations will be performed by Operations personnel; for example, scheduled preoperational tests will not be deferred because the Operations Department cannot supply the required numbers of people. However, Operations personnel will be assigned to carry out all test manipulations for the major system integrated tests, in particular, the hot functional tests. Operating procedures will be evaluated through use during preoperational testing by U.E. Startup and Operations personnel. This effort will refine and where necessary, correct the permanent plant operating procedures prior to their use later in the plant startup evolution.

ITEM 8 Contracts for Outside Technical Support

Union Electric Response

Union Electric commits to having signed contracts for additional outside technical support (Westinghouse, Bechtel, and Nuclear Projects Incorporated) before fuel load at Callaway. The details of this commitment will be given at that time.

ITEM 9 Description of Union Electric Pipeline to SRO and RO Qualifications

Union Electric Response

At present, Union Electric has thirty-four positions identified for licensed individuals. Seventeen will be licensed at the senior reactor operator level and seventeen will be licensed at the reactor operator level. This excludes at least four additional senior reactor operator license holders in higher staff positions. The number of seventeen in each of the two reference positions was predicated on a basic assumption of two individuals per shift, and staffing for a total of six shifts. The fifth shift provides for vacation relief and sickness. The sixth shift provides for re-training. Assuming some losses to attrition and failure to license, we have adjusted the number of positions upward to seventeen.

The selection criteria and training provided to fill these positions should be noted. There are two other positions in the line of promotion to reactor operator. They are: Assistant Equipment Operator and Equipment Operator. All personnel undergo a rigorous selection program prior to their qualifying for the position of Equipment Operator. This consists of a basic mathematics and science skills test coupled with a stress reaction test to predict the individuals ability to funciton well under stressful stituaitons. These tests coupled with an acceptable physical examination are required before an individual is considered for training in any of these positions. The training program consists of a mathematics and science refresher program followed by an in-depth course in reactor theory. This program presently consists of 12 weeks of full-time classroom training referred to as Phase I. Phase II follows, which provides system training. Those personnel entering the licensing program continue on to Phase III, simulator program taught on our Callaway Plant simulator. Following Phase III for the license candidates and Phase II for the Equipment Operators, a Phase V is offered which consists of a plant familiarization program designed to relate the individual to physical arrangements witnin the plant proper. To date, 36 personnel have been certified out of 37 who have taken the examination. This success rate fortifies our confidence that the screening process is effective and that those selected for training are likely to be certified and ultimately licensed.

Two remaining factors must be considered in judging the reasonableness of the number of personnel budgeted for license positions. The first deals with a review of the position of Equipment Operator. Each person in this position has undergone the same selection criteria and has received the same training as a license candidate with the exception of the simulator program. In fact, two of our Equipment Operators have already been certified at the reactor operator level and yet are still Equipment Operators. This convinces us that the Equipment Operator is in fact ready to step in to be licensed in a very short period of time. The second factor to be considered is the availability of a simulator at the plant site. This will be placed in service in early 1982 and will provide an advanced tool for operators.

The screening process, our training program with its demonstrated success rate, the availability of an on-site simulator for developing qualified operators, and the "pipeline" provided by the Equipment Operator and Assistant Equipment Operator positions to fill vacancies in the licensed operator ranks, convince us that the currently budgeted number of license candidates is adequate.

ITEM 10 Commitment to ANS 3.1 Standard

Union Electric Response

Union Electric will commit to ANS 3.1, 1978. Callaway will review and revise documentation to be consistent with the 1978 standard.

ITEM 11 Qualifications of the Superintendent and Assistant Superintendent of Maintenance in Codes and Standards

Union Electric Response

The resumes of R. H. Leuther and G. J. Czechin will be revised to include a more current and accurate reflection of their experience and familiarity with NDE, electrical, pressure vessel, piping and welding codes for FSAR Section 13.1. These documents will be submitted in the next FSAR change. Union Electric commits to provide the Superintendent of Maintenance or the Assistant Superintendent formal training in subjects not included in their experience base. This formal training will be complete prior to 90 days before fuel load.

ITEM 12 Union Electric ISEG Charter and Organization Description

Union Electric Response

Attached are the ISEG Charter and a description for the Superintendent - Independent Safety Engineering Group.

SUPERINTENDENT - INDEPENDENT SAFETY ENGINEERING GROUP

Reports to: Manager Nuclear Engineering

Requirements: Bachelor's in Engineering with experience in reactor safety analysis

Assignment Location: Callaway site

Responsibilities:

Directs a group of engineers assigned to meet the requirements of NRC document NUREG-0660 for an independent safety review group and performing work in the following areas:

- Evaluate plant operations from a safety prospective and compare the operating experience with other plants of similar design.
- Preliminary review of NSRB review material (e.g. special tests, changes to technical specifications, etc.)
- Callaway abnormal occurrence report review.
- Review of procedures and revisions for technical acequacy and clarity.
- Review of Licensee Event Reports for applicability to Callaway.
- Nuclear Plant Reliability Data System reports of component failures.
- Preparation of summaries for management on safety-related abnormal occurrences, charges to plant operational procedures, changes to technical specifications, etc.
- Provide input to engineers doing plant safety analysis and FSAR submittals.
- Provide input for responses to NRC Bulletins, Circulars, and Information Notices.
- Safety review of violations and deviations reportable to the NRC.
- Provide manpower at site to report to Emergency Response Facilities in case of declared plant emergency.

INDEPENDENT SAFETY ENGINEERING GROUP

ORGANIZATION AND RESPONSIBILITY

1.0 PURPOSE AND SCOPE

This procedure establishes the Independent Safety Engineering Group (ISEG) organizational structure and responsibilities. The ISEG will be independent of the plant staff but will be assigned onsite to perform independent reviews of plant operational activities and have a capability to evaluate operating experiences at nuclear power plants.

2.0 DEFINITIONS

None

3.0 ORGANIZATION

3.1 The ISEG will be headed by the Superintendent ISEG reporting offsite to the Manager of Nuclear Engineering. The Superintendent will have a Bachelor's degree in engineering and two years of nuclear related experience and experience in reactor safety analysis.

3.2 The ISEG Superintendent will direct a group of graduate engineers. It is expected that this group will consist of four engineers in addition to the Superintendent. These engineers will have Bachelor of Engineering or Science degrees and have two years of nuclear related experience. This group will have expertise in nuclear, mechanical, electrical and chemical engineering as well as some experience in nuclear operations.

4.0 RESPONSIBILITIES

The ISEG will perform independent reviews of plant operation and maintenance. They will review and evaluate all safety related matters that have been delineated by corporate management or by regulatory requirements. Review will consist of the following:

4.1 Evaluate plant operations from a safety perspective and compare the operation experience with other plants of similar design.

4.2 Conduct preliminary review of NSRB material (e.g. special tests, changes to technical specifications, etc.)

4.3 Review Callaway abnormal occurrence reports.

4.4 Review of procedures and revisions for technical adequacy and clarity.

4.5 Review of License Event Reports, SEE-IN Reports by EPRI and operating event reports prepared in INPO for applicability to Callaway.

4.6 Evaluate Nuclear Plant Reliability Data for component failure.

4.7 Prepare summaries for management on safety related abnormal occurrences, changes to plant operational procedures, change to technical specifications, etc.

4.8 Provide input to engineers doing plan safety analysis and FSAR submittal work.

4.9 Provide input for responses to NRC Bulletins, circulars, and Information Notices.

4.10 Review safety violations and deviations reportable to the NRC.

4.11 Provide manpower at site to report to Emergency Response Facilities in case of a declared plant emergency.

5.0 RECORDS

Later

ITEM 13 Description of the Training for Contractors

Union Electric Response

Sections 1.1.1.3 and 1.1.1.4 of the Callaway Training Manual that pertains to the training for contractors, consultants, off-site Union Electric employees and temporary maintenance and service personnel are being expanded and the areas of training more defined in terms of the type of access to be granted and the anticipated work areas; i.e. restricted or unrestricted.

If the individual is escorted or works in an unrestricted area, training will be provided in the areas of emergency alarms and responses, radiation protection, including respirators and respiratory protection, prenatal exposure if applicable and site security procedures.

If the individual works unescorted in restricted areas, the training will be expanded to insure a more in-depth knowledge of all the subject areas previously mentioned. Areas receiving increased training emphasis include normal movement in the plant, plant security, emergency alarms and responses, Callaway ALARA concepts, respiratory protection, radiological work permits, prenatal exposure and whole body exposure.

ITEM 14 Training for Off-Site Technical Support Engineers

Union Electric Response

Union Electric provides training and indoctrination sessions for all newly hired engineers. New engineering employees attend Engineering Orientation sessions of ten (10) days which provide an overview of the entire Union Electric System, its various organizations, and their operation. Since engineers are considered members of management they are also scheduled to receive two (2) weeks of supervisory training through the Basic Management program. The technical support engineers who report to the Manager of Nuclear Engineering in the Nuclear Function receive training and indoctrination in the Union Electric Quality Assurance Program, in their job related procedures, and in specific work related areas as needed. Additional training when needed is through participation in seminars, workshops, and courses offered by groups such as The American Society of Mechanical Engineers, the Edison Electric Institute, the Electric Power Research Institute, the Institute for Nuclear Power Operations, and the American Nuclear Society. Offerings through university programs, Westinghouse and other vendor groups, and various consultants have also been utilized for training in specific areas. Union Electric is currently reviewing its training for offsite support engineers and is committed to formalizing its efforts in this area, and to expanding the scope of a formal training program. Currently under consideration is the continued use of the Westinghouse PWR Information Course; participation in the Westinghouse Station Nuclear Engineering Course as needed; and selected training sessions on the Engineering Simulator. All engineers in Nuclear Engineering will receive training in the Callaway Security Training Program, the Radiation Protection Program, and other key plant areas as needed.

This formalized training program will also include elements to keep the engineers current in the various codes, standards, plant modifications, pertinent LER events, and general industry updates.

ITEM 15 The Nuclear Safety Review Board Membership and Charter

Union Electric Response

The NSRB membership consists of a chairman and five members. The attached table indicates the description of the NSRB members and the areas of expertise they represent. Also attached is a draft of the NSRB Charter. The charter and table together indicate that the NSRB meets the requirements given in ANS 3.2. The number of members on the board exceeds the minimum given in ANS 3.2. In addition only a minority of the members have direct responsibility for the operation of the plant. The members collectively represent coverage of the key areas of expertise outlined in ANS 3.2. For special problems, outside consultants will be used as needed. The meeting frequency, the use of meeting records, and the documentation of reviews as described in the charter is in agreement with the requirements of ANS 3.2. The subject lists for review given in the charter also satisfies ANS 3.2. The NSRB will become active three months before fuel load.

NSRB MEMBERSHIP DESCRIPTION

NSRB MEMBER BY TITLE	NSRB POSITION	AREA OF EXPERTISE*
General Manager, Nuclear Engineering	Chairman	Nuclear Engineering, Chemistry and Radiochemistry, Instrumentation and Control, Radiological Safety, Mechanical and Electrical Engineering, Administrative Controls, Emergency Plans and Organization.
Manager, Nuclear Engineering	Vice Chairman	Same as General Manager, Nuclear Engineering
Manager, Quality Assurance	Member	Administrative Controls and Quality Assurance
Plant Superintendent	Member	Nuclear Power Plant Operations, Chemistry and Radiochemistry, Metallurgy and Non-destructive Testing, Instrumentation and Control, Radiological Safety, Administrative Controls, Emergency Plan and Organization, Training
Asst. Plant Superintendent	Member	Same as Plant Superintendent
SNUPPS Technical Director	Member	Nuclear Engineering, Radiological Safety Instrumentation and Control
Fuels Engineer	Member	Nuclear Engineering, Nuclear Power Plant Operation

(*The member indicated possesses the expertise or his personnel possesses the expertise.)

CHARTER FOR THE OPERATION OF THE NUCLEAR SAFETY REVIEW BOARD

I. GENERAL

The operation of the Nuclear Safety Review Board (NSRB) shall be in accordance with Section 6.5.2 of the Standard Technical Specifications as modified to reflect Union Electric's organizaiton.

II. MEMBERSHIP

The General Manager, Nuclear Engineering shall serve as the board chairman and the board shall consist of at least five members appointed by the chairman. The Manager, Nuclear Engineering shall serve as vice chairman and will act for the chairman in his absence. Additional members may be appointed by each member and must be approved by the chairman. Designated alternates may act with full privileges of regular members, however, no more than two alternates will participate as voting members at any one time.

Consultants may be utilized as determined by the chairman to provide expert advice to the board. Specialized problems in particular will be handled by outside consultants as needed.

III. RESPONSIBILITIES

The NSRB shall review the following subjects:

1. Written safety evaluations of changes in plant facilities described in proposed revisions to the Safety Analysis Report, changes in safety-related procedures from commitments described in the Safety Analysis Report, and tests or experiments not described in the Safety Analysis Report which are completed without prior NRC approval under the provisions of 10 CFR Part 50.59 (a) (1). This review is to verify that such changes, tests or experiments did not involve a change in the Technical Specifications or an unreviewed safety question as defined in 10 CFR 50.59 (a) (2).

2. Proposed changes in procedures, proposed changes in the facility, or proposed tests or experiments, any of which involves a change in the Technical Specifications or an unreviewed safety question as defined in 10 CFR 50.59 (c).

3. Proposed changes in the Technical Specifications and license amendments will be reviewed prior to submittal to the NRC to verify the advisability of such changes.

4. Violations, deviations and reportable events which require reporting to the NRC in writing within 24 hours will be reviewed to verify the adequacy of any investigations and the corrective actions taken to prevent or reduce the probability of recurrence of such events.

5. Periodically review the onsite audit program, as developed by the Quality Assurance Department, to assure that audits are being performed in accordance with Technical Specification requirements and the plant Operating Quality Assurance Program.

6. Periodically review reports and documentation selected by the NSRB of reviews of safety-related matters conducted by the Plant Operating Staff as described in FSAR Section 13.4.1 to verify the adequacy of the onsite review process.

7. Other matters deemed appropriate by NSRB members or referred to the NSRB by the ORC or ISEG.

8. ORC meeting minutes.

9. Periodically review selected reports of audits conducted by the NRC and onsite audits conducted by UE Quality Assurance Department for compliance with the plant Operating Quality Assurance Program and plant license requirements. Basis for selection of reports for review will be consensis of NSRB members.

10. Other items included in the Technical Specifications Section 6.5.2.7.

IV. AUTHORITY

The NSRB is advisory to the Vice President-Nuclear. Minutes of the NSRB, which shall include its reports, findings, and recommended actions, shall be submitted to the Vice-President-Nuclear within 14 days of the meeting.

V. MEETINGS

1. Meeting dates shall be determined by the chairman. The NSRB shall meet at least once per calendar quarter during the initial year of unit operation following fuel loading and at least once per six months thereafter. The first meeting will convene three months before fuel load.

2. A quorum for meetings shall consist of the board chairman or vice-chairman and at least 4 members or their alternates.

3. A majority vote of the members present shall be required for approval of an agenda item. Each member shall have one vote. At any one time only two alternates shall have one vote each. The majority opinion and dissenting comments shall be incorporated into meeting minutes.

4. An agenda shall be supplied to each NSRB member prior to the meeting. The agenda will include items listed in section III, items submitted by the ORC, and items submitted for review by NSRB members or UE management.

5. Presentations to the NSRB will generally be categorized as follows:

   a. ORC submittal of recommendations and other information to the NSRB for review.

   b. Presentations by members of the NSRB, the plant operating staff, or other individuals in response to requests or interests of the NSRB.

   c. Presentations to the NSRB may include written documents sent to the members by mail, written documents presented to members at their meetings, or verbal presentations given during the NSRB meetings. Generally, written presentations also required a verbal summary at a meeting.

   d. The content of a presentation to the NSRB may vary widely according to the nature of the subject or the scope necessary for adequate review. If an item warrants only a brief explanation or discussion, written presentations may not be required.

VI. RECORDS AND INFORMATION REPORTING

1. Minutes shall be prepared and retained for all scheduled meetings of the NSRB. The minutes should identify all documentary material reviewed. Decisisons and recommendations made by the NSRB shall be documented. The minutes shall be distributed to the Vice-President-Nuclear, the Superintendent-Callaway, each member of the NSRB and others designated by the Chairman or Vice Chairman, within 14 days of the meeting. Minutes of each meeting shall be reviewed and approved at the first meeting following distribution of the minutes.

2. The minutes of the NSRB will function as the written means of identifying problems and keeping appropriate management personnel knowledgeable of NSRB activities.

3. NSRB members shall be kept informed on a timely basis of matters within their scope of responsibility. They should be provided with, or have made available, copies of: the FSAR, communications between the NRC and UE relating to nuclear safety matters or non-compliance with Operating License or Appendix A Technical Specification requirements; Reportable Occurence investigations; and such additional information as they may request from the Chairman.

ITEM 16 Resume of the Vice President-Nuclear

Union Electric Response

On October 1, 1981 Donald F. Schnell will become the Vice President-Nuclear. His resume is currently listed in Section 13.1 of the FSAR as the General Manager, Operations.

ITEM 17 Fire Marshall's Resume

Union Electric Response

Enclosed for NRC review is a revised resume of Frank Young; Callaway Safety Supervisor, who fills the position of Fire Marshall:

Frank R. Young - Safety Supervisor

Education - Bachelor of Science, Fire Technology
Central Missouri State University
Warrensburg, Missouri

Master of Science, Industrial Safety
Central Missouri State University
Warrensburg, Missouri

Related
Training - U. S. Navy Firefighting School, 1946, 8 weeks

Certified State of Missouri Instructor
Fire Related Courses

Certified Safety Professional (CSP)
National Exam, 1978

Certified First Aid Instructor
Standard and Advanced, 1966

Certificate - Radiological Monitoring
St. Louis County Civil Defense, 1962

Certificate - Instructor Radiological Monitoring
University of Missouir, 1966

Certificate - Instructor Shelter Management
University of Missouri, 1967

Certificate - Occupational Health Hazards
Washington University, 1970

Experience - U.S. Navy, 1946-1949
Damage Control and Firefighting

Firefighting and Fire Service Related, 1951-1981

Firefighting - Ammunition Storage Area, 1951-1955

Firefighter and Engineer, 1955-1968
Kirkwood Fire Department

Fire Inspector, 1968-1971
St. Louis, County

Safety Manager, 1971-1980
Six Flags Amusement Park

Fire Marshal, 1980-1981
Mehlville Fire District

Safety Supervisor, 1981 to Present
Callaway Plant

ITEM 18 Site Personnel with Previous Nuclear Experience

Union Electric Response

Transmitted to NRC as requested by separate letter and additional copy is attached.

TRAINING DEPARTMENT

NAME & PRESENT POSITION	PREVIOUS COMMERCIAL PWR EXPERIENCE (Plant)	JOB TITLE (At Referenced Plant)	YEARS
Appleby, P. T. (Supt., Training)	TVA (Sequoyah) Con. Ed. (Indian Point)	S/U Test Eng. Refueling Eng.	2.5 0.5
Forrest, W. R. (Sr. Training Supv.)	Commonwealth Ed. (Zion) SRO Certified	Instructor	3.2
Hobbs, P. S. (Sr. Training Supv.)	Duquesne Light Co. (Beaver Valley) SRO Licensed	Reactor Operator	2.8
	Memphis State University	Training Inst. for BWR/PWR Fund. Course & S/U on Research Rx for RO/SRO Candidates	2.5
Huff, J. L. (Sr. Training Supv.)	Rochester Gas & Electric Co. (Ginna)	I & C Technician	10.0
Weldon, H. V. (Training Supv.)	Public Service of Oklahoma (Black Fox)	Training Specialist	0.75
Dampf, J. F. (Training Supv.)	Kansas Gas & Electric Co. (Wolf Creek)	R.O. Candidate	0.8
Sampson, S. E. (Training Supv.)	Wisconsin Public Service Co. (Kewaunee) R.O. Licensed	Reactor Operator Training Inst.	8.5 0.25
Evans, M. E. (Training Supv.)	Duke Power Co. (Oconee) R.O. Licensed	Reactor Operator	3.0
Tefertiller, R. L. (Training Supv.)	Carolina Power & Light Co. (H.B. Robinson) R.O. Licensed	Reactor Operator	3.0

ENGINEERING DEPARTMENT

NAME	COMMERCIAL NUCLEAR PLANT	POSITION AT REFERENCE PLANT	TIME
R. L. Wilks (Supt., Engineering)	Trojan	Observer - outage	8 weeks -outage
T. E. Metcalf (Supervising Engineer)	Maine Yankee	Control Board Operator Certified RO and SRO	4 years
J. D. Schottel (QC Supervisor)	Dresden Cooper	Nuclear Engineer Quality Assurance Spec.	1 1/2 years 1 1/4 years
C. A. Brewer (Supervising Engineer)	Kewaunee Cook	Observer	7 1/2 weeks
K. R. Bryant (Engineer)	Salem	Observer	2 months
D. S. Hollabaugh (Asst. Engineer)	Robinson	Observer	2 months
F. T. Semper (Asst. Supt. Eng-I&C)	Trojan	Observer	1 month

RADIATION-CHEMISTRY

NAME	COMMERCIAL NUCLEAR PLANT	POSITION AT REFERENCE PLANT	TIME
J. R. Peevy (Asst. Supt, Eng - Rad/Chem)	Farley	Observer	4 weeks
R. R. Roselius (Health Physicist)	Palisades	Health Physicist	5 months
P. A. Walsh (Health Physicist)	Calvert Cliffs	Sr. Plant Operator	15 months
	Vermont Yankee	Health Physics Tech	3 months
	Maine Yankee	Health Physics Tech	3 months
	Yankee Atomic Elec. Co.	Asst. to the RPM	3 months
M. P. Hedges (Chemist)	Farley	Observer	4 months
J. R. Polchow (Rad/Chem Foreman)	Farley	Observer - Foreman	6 weeks
J. A. Ridgel (Rad/Chem Foreman)	Millestone	Rent-A-Tech	4 months
C. L. Wohlers (Rad/Chem Tech)	Maine Yankee	Rad/Chem Tech	6 months
	Farley	Rad/Chem Tech (Observer)	2 weeks
D. J. Voeller (Rad/Chem Tech)	Farley	Rad/Chem Tech (Observer)	2 weeks
T. L. Shaw (Rad/Chem Tech)	Commonwealth	Rad/Chem Tech	6 1/2 years
G. L. Lewis (Rad/Chem Tech)	D. C. Cook	Chemistry Tech	21 months

OPERATIONS DEPARTMENT

NAME	REFERENCE COMMERCIAL NUCLEAR EXPERIENCE	JOB TITLE AT REFERENCE PLANT	TIME
A. P. Neuhalfen (Superintendent, Operations)	Turkey Point	Superintendent, Operations (Observer)	5 weeks
D. E. Heinlein (Asst. Supt., Operations)	Farley Plant	Asst. Superintendent, Operations (Observer)	6 weeks
N. E. Barnett (Operating Supervisor)	D. C. Cook Plant	Operating Supervisor (Observer)	5 weeks
A. H. Daume (Operating Supervisor)	Three Mile Island	Consulting Engineer	15 months
	Indian Point and Peach Bottom	Consulting Engineer	8 months
J. R. Fish (Operating Supervisor)	D. C. Cook	Operating Supervisor (Observer)	5 weeks
B. L. Fravel (Operating Supervisor)	Sequoya	Operating Supervisor (Observer)	2 weeks
W. E. Lacefield (Operating Supervisor)	Sequoya	Operating Supervisor (Observer)	2 weeks
N. E. Morris (Operating Supervisor	North Anna	Operating Supervisor (Observer)	6 weeks
P. W. Mory (Operating Supervisor)	North Anna	Operating Supervisor (Observer)	6 weeks
S. M. Putthoff (Operating Supervisor)	Farley	Operating Supervisor (Observer)	6 weeks
V. J. Shanks (Operating Supervisor)	Turkey Point	Operating Supervisor (Observer)	6 weeks
D. E. Young (Operating Supervisor)	Turkey Point	Operating Supervisor (Observer)	6 weeks

MAINTENANCE DEPARTMENT

NAME	REFERENCE COMMERCIAL NUCLEAR EXPERIENCE	JOB TITLE AT REFERENCE PLANT	TIME
W. H. Sheppard (Mtce. Planner Foreman)	Turkey Point	Observer	1 month
G. E. Pritchett (Mtce. Foreman)	Turkey Point	Observer	1 month
R. R. Simpson (Mtce. Foreman)	Turkey Point	Observer	1 month
B. F. Albaugh (Mtce. Foreman)	Turkey Point	Observer	1 month
T. W. Stahl (Nuclear Mtce.Mech.-Mechanical)	Calvert Cliffs	Senior Machinist Mechanic	3½ years
R. D. Watkins (Nuclear Electrical Mechanic)	Farley	Electrician	1 year

ITEM 19 Additional Training Information on Callaway Personnel in the following items:

a. Percent training completed per man

b. Personnel with on-the-job training at other plants

c. List of all people certified or who will be certified at Zion

d. Copy of INPO letter describing bases for chemistry training

Union Electric Response

An enclosure is attached to supply information concerning Question 19, a through c. The second enclosure is the Chemistry Manual supplied by INPO, but this document is a draft only.

EXPLANATION OF SYMBOLS

I	Phase I - Fundamentals
RR	Research Reactor Training
II	Phase II - Systems
III	Phase III - Simulator
OPT III	Option III - Simulator Training
RO CERT	Reactor Operator Certification by Westinghouse
SRO CERT	Senior Reactor Operator Certification by WES
OBS	Observation Training
ON SITE	On Site Training
URO	Unit Reactor Operator
( )	Numbers in brackets; refer to applicable notes.
	The numbers below the headings indicate the percent (%) complete in that particular course.

APPLICABLE NOTES

(1) Certification on Zion Station.

(2) The indicated Unit Reactor Operators have completed Phase III training, and all have taken both the Senior Reactor Operator and Reactor Operator certification examinations. These examinations are currently being evaluated by Westinghouse in Pittsburg, Pennsylvania. It is anticipated that all operators will certify as both Reactor Operator and Senior Reactor Operator (as of 29 July 1981).

(3) The indicated personnel (2 Unit Reactor Operators and 1 Training Supervisor) have completed training through Phase II (as of 24 July 1981). Phase III training and subsequent certification will commence on 3 August 1981. All personnel indicated are expected to certify as Reactor Operator and Senior Reactor Operator. Scheduled completion date: 21 October 1981.

(4) The indicated personnel are new and will not Cold License.

(5) The Research Reactor training for the indicated Operating Supervisor has been waived due to previous military experience (Navy).

(6) The indicated Operating Supervisor will attend the Research Reactor Training Program at the University of Missouri (Rolla) on 6 September 1981.

(7) The indicated Operating Supervisor has completed Phase III training and certification audit for Reactor Operator and Senior Reactor Operator. These examinations are currently being evaluated by Westinghouse in Pittsburg, Pennsylvania. It is anticipated that he will certify as Reactor Operator and Senior Reactor Operator.

(8) On Site Training - Phase V; as outlined in Volume 5 Addendum to the FSAR, Chapter 13.2 (13.2.1.1.5) states that, "This segment of training will cover a period of approximately 18 months." Phase V topics include:

1. Part 1 - Fundamental Nuclear Training

2. Part 2 - Systems Training

3. Part 3 - Systems Checkouts (accomplished in Conjunction with Part 2).

    a. Phase V-1; Approximately 40% of Systems and Checkouts

    b. Phase V-2; Approximately 60% of Systems and Checkouts

4. Part 4 - Simulator Review Course

5. Part 5 - Pre-Licensing Review Series

6. Part 6 - Pre-Licensing Audit Examination

For percentage tabulation, Callaway is performing Parts 2 and 3 together, and Phase V-1 is considered to represent approximately 10% completion.

(9) Observation Training: The Superintendent of Operations and his two assistants are, as off-site time becomes available, working toward completion of their Observation training. They are, as much as possible, attempting to pattern this training to reflect the requirements of ANS 3.1 Draft Revision 12/6/79.

(10) Observation Training: Operating Supervisors; Callaway's current compliment of thirteen (13) Operating Supervisors are working toward the completion of their Observation training, as off-site time becomes available. They are, as much as possible, attempting to pattern their training to reflect the requirements of ANS 3.1 Draft Revision 12/6/79.

(11) Observation Training: Mr. Miltenberger (Assistant Plant Superintendent) is currently off-site working toward completion of his Observation training. This is being patterned, as much as possible, to reflect the requirements of ANS 3.1 Draft Revision 12/6/79.

Mr. Wilks (Superintendent of Engineering) is also currently off-site working toward completion of his Observation training.

ADMINISTRATION

NAME	JOB TITLE	I	RR	II	III	OPT III	RO CERT	SRO CERT	OBS	ON(B) SITE
Stiller, M.A.	Plant Superintendent	100	100	100	100		100	100(1)		
Miltenberger, S.E.	Asst. Plant Supt.	100	100	100	100		100	100	50(11)	
Wilks, R.L.	Superintendent, Eng.	100	100	100	100		100	100	50(11)	

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OPERATIONS DEPARTMENT

NAME	JOB TITLE	I	RR	II	III	OPT III	RO CERT	SRO CERT	OBS	ON(8) SITE
Neuhalfen, A.P.	Supt. Operations	100	100	100	100		100	100	(9)	
Heinlein, D.E.	Asst. Supt. Operations	100	100	100	100		100	100	15(9)	10
Taylor, M.E.	Asst. Supt. Operations	100	100	100	100		100	100	(9)	10
Barnett, N.E.	Operating Supervisor	100	100	100	100		100	100	(10)	10
Blosser, J.D.	Operating Supervisor	100	(5)	100	100		100	100	(10)	10
Daume, A.H.	Operating Supervisor	100	(5)	100	100		100	100	(10)	10
Fish, J.R.	Operating Supervisor	100	100	100	100		100	100	(10)	10
Fravel, B.L.	Operating Supervisor	100	100	100	(7)		(7)	(7)	(10)	
Heinzer, M.E.	Operating Supervisor	100	(5)	100	100		100	100	(10)	10
Lacefield, W.E.	Operating Supervisor	100	100	100	100		100	100	(10)	10
Morris, N.A.	Operating Supervisor	100	100	100	100		100	100	90(10)	10
Mory, P.W.	Operating Supervisor	100	100	100	100		100	100	90(10)	10
Putthoff, S.M.	Operating Supervisor	100	100	100	100		100	100	25(10)	10
Schoenbach, B.G.	Operating Supervisor	100	(6)	100	100		100	100	(10)	10
Shanks, V.J.	Operating Supervisor	100	100	100	100		100	100	90(10)	10
Young, D.E.	Operating Supervisor	100	100	100	100		100	100	90(10)	10

TRAINING DEPARTMENT

NAME	JOB TITLE	I	RR	II	III	OPT III	RO CERT	SRO CERT	OBS	ON(8) SITE
Appleby, P.T.	Supt. Training	100	100	100	100		100	100(1)	N/A	
Burris, R.E.	Training Supervisor	100	100	100	(3)		(3)	(3)	N/A	
Dampf, J.F.	Training Supervisor	100	100	100	100		100	100	N/A	10
Forrest, W.R.	Sr. Training Supv.					.00	100	100	N/A	10
Halverson, S.M.	Training Supervisor	100	100	100	100		100	100	N/A	10
Hobbs, P.S.	Sr. Training Supv.			100		100	100	100	N/A	
Sampson, S.E.	Training Supervisor					100	100		N/A	10

UNIT REACTOR OPERATORS

NAME	JOB TITLE	I	RR	II	III	OPT III	RO CERT	SRO CERT	OBS	ON(8) SITE
Beerman, R.P.	URO	100	100	100	(2)		(2)	(2)	N/A	
Bellers, S.J.	URO (4)								N/A	
Bredeman, B.P.	URO	100	100	100	(2)		(2)	(2)	N/A	
Coffin, C.H.	URO	100	100	100	100		100	100	N/A	10
Cunningham, J.L.	URO	100	100	100	(2)		(2)	(2)	N/A	
Fisher, R.J.	URO	100	100	100	(2)		(2)	(2)	N/A	
Geisler, J.E.	URO	100	100	100	(2)		(2)	(2)	N/A	
Jessop, W.O.	URO	100	100	100	(3)		(3)	(3)	N/A	
Johnson, J.W.	URO	100	100	100	(2)		(2)	(2)	N/A	
Jones, L.	URO	100	100	100	100		100	100	N/A	
Miller, P.S.	URO (4)								N/A	
Nowell, W.D.	URO	100	100	100	100		100	100	N/A	10
Patterson, J.T.	URO	100	100	100	(3)		(3)	(3)	N/A	
Shannon, P.C.	URO	100	100	100	(2)		(2)	(2)	N/A	
Weekley, R.J.	URO	100	100	100	100		100	100	N/A	10
Yauger, S.L.	URO	100	100	100	100		100		N/A	10

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NUCLEAR POWER PLANT
TECHNICAL PERSONNEL

GUIDELINES FOR CHEMISTRY TECHNICIAN TRAINING

THE
INSTITUTE OF NUCLEAR POWER OPERATIONS

OFFICIAL RELEASE

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DOCUMENT NUMBER

DRAFT 2
January, 1981

FOREWORD

Consistent with the Institute of Nuclear Power Operations' responsibility to assist the nuclear power industry in improving operational safety we have developed guidelines for training and education programs. These guidelines are designed to provide knowledge and skills necessary for acceptable job performance in specific positions. This document provides guidelines for Chemistry Technicians.

Additionally, this document provides a basis for INPO evaluation of efforts toward providing well-qualified personnel in nuclear unit positions.

These guidelines were prepared utilizing input from two sources: existing industry programs and the experience of INPO staff and industry reviewers. A long-range goal for INPO is to develop training and education specifications based on the results of job/task analysis. When complete, that effort will result in modifications (if necessary) to this document.

The safe, reliable and efficient operation of a nuclear power plant requires dependable and accurate chemistry control. Such attributes can only be achieved and maintained by competent instrument and chemistry technicians. A comprehensive program of education and training is required not only to develop but also to maintain such competency.

The purpose of this document is to provide guidelines for the development and maintenance of the knowledge and skills necessary to accomplish the tasks of chemistry technicians. The training topics as well as the prescribed number of hours dedicated to each topic were ascertained by researching present programs within the industry. Those guidelines are practicable and achievable as evidenced by the fact that many utilities currently meet portions of them. By implementation of and adherence to these guidelines, the utility will improve the overall technical competence of its chemistry technicians and will contribute to industry-wide consistency in technician training.

GUIDELINES FOR CHEMISTRY

TECHNICIAN TRAINING

TABLE OF CONTENTS

I. INTRODUCTION

Recent incidents at nuclear power units has demonstrated the need for comprehensive aining of technicians. The purpose of this document is to prescribe the guidelines necessary to upgrade their performance and to assure the continual expertise of the instrument and control technicians.

For the purpose of this document, the term "Chemistry Technician" and "technician" are used to describe those persons within the unit staff who sample and analyze unit chemistry and prescribe chemical controls and precautions. Regardless of their position title(s) within the utility organization, this document pertains to those personnel who perform the duties described above.

Additionally, two levels of technicians have been defined for the purpose of establishing curriculum, scope, comptencies, and qualifications. The defined levels pertain to tasks and responsibilities of technicians rather than discrete organizational positions and the application of these guidelines must be in the same manner.

These guidelines are only a segment in the development of comprehensive training programs for all nuclear power unit personnel. This document will inter-relate with similar INPO guidelines such as those which pertain to Instructor Certification and General Employee Training as well as others to be developed in the future. Such inter-relationships will be delineated within each INPO guideline.

The fundamental approach to these guidelines is performance-based training. That is, the result of training efforts recommended herein is the demonstrable proficiency of the knowledge and skills necessary in quality performance of the tasks within the scope of the technician's responsibility. Many of the requirements of these guidelines may be met by the education, training, experience and competencies presently held by the individual technicians. However, the implementation of this guidelines requires the demonstration of the assumed present knowledge and skills to ascertain the threshold of any and all needed training.

The course material outlined in this document, when taught in a meaningful and comprehensive manner, will meet the course goal. Approximate hours are provided for most topics and are based on a best estimate of the time needed to achieve the desired level of training. Actual hours may vary somewhat with the method of instruction, type of unit and the trainees for whom training is provided.

The method of instruction is the variable which may have the most significant impact on the topical time allotments. The recommended numbers of hours, when not specifically prescribed, are based on lecture-type instruction. Some training departments may choose alternate modes of material presentation such as individualized self-study. It is the responsibility of the instructional staff to assure that the course content and the time alloted for material presentation meets the intent of this course objective, regardless of the mode of presentation.

II. DEFINITIONS

The definitions given below are of a restricted nature for the purpose of this document.

A. Unit: A single nuclear steam supply system and its associated electrical, mechanical and instrument and control systems.

B. Plant: One or more units at a single location.

C. Criterion - referenced performance measurement

A statement in precise, measurable terms of a particular behavior to be exhibited by the student under specified conditions.

III. Course Goal

To ensure that nuclear power unit Chemistry technicians possess the knowledge and skills necessary to contribute to unit safety, reliability and efficiency by performing accurate sampling and analysis of unit chemistry and prescribing appropriate chemistry control.

These guidelines prescribe means for achieving this goal in the following manner:

A. Identifying levels of training

B. Delineating competencies needed for each level

C. Delineating qualifications needed for each level

D. Qualifying and quantifying subject matter and instructional modes

E. Prescribing modes and means of trainee evaluations

F. Specifying requalification criteria

G. Prescribing modes and means of program evaluation

H. Specifying program record management criteria

IV. Technical Training Levels

The course material is divided to accomodate two technical training levels:

Level One corresponds to those technicians whose duties include sampling and analysis of non-safety related and non-contaminated unit components and systems. Additionally, Level One technicians calibrate, standardize and maintain the instruments associated with the analysis of non-safety related and non-contaminated unit components and systems.

Level Two corresponds to those technicians whose duties include surveillance tests, sampling and analysis and prescription of chemistry controls of all safety and non-safety related and all contaminated or potentially contaminated components and systems. Additionally, Level Two technicians calibrate, standardize and maintain instruments associated with the analysis of safety and non-safety related and all contaminated as potentially contaminated unit components and systems.

The establishment of two levels is intended to distinguish those who work on safety related and contaminated equipment and, thus require additional training, from those who perform tasks not involving such additional expertise.

These guidelines require the trainee to demonstrate skill and knowledge proficiency prior to assuming responsibility for tasks which involve such expertise. Additionally, it is required that the Level Two trainee have demonstrated proficiency in all Level One topics.

V. Level One Training Program

A. Competencies Required For Satisfactory Training

Typical tasks of the Level One technician are the determining of correct sample points, the sampling preparation and analysis of such samples, the calibration, standardization and use of analytical instruments within a nuclear power unit, and the determination and prescription of chemical controls. The performance of these tasks also requires written and oral communications skills. Satisfactory training as a Level One technician requires demonstratable competency in these and associated tasks and skills. The guidelines within this document prescribe methods of competency development and measurement.

B. Attributes Required for Program Entry

1. Education:

These guidelines do not recommend educational requirements exceeding high school diploma or equivalent in that formal education in itself does not relate directly to task competency.

2. Experience:

In that the Level One technician is considered a hire-in position and since he/she does not work on safety-related equipment systems, there are no experience requirements for the position. The experience gained by the technician with performance of Level One tasks is considered preparatory for advancement to Level Two.

3. Physical:

The following criteria are required:

a. Natural or corrected near-distance visual acuity such that the individual is capable of reading J-1 letters on a standard Jaeger test or equivalent.

b. Color vision such that the individual is capable of distinguishing and differentiating contrast between common colors.

c. Physique, motor power, range of motion and dexterity to allow ready access to and safe execution of assigned duties.

C. Training Program Content

The material outlined in this document falls within five major categories. Each category will be presented in detail. Appendix A, "Chemistry Technician Training Guidelines," delineates the topics and recommended number of hours per topic for both Level One and Level Two technicians. Retraining on certain topics is also delineated in Appendix A.

1. General Technical Training (GTT):

Topics which fall within this category provide the technician with generic technical knowledge in subject matter pertinent to the sciences of nuclear power plants. The intent of this training is to familiarize the trainee with the fundamental technical aspects of assigned jobs and coincidentally provide a basis for the advanced, unit-specific topics within the subsequent category.

Since General Technical Training topics are generic in nature, it is not necessary that they be presented by either unit or utility instructors. Colleges, technical, trade, vendor and/or military schools often provide satisfactory training in these topics. Additionally, these topics lend themselves to various modes of presentation such as lecture-based and/or individualized self- study. Many of the topics require lab or hands-on exercises to relate theory to practical application of the subject matter. Those subject which require such exercises are marked with a pound sign (#).

Knowledge topics, Basic Physics, lend themselves to written examinations such as essay questions or problems which require the trainee to demonstrate knowledge of concepts and details. Skill topics, such as sampling techniques and sample preparation lend themselves to demonstration of those skills in actual or simulated conditions in which the technicians perform their actual tasks. In both cases the performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individual's proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees. In this manner of evaluation, the trainee with either pass or fail each topic. Should the trainee fail a particular topic, the subject matter must be repeated, followed by a performance evaluation until the student passes the

evaluation or it is determined he/she is incapable of passing. If the latter occurs, this guideline requires the technician be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

The following is a list of required subjects and the corresponding topics for the category of General Technical Training. Also included is the objective and the recommended number of hours for each subject and topic. Appendix B, "Topic Descriptions", describes the recommended content of G. T. T. subject matter.

a. Mathematics (60 hours)

Objective: Upon completion of this subject matter the trainee will be able to perform calculations of symbolic and word problems using the laws and formulas of:

1. Basic mathematics (10 hours)
2. Algebra (30 hours)
3. Basic geometry (20 hours)

b. Physics (56 hours)

Objective: Upon completion of this subject matter the trainee will be able to perform calculations and describe the concepts of:

1. Mechanics (24 hours)
2. Heat transfer (16 hours)
3. Nuclear physics (16 hours)

c. Chemistry (74 hours)

Objective: Upon completion of this subject matter the trainee will be able to describe concepts of and demonstrate skills associated with:

1. Atoms, elements and bonding (4 hours)
2. Molecules, compounds and ions (4 hours)
3. Chemical equations (4 hours)
4. Periodic table (4 hours)
5. Solvents and solutes (4 hours)
6. Chemical and ionic equilibrium (4 hours)
7. Acids and bases (4 hours)
8. Basic water chemistry (16 hours)
9. Corrosion process and corrosion control (12 hours)
10. Analytical chemistry theory (12 hours)
11. Weight and volume measurement (6 hours)

d. Basic Electricity (40 hours)

Objective: Upon completion of this subject matter, the trainee will be able to describe concepts of:

1. Sources of differences of electrical potential (8 hours)
2. Ohm's Law and Watt's Law (8 hours)
3. Series, parallel and compound circuits (16 hours)
4. Basic alternators and transformers (8 hours)

e. Technical Skills and Knowledge (110 hours)

Objectives: Upon completion of this subject matter the trainee will be able to describe the concepts and demonstrate skills associated with:

1. Sampling techniques (6 hours)
2. Sample preparation (6 hours)
3. Safe handling of samples and solutions (6 hours)
4. Preparation of standards and reagents (6 hours)
5. Techniques of analysis using the following types of analysis instruments:
   a. volumetric (12 hours)
   b. gravimetric (6 hours)
   c. colorimetric (12 hours)
   d. spectrophotometric (12 hours)
   e. potentiometric (6 hours)
   f. conductometric (6 hours)
6. Principles of chemical addition and control (12 hours)
7. Chemistry control criteria (12 hours)
8. Mechanical Print (P & ID) reading (8 hours)

2. Unit-Specific Technical Training (USTT)

Topics which fall within this category provide the technician with specific technical knowledge of instruments and techniques used within the unit where he/she works. The intent of this category is to familiarize the trainee with the principles of operation and methods of calibration, standardization and use of the specific analysis instruments and associated equipment within the unit he/she works.

Unit-Specific Technical Training topics require instructors who have in-depth knowledge and experience with the instruments and equipment which they are instructing. Such technical expertise is often available from vendors and can be satisfactorily provided either directly to the unit technicians or to a utility instructor who subsequently instructs the technicians. Additionally, these topics lend themselves to various modes of presentation such as lecture-based and/or individualized self-study. All of the topics require lab or hands-on exercises to relate theory to practical application of the subject matter.

Knowledge topics, such as the purpose, use, and principals of operation of a specific device, lend themselves to written examinations such as essay questions which require the trainee to demonstrate knowledge of concepts and det[illegible] Skill topics, such as methods of calibration and standardization and techniques of analysis using a specific device, lend themselves to demonstrations of those skills in actual or simulated conditions in which the technicians perform their tasks. In both cases the performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individuals' proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees. In this manner of evaluation the trainee will either pass or fail each topic. Should the trainee fail a particular topic, the subject matter must be repeated, followed by a performance evaluation until the trainee passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs, these guidelines require the technician to be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

While it is impracticable to instruct each type of device manufactured by each vendor within a specific unit, it is practicable and achievable to instruct major product lines manufactured by each major vendor. Additionally, the types of numbers of devices varies from unit to unit. Consequently, specific hours of instruction in Unit-Specific Technical Training topics are not prescribed. However, it is the responsibility of the cognizant individual to develop and measure trainee expertise commensurate with assigned duties and responsibilities within his/her unit.

The following is a list of required subjects and corresponding topics for the category of Unit-Specific Technical Training. Also included is the objective for the subject matter. Appendix B, "Topic Descriptions", describes the recommended U.S.T.T subject matter. The asterisk (*) indicates that instruction should be sufficient to assure in-depth and detailed trainee knowledge in the subject matter. The pound-sign (#) indicates that lab/hands-on time should be sufficient to assure practical application of the subject matter.

a. Unit Specific Analytical Instruments (*#)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the purpose, use and theory of operations of and 2) perform calibrations, standardization and analyses with the following equipment:

1) Installed process analysis instruments (*#)
2) Portable analysis instruments (*#)
3) Cold laboratory analysis instruments (*#)

3. Unit-Specific Systems Training (U.S.S.T)

Topics which fall within this category provide trainee familiarity with the electrical, mechanical and I & C systems within a unit and the relation and interactions of the systems. In plants which have common systems between units, the interactions of the units must be presented also. The intent of this category is to make the trainee aware of the purpose, design, modes of operation and dynamics of the systems and system components. Unit-specific Systems Training topics lend themselves to experts in all aspects of plant systems and their characteristics. Therefore, it is recommended that such topics be presented by the utility's on-site instructors. Additionally, these topics lend themselves to various modes of instruction such as lecture-based or individualized self-study.

This category consists entirely of knowledge topics and therefore lends itself to written examinations such as essay questions which require the trainee to demonstrate knowledge of unit design, layout and modes of unit operation. The performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is aware of the unique environment in which he/she works. The individuals' proficiency measurement must be criterion referenced rather than relative to the performance of other trainees. In this manner of evaluation the trainee will either pass or fail each topic. Should the trainee fail a particular topic, the subject matter must be repeated followed by a performance evaluation until the trainee passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs, this guideline requires the technician be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

The following is a list of required subjects for the category of Unit-Specific Systems. Also included is an objective for each subject. In all cases, the scope of the subject matter is dependant on the complexity of the individual's unit. Therefore it is difficult to quantify the recommended amount of training. The asterisk (*) indicates that instruction should be sufficient to assure in-depth and detailed trainee knowledge of the subject matter. Appendix B, Topic Descriptions, describes the recommended U.S.S.T. subject matter.

a. Mechanical Systems (*)

Objective: Upon completion of this subject matter the trainee will be able to 1) describe the purpose, 2) draw a one-line diagram, and 3) describe the normal and abnormal conditions of all unit mechanical systems.

b. Electrical Systems (*)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the purpose 2) draw a one-line diagram and 3) describe the normal and abnormal conditions of all unit electrical systems.

c. Instrument and Control Systems (*)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the purpose 2) identify normal and back-up power sources, 3) describe the logic and 4) describe the normal and abnormal conditions of all major unit instrument and control systems.

d. Specific Unit Operation and Systems Interactions (*)

Objective: Upon completion of this subject matter, the trainee will be able to 1) draw a multi-line diagram of the energy generation system from the reactor to the turbine and through the condensate and feedwater systems; 2) describe system interactions and dynamics during; a.) start-up b.) operation c.) power changes and d.) trip conditions and 3) descibe the purpose and modes of operation of all engineered safety features of the unit in which he/she works.

4. DEPARTMENTAL PROCEDURE TRAINING

Topics which fall within this category provide the trainee familiarity with the procedures for the activities and policies of his/her department. The intent of this category is to indoctrinate the trainee on procedural purpose and objectives, the need for strict procedural adherence, methods and limitations of temporary procedure changes and the actual performance of the departmental procedurs. Departmental Procedure Training requires instructors who are intimately familiar with all aspects of the procedures which they instruct. Department supervisor s often have such familiarity and therefore it is recommended that they or staff members with similar knowledge present this topical material. Additionally, these topics lend themselves to various modes of instruction. In some cases, such as Administrative Procedures, the preferred modes of instruction are lecture-based or individualized self-study. However, Calibration and Maintenance Procedure training lend themselves to on-the-job training.

Knowledge topics, such as Departmental Administrative Procedures, lend themselves to written examinations such as essay questions which require the

trainee to demonstrate knowledge of concepts and details. Skill topics such as Maintenance and Calibration procedures, lend themselves to demonstration of those skills in actual or simulated conditions in which the technicians perform their tasks. In both cases the performance criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The technicians proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees. In this manner of evaluation, the trainee will either pass or fail each topic. Should the trainee fail a particular topic the subject matter it must be repeated, followed by a performance evaluation until the trainee either passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs this guideline requires the technician to be prohibited from performing tasks which require expertise in the failed subject matter.

The following is the required subject for Departmental Procedure Training. Also included is the objective for the subject. Appendix B, "Topic Descriptions", describes the recommended D.P.T. subject matter. Since the scope and number of procedures varies considerably from unit to unit prescribed numbers of hours are not explicitly stated. The asterisk (*) indicates that instruction should be sufficient to assure in-depth and detailed trainee knowledge in the subject matter. The pound sign (#) indicates that lab/hands-on time should be sufficient to assure practical application of the subject matter.

a. Department Administrative Procedures (*#)

Objective: Upon completion of this subject matter the trainee will be

able to describe the purpose, scope and application of Departmental Administrative Procedures.

b. Department Maintenance Procedures (*#)

Objective: Upon completion of the subject matter, the trainee will be able to 1) describe the (a) purpose (b) scope and (c) application and 2) perform the tasks specified in the Department Maintenance Procedures.

c. Department Calibration Procedures (*#)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the (a) purpose (b) scope and (c) application and 2) perform the tasks specified in the Department Calibration Procedures.

5. Non-Technical Training (NTT)

Topics which fall within this category provide the trainee familiarity with the concepts and practices of Communications Skills. The intent of this category is to indoctrinate the trainee in the non-technical aspects of his/her job.

Non-Technical Training requires instructors who are familiar with the behavioral sciences involved in the subject matter. Such expertise is often available from corporate management training departments or local colleges and/or universities. Additionally, these topics lend themselves to various modes of instruction such as lecture-based and/or individualized self-study.

Non-Technical Training consists of skill topics which lend themselves to demonstration of those skills in simulated conditions in which the technicians actually perform their tasks. The performance criteria must be stringent enough to assure the cognitive individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The

technician's proficiency measurement must be criteria referenced than relative to the performance of the other trainees. In this manner of evaluation, the trainee will either pass or fail each topic. Should the trainee fail a particular topic the subject matter must be repeated, followed by a performance evaluation until the student passes the evaluation or it is detemined that he/she is incapable of passing. If the latter occurs, this guideline requires the technician to be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

The following is the required subject matter for the category of Non-Technical Training. Also included is the objective for each subject. Appendix B, "Topic Descriptions", describes the recommended D. P. T. subject matter.

a. Communications Skills (24 hours)

Objective: Upon completion of this subject matter, the trainee will be able to demonstrate proficiency in (1) group participation skills (2) dyadic oral communication skills and (3) written communication skill.

VI. Level Two Training Program

A. Competencies Required For Satisfactory Training

Typical tasks of the Level Two technician are the surveilliance tests, sampling, sample preparation, analysis and presentation of chemistry controls for safety related and contaminated unit components and systems. Qualification as a Level Two technician requires demonstrable competency in these and assorted tasks and skills. The guidelines within this document prescribe methods of competency development and measurement.

B. Attributes Required for Program Entry

1. Education

These guidelines do not recommend educational requirements exceeding the high school diploma or equivalent in that formal education in itself does not relate directly to task competeny.

2. Experience

The Level Two technician must be fully qualified as a Level One technician and performed the functions and tasks of a Level One technician for no less than one year.

3. Physical

The following criteria are required:

a. Natural or corrected near-distance visual activity such that the individual is capable of reading J-1 letters on a standard Jaeger test or equivalent.

b. Color vision such that the individual is capable of distinguishing and differentiating contrast between common colors.

c. Physique, motor power, range of motion and dexterity to allow ready access to and safe execution of assigned duties.

C. Training Program Content

The material outlined in this document falls within five major categories. Each category will be presented in detail. Appendix A, "Chemistry Technician Training Guidelines," delineates the topics and recommended number of hours per topic for both Level One and Level Two technicians. Retraining on certain topics is also delineated in Appendix A.

1. General Technical Training (G.T.T.):

Section VII

Topics which fall within this category provide the technician with generic technical knowledge in subject matter pertinent to the sciences of nuclear power units. The intent of this training is to familiarize the trainee with the fundamental technical aspects of assigned jobs.

Since General Technical Training topics are generic in nature, it is not necessary that they be presented by either unit or utility instructors. Colleges, technical, trade, vendor and/or military schools often provide satisfactory training in these topics. Additionally these topics lead themselves to various modes of presentation such as lecture-based and/or individualized self-study. Many of the topics require lab or hands-on exercises to relate theory to practical application of the subject matter. Those subjects which require such exercises are marked with a pound sign (#).

Knowledge topics, such as Radioactivity and Radioactive decay, lend themselves to written examinations such as essay questions or problems which require the trainee to demonstrate knowledge of concepts and details. Skill topics, such as Electrical Print Reading, lend themselves to demonstrations of those skills in actual or simulated conditions in which the technicians perform their actual tasks. In both cases the performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individuals' proficiency measurement must be criteria referenced rather than relative to the performance of the the trainees. In this manner of evaluation, the trainee will either pass or fail each topic. Should the trainee fail a particular topic, the subject matter must be repeated, followed by a performance evaluation until the student passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs, these guidelines requires the technician be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

a. Health Physics (78 hrs. #)

Objective: Upon completion of this subject matter, the trainee will be able to describe concepts of and demonstrate skills associated with:

1. Radioactivity and radioactive decay (6 hours)
2. Chart of the nuclides (6 hours)

3. Sources of radiation (4 hours)
4. Radiological quantities and units (6 hours)
5. Interactions of radioactivity and matter (8 hours)
6. Biological effects of radiation (12 hours)
7. Counting statistics (6 hours)
8. Radiation protection standards (6 hours)
9. External radiation exposure control (6 hours)
10. Radioactive contamination control (6 hours)
11. Airborne hazards control (6 hours)
12. Respiratory protection techniques (6 hours)

b. Technical Skills and Knowledge (24 hours)

Objective: Upon completion of this subject matter, the trainee will be able to describe concepts of and demonstrate skills associated with:

1. Preparation of radiochemical carriers. (4 hours)
2. Techniques of analysis using counting and spectros copy equipment. (16 hours)
3. Intralaboratory Contamination Control (4 hours)

2. Unit-Specific Technical Training (USTT)

Topics which fall within this category provide the technician with specific technical knowledge of instruments and techniques used within the unit where he/she works. The intent of this category is to familiarize the trainee with the principles of operation and methods of calibration, standardization and use of the specific analysis instruments and associated equipment within the unit he/she works.

Unit-Specific Technical Training topics require instructors who have in-depth knowledge and experience with the instruments and equipment which they are instructing. Such technical expertise is often available from vendors and can be satisfactorily provided either directly to the unit technicians or to a utility instructor who subsequently instructs the technicians. Additionally, these topics lend themselves to various modes of presentation such as lecture-based and/or individualized self-study. All of the topics require lab or hands-on exercises to relate theory to practical application of the subjet matter.

Knowledge topics, such as the purpose, use, and principals of operation of a specific device, lend themselves to written examinations such as essay questions which require the trainee to demonstrate knowledge of concepts and details. Skill topics, such as methods of calibration and standardization and techniques of analysis using a specific device, lend themselves to demonstrations of those skills in actual or simulated conditions in which the technicians perform their tasks. In both cases the performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individuals proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees. In this manner of evaluation the trainee will either pass or fail each topic. Should the trainee fail a particular topic, the subject matter must be

repeated, followed by a performance evaluation until the trainee passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs, these guidelines require the technician to be removed from the responsibility of performing tasks which require expertise in the failed subject matter.

While it is impracticable to instruct each type of device manufactured by each vendor within a specific unit, it is practicable and achievable to instruct major product lines manufactured by each major vendor. Additionally, the types of numbers of devices varies from unit to unit. Consequently, specific hours of instruction in Unit-specific Technical Training topics are not prescribed. However, it is the responsibility of the cognizant individual to develop and measure trainee expertise commensurate with assigned duties and responsibilities with his/her unit.

The following is a list of required subjects and corresponding topics for the category of Unit-Specific Technical Training. Also included is the objective for the subject matter. The asterisk (*) indicates that instruction should be sufficient to assure in-depth and detailed trainee knowledge in the subject matter. The pound-sign (#) indicates that lab/hands-on time should be sufficient to assure practical application of the subject matter.

a. Unit Specific Analytical Instruments (*#)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the purpose, use and theory of operations of and 2) perform calibrations, standardization and analyses with Hot Laboratory Analysis Instruments.

3. Departmental Procedure Training (D.P.T.)

The topic which falls within this category provides the trainee familiarity with the procedures for the activities and policies of his/her department. The intent of this category is to indoctrinate the trainee on procedural purpose and objetives, the need for strict procedural adherence, methods and limitations of temporary procedure changes and the actual performance of the departmental procedures.

Departmental Procedure Training requires instructors who are intimately familiar with all aspects of the procedures which they instruct. Department supervisors often have such familiarity and therefore it is recommended that they or staff members with similar knowledge present this topical material. Additionally, this topic lends itself to various modes of instruction, such as lecture based or individualized self-study. These modes are satisfactory for the purpose of procedural familiarity however, the ideal mode for assuring student performance is on-the-job training with close supervision. Performance measurement must be the proficient

execution of the procedures in actual or simulated conditions in which the technicians perform their tasks. The performance criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The technicians' proficiency measurement must be criteria referenced rather than relative to the performance of other trainees. In this manner of evaluation the trainee will either pass or fail each topic. Should the trainee fail a particular topic the subject matter it must be repeated, followed by a performance evaluation until the trainee either passes the evaluation or it is determined he/she is incapable of passing. If the latter occurs this guideline requires the technician to be prohibited from performing tasks which require expertise in the failed subject matter.

The following is the required subject for Departmental Procedure Training. Also included is the objective for the subject. Appendix B, "Topic Descriptions", describes the recommended D.P.T. subject matter. Since the scope and number of procedures varies considerably from unit to unit prescribed numbers of hours are not explicitly stated. The asterisks (*) indicates that instruction should be sufficient to assure in-depth and detailed trainee knowledge in the subject matter. The pound sign (#) indicates that lab/hands-on time should be sufficient to assure practical application of the subject matter.

a. Department Surveillance Procedures (*#)

Objective: Upon completion of this subject matter, the trainee will be able to 1) describe the a) purpose, b) scope and c) application and 2) perform the tasks specified in the Department Surveillance Procedures which the technician is responsible for performing.

VII. Trainee Evaluation

The quality of training programs, course content and instructional mode is best evaluated by the terminal behavior of the trainee. Recalling that the objective of these guidelines is to ensure that unit chemistry technicians possess the knowledge and skills necessary to perform their tasks, the ideal measurement of program effectiveness is to require demonstration of those skills and areas of knowledge. Therfore, it is required that trainee performance be evaluated at the conclusion of each topic of instruction.

With respect to the hiring-in criteria and the present skills and knowledge of chemistry technicians as well as the efficiency of the application of this guideline, a vehicle is provided to exempt qualified personnel from attending specific presentations. Individuals considered for exemption must demonstrate the same level of expertise in each topical area as the trainees who have received the instruction. In this manner, lessons can be challenged by means of an entrance examination or skill demonstration.

VIII. Retraining Program

While many subjects and topics described in these guidelines remain relatively unchanged for extensive periods, others change quite often. Additionally, some skills and knowledge remain current through continual use and application while others degrade through lack of use. Therefore, it is obvious that Chemistry technicians must receive retraining in portions of this subject matter to maintain expertise. The purpose of this section is to prescribe retraining criteria and recommend methods of achieving them.

Chemistry technician training subject matter consists of both knowledge and skill topics. Knowledge topics such as Mechanical systems require biennial written examinations similar to those at the conclusion of the original training. The performance evaluation criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individuals' proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees. In this manner of evaluation, the trainee will either pass or fail. Should the trainee fail a particular topical area of the examination(s), retraining in that topic must be performed as soon as practicable. In the period between the time of failure and the time of retraining, the technician must be relieved from the responsibility of performing tasks which require expertise in the failed subject matter. Recommended modes of retraining are either lecture-based or individualized self-study. Subsequent to the retraining, a performance examination must be administered. Such an examination should be similar to the requalification examination but consist of different questions for the

same subject matter. Should the technician fail the evaluation, retraining and re-evaluation must continue until he/she passes the performance evaluation. Should the trainee continue to fail retraining performance examinations, it is recommended that the immediate supervisor counsel him/her to determine the cause for such failure and provide appropriate remedies.

Skill topics, such as calibration, standardization and operation of analysis instruments require continual performance evaluation. Additionally, individuals who are responsible for infrequently performed tasks must be evaluated for task proficiency on a biennial basis. Areas of marginal or poor performance must be documented and retraining must follow as soon as practicable. In the period between observed poor performance and time of retraining, the technician must be relieved from the responsibility of performing tasks which require expertise in the pertinent subject matter. The recommended mode of retraining is tutored practice sessions. Following the retraining, a performance examination must be administered. It is recommended that the examination(s) consist of demonstrations of the pertinent skills in actual or simulated conditions in which the technician performs assigned actual tasks. The performance criteria must be stringent enough to assure the cognizant individual that the technician is capable of performing assigned duties in a skillful and responsible manner. The individuals' proficiency measurement must be criteria referenced rather than relative to the performance of the other trainees or the previous performance of the retrained individual. In this manner, the technician will either pass or fail. Should the technician fail the evaluation, retraining and re-evaluation must continue until he/she passes the performance evaluation.

Should the trainee continue to fail a retraining performance examination, it is recommended that the immediate supervisor counsel him/her to determine the cause for such failure and provide appropriate remedies.

The value of retraining is considered equal to that of initial training and therefore the qualifications of the instructor are identical for both activities.

IX. Program Evaluation

An important aspect of this and all training programs is communciation between members of the training organization, departmental supervisors and the trainees. Such communication promotes program updating and improvements as well as coordination of training needs. Additionally, it is highly beneficial to review programs prior to commencement and following presentations. Such reviews should include but not be limited to:

A. Expansion/contraction of time allotments for each subject and topic

B. Quality and quantity of training aids

C. The condition of the training facilities including:

1. noise
2. lighting
3. distractions
4. safety and health conditions
5. seats, tables, benches and stools
6. tools and equipment
7. consumable supplies
8. program materials
9. heating, air conditioning and ventilation

D. Modes and methods of presentations

E. Quality and pertinance of evaluation methods and tools

F. Performance of instructors and instructional staff

G. Pass/Fail ratio of the trainees

H. Trainees' assessment of training program

I. Supervisors' assessment of training program

J. Instructors' assessment of training program

X. Program Records

The following trainee records are needed for determining program effectiveness and documentation of trainee performance:

A. Training attendance sheets

B. Lesson plans

C. Training schedules

D. Instructor certifications and qualifications

E. Trainee performance evaluations including:

1. Written examinations, pass/fail criteria and trainee answer sheets

2. Skill demonstrations, pass/fail criteria and trainee performance sheets

3. Supervisory skill performance reviews

These guidelines require the maintenance of these records until the technician terminates employment with the utility.

Appendix A

CHEMISTRY TECHNICIAN TRAINING GUIDELINES

CATEGORY	TOPIC	NO. HOURS	TECH. LEVEL	RETRAINING
	MATHEMATICS:			
	Basic math	10	I	2
	Algebra	30	I	2
	Basic geometry	20	I	2
	PHYSICS:			
	Mechanics	24	I	2
	Heat Transfer	16	I	2
	Nuclear Physics	16	I	2
	CHEMISTRY			
	Weight, mass and volume measurement	2	I	2
	Atoms, elements and compounds	4	I	2
	Periodic table	4	I	2
	Ions, molecules and bonding	6	I	2
	Chemical equations	4	I	2
	Solvents and solutes	4	I	2
	Chemical equilibrium	6	I	2
	Acids and bases	4	I	2
	Basic water chemistry	16	I	2
	Corrosion process and corrosion control	16	I	2
	Analytical chemistry theory	16	I	2
	TECHNICAL SKILLS AND KNOWLEDGE			
	Sampling techniques	6#	I	1,2
	Sample preparation	6#	I	1,2
	Safe handling of samples and solutions	2#	I	1,2
	Preparation of standards and reagents	8#	I	1,2
	Preparation of radiochemical carriers	4#	II	1,2
	Techniques of analysis			
	volumetric	2#	I	1,2
	gravimetric	2#	I	1,2
	colorimetric	4#	I	1,2
	spectrophotometric	12#	I	1,2
	potentiometric	4#	I	1,2
	conductometric	6#	I	1,2
	counting and spectroscopy equipment	4#	II	1,2
	Principles of chemical addition control	4	I	2
	Mechanical print (P&ID's) reading	8#	I	2
	BASIC ELECTRICITY	40#	I	2
	HEALTH PHYSICS			
	Radioactivity and radioactive decay	6	II	2
	Chart of the nuclides	6#	II	2
	Sources of radiation	4	II	2
	Radiological quantities and units	6	II	2
	Interactions of radiation and matter	8	II	2

Appendix A

CHEMISTRY TECHNICIAN TRAINING GUIDELINES

CATEGORY	TOPIC	NO. HOURS	TECH. LEVEL	RETRAINING
	Biological effects of radiation	12	II	2
	Counting statistics	6	II	2
	Radiation protection standards (detailed 10 CFR20)	6	II	1,2
	External radiation exposure control	6	II	2
	Radioactive contamination control and evaluation	6	II	2
	Airborne hazards control	6	II	2
	Respiratory protection techniques	6#	II	1,2
UNIT SPECIFIC ANALYTICAL INSTRUMENTS				
	Installed process analysis instruments	*#	I	1,2
	Portable analysis instruments	*#	I	1,2
	Cold laboratory instruments	*#	I	1,2
	Hot laboratory analysis instruments	*#	II	1,2
MECHANICAL SYSTEMS		*	I	1,3
ELECTRICAL SYSTEMS		*	I	1,3
INSTRUMENT AND CONTROL SYSTEMS		*	I	1,3
OPERATIONS AND SYSTEMS INTERACTIONS		*	I	1,3
ADMINISTRATIVE PROCEDURES		*	II	1,2
MAINTENANCE PROCEDURES		*#	II	1,2
CALIBRATION PROCEDURES		*#	II	1,2
SURVEILLANCE PROCEDURES		*#	II	1,2
COMMUNICATIONS SKILLS				
	Group participation skills	8	I	2
	Dyadic oral communication skills	8	I	2
	Written communication skills	8	I	2

RETRAINING CODE

1. When Significant Changes Take Place
2. When Task Performance Indicates Need
3. Biennially

NUMBER OF HOURS CODE

* Sufficient instruction to assure in-depth and detailed student knowledge of all aspects of the topic.

\# Sufficient lab/hands on time to assure practical application of topical theory.

APPENDIX B

MATHEMATICS

Basic Math: (10 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of:

1) addition, subtraction, multiplication and division of whole numbers, fractions and decimals;
2) percentages and
3) square roots.

Algebra (30 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of:

1) the meaning of algebra; signed numbers; operation with signed numbers; algebraic expressions and terms; addition and subtraction of expressions; use of parentheses; multiplication and division of algebraic expressions; factoring; and changing signs.
2) Systems of equations; exponents and radicals; quadratic functions; graphs of functions; ratios; proportion and variation; complex numbers; logarithms; progressions and determinants.

Geometry (20 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of; the elements of geometry; lines and angles; polygrams; triangles

quadrilaterals; measuring of polygons, right triangles, circles, rectangular solids and cubes, cylinders, and spheres.

PHYSICS

Mechanics: (24 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: Systems of units; conditions for equilibrium; translational and rotational motion; Newton's laws of motion and gravitation; work; energy; momentum; uniform circular motion; elasticity; statics and dynamics of fluids.

Heat Transfer: (16 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: Temperature; heat; work and heat; energy and power equivalences; enthalpy; the First and Second Laws of Themodynamics; heat transfer.

Nuclear Physics: (16 hrs.)

The purpose of this topic is to establish trainee familiarity with: Nucleus; nuclear reactions; binding energy: radioactivity; fission; reactivity and reactivity controls.

CHEMISTRY

Weight, Mass and Volume Measurement (2 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the concepts, the units and measurement techniques of weight, mass and volume.

Atoms, Elements, and Compounds (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the concepts of matter and its three states chemical and physical

changes; the Bohr model; the basic components of the atom and their electrical characteristics; and elements and compounds.

Periodic Table (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the periodic tables. Topics to be included are: symbols of elements; atomic weight; atomic number; the number of electrons for an element, physical state of the elements in nature; metals and non-metals; and valences.

Chemical Equations (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: the 'Law of Conservation of Mass'; products and reactants; single replacement and double replacement equation; decomposition reactions and synthesis; and redox.

Solvents and Solutes (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of solvents and solutions. Topics to be included are: colligative properties; solutes; solvents; mole fraction; molality; molarity; solubility; electrolytes; ideal and real solutions.

Chemical Equalibrium (6 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of chemical equilibrium. Topics to be included are: chemical affinity; chemical reversibility; the law of chemical equilibrium; calculation of the equilibrium constant; and the principles of Le Chatelier & Braun.

Acids and Bases (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: water and water equilibrium; the theory of acids and bases; pH; strong acids and bases, weak acids and bases, nonaqueous solutions; and acid-base equilibria.

Basic Water Chemistry (16 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: ion exchange principles; ion exchanger types; demineralizers; regeneration; water filtration; water treatment; chemical addition (AVT or Phosphate); primary chemistry and secondary chemistry (PWR's only).

Corrosion Process and Corrosion Control (16 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical aplication of: general corrosion; chloride and fluoride stress cracking; caustic corrision; galvanic corrosion; crevice corrosion; pitting corrosion; and the prevention of corrosions.

Analytical Chemistry Theory (16 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: qualitative and quanitative inorganic chemistry and qualitative organic chemistry.

TECHNICAL SKILLS AND KNOWLEDGE

Sampling Techniques (6 hrs.#)

The purpose of this topic is to establish trainee familiarity with and practical application of the sampling of liquids, gases, and solids. Additionally, the subject matter includes the differences in taking samples in controlled and natural environments.

Sample Preparations (6 hrs.#)

The purpose of this topic is to establish trainee familiarity with and practical application of the processes for the safe and valid preparation of liquid, gaseous, and solid samples.

Safe Handling of Samples and Solutions (2 hrs.#)

The purpose of this topic is to establish trainee familiarity with and practical application of safe practices on how to safely handle, store, and dispose of samples and solutions.

Preparation of Standards and Reagents (8 hrs.#)

The purpose of this topic is to establish trainee familiarity with and practical applications of the standardized processes for the preparation of standards and reagents.

Preparation of Radio Chemical Carriers (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the methods and techniques for the preparation of radiochemical carriers.

Techniques of Analysis

The purpose of this topic is to establish trainee familiarity with and practical application of principals, applications, and techniques of analysis:

volumetric (2 hrs.#)

gravimetric (2 hrs.#)

colorimetric (4 hrs.#)

spectrophotometric (12 hrs.#)

(to include methods of continuous variations, mole ratio methods and slope-ratio methods)

potentiometric (4 hrs.#)

conductometric (6 hrs.#)

(to include methods of electrolytic conductance, conductance measurement and conductometric titrations)

Principles of Chemical Addition and Control (4 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the principles and methods of chemical addition and control.

Mechanical Print Reading (8 hrs#)

The purpose of this topic is to establish trainee familiarity with and practical application of: piping and instrument diagram symbology; normal and abnormal systems flow paths; normal and abnormal major equipment status; and system interations and boundaries.

BASIC ELECTRICITY (40 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of: Fundamental concepts of electricity; electrical units and laws; sources of differences in potential; simple D. C. circuits; complex D. C. circuits; magnetism and magnetic circuits; inductance and capacitance; basic A. C. theory; alternators, transformers and motors.

HEALTH PHYSICS (later)

UNIT SPECIFIC ANALYTICAL INSTRUMENTS (*#)

The purpose of this topic is to establish trainee familiarity with and practical application of: the input and output relationships; theory of operation; failure modes; and calibration and repair techniques of the unit:

Installed process analysis instruments

Portable analysis instruments

Cold laboratory instruments

Hot laboratory instruments

MECHANICAL SYSTEMS *

The purpose of this topic is to establish trainee familiarity with the; purpose; major equipment; flow paths; interations; and modes of operation of the unit and common plant mechanical systems.

ELECTRICAL SYSTEMS *

The purpose of this topic is to establish trainee familiarity with the: purpose; major equipment; flow paths; interactions; and modes of operation of the unit and common plant electrical systems.

INSTRUMENT AND CONTROL SYSTEMS *

The purpose of this topic is to establish trainee familiarity with: the purpose; major equipment; flow paths; interactions; and modes of operation of the unit and common plant I and C systems.

OPERATION AND SYSTEM INTERACTIONS *

The purpose of this topic is to establish trainee familiarity with the system interactions and dynamics during; startup; operation; power changes, and; trip conditions of the energy generation systems and emergency safety features of the unit.

DEPARTMENT PROCEDURES *#

The purpose of this topic is to establish trainee familiarity with and practical application of: the purpose; scope; application; and performance of the following departmental procedures:

A. Administrative

B. Maintenance

C. Calibration

D. Surveilance

COMMUNICATION SKILLS

Group Participation Skills (8 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the skills in communicating with individuals as a participant in a group problem-solving mode.

Dyadic Oral Communicating Skills (8 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the skills in communicating with another individual in a problem solving, conflict resolution or data gathering mode.

Written Communication Skills (8 hrs.)

The purpose of this topic is to establish trainee familiarity with and practical application of the skills in presenting ideas and information in written form.

RETRAINING CODE

1. When Significant Changes Take Place
2. When Task Performance Indicates Need
3. Biennially

NUMBER OF HOURS CODE

* Sufficient instruction to assure in-depth and detailed student knowledge of all aspects of the topic.

\# Sufficient lab/hands on time to assure practical application of topical theory.

APPENDIX C

GUIDELINES IMPLEMENTATION

The purpose of this appendix is to provide information regarding INPO's plans for using these guidelines.

The guidelines reflect currently identified best training practices directed toward maintaining Chemistry Technician competency. The guidelines will serve as a basis for nuclear unit training evaluations conducted by INPO with the goal of enhancing overall nuclear industry training practices. It is recognized that nuclear units may develop acceptable alternative methods for maintaining Chemistry Technician competency reflecting specific unit training needs. Alternative methods will be evaluated on the basis of achieving results equivalent to or better than results achievable by implementing these guidelines.

The INPO guidelines will be used upon issue for evaluating nuclear unit training. Progress by the nuclear industry toward achieving guideline implementation will be monitored by the periodic INPO evaluation and accreditation efforts. All nuclear units are expected to demonstrate continual progress toward meeting these guidelines and achieving full implementation as soon as practicable. The INPO guidelines will continue to serve as a basis for evaluation until revised as a result of suggested improvements and additional analysis of training methods and requirements.

APPENDIX D

CHEMISTRY TECHNICIAN RETRAINING

PROGRAM RESOURCE SUGGESTIONS

In order to implement the Chemistry Technician Training Program, certain requirements for availability of trainees, instructional staff and training facilities exist. It is the purpose of this appendix to provide suggestions to utility management regarding estimated resource requirements for these guidelines for single nuclear unit.

Technician Availability

Due to the renewed emphasis on high qualified training, utility management may wish to consider additional staffing requirements for Chemistry Technicians to allow adequate time for initial training and retraining requirements.

Training Staff Availability

Personnel needed in developing, conducting and evaluating training sessions and maintaining program records may involve the following:

- Qualified instructors responsible for the technical training and retraining program
- Clerical support
- Selected subject matter experts for periodic material review or presentation

Management Availability

The Training Supervisor and the technicians' Functional Supervisors are required to monitor and evaluate performance of duties periodically and to evaluate the training program effectiveness.

Training Facilities Availability

The training facilities and equipment needed to support the training exercises included in the program are not specifically listed here due to the wide variety of methods available to implement the program.

ITEM 20 Clarification of Union Electric Fire Protection Program and Description in the FSAR

Union Electric Response

A change to the FSAR has been submitted to delete Section 13.3B and revise Section 9.5. UE committs to conduct training in accordance with 10CFR50, Appendix R. A copy of the revised Section 9.5 is attached.

Fire Protection Systems

9.5.1 Fire Protection System

The Fire Protection System (FPS) is designed to detect fires, protect the plant against damage from fire, minimize hazards to personnel, and reduce property loss. This system description relates only to components of the site FPS outside the Standard Power Block.

9.5.1.1 Design Basis

9.5.1.1.1 Safety Design Basis

Safety Design Basis One - The FPS is designed to prevent, detect and extinguish fires that could indirectly or directly affect structures, systems and components required for safe shutdown. Non-Category I site buildings and facilities are sufficiently remote from the Standard Power Blocks and Site Category I facilities to minimize the effects of fires in these areas on Category I facilities.

Safety Design Basis Two - A single failure in the FPS will not impair fire suppression capability.

Safety Design Basis Three - FPS components are designed so that their failure or inadvertent operation does not cause the loss of function of plant structures, systems and components important to safety.

9.5.1.1.2 Power Generation Design Basis

Power Generation Design - The FPS is designed to detect the occurrence of fire and/or to mitigate the consequences of fire in plant structures, systems and components related to power generation.

9.5.1.1.3 Codes and Standards

The following codes and standards are used as guidelines in the design of the Fire Protection System and Equipment, and where required by law, the system and equipment conform to the applicable standards.

a. National Fire Protection Association (NFPA)

b. Nuclear Energy Liability Property Insurance Association (NEL-PIA), April, 1976 (NEL-PIA) is now American Nuclear Insurance (ANI).

c. Occupational Safety and Health Standards (OSHA) October 1972.

9.5.1.2 System Description

9.5.1.2.1 General Description

This layout of the FPS outside the Standard Power Block is shown on Figure 9.5-1. A flow diagram of the FPS is shown on Figure 9.5-2. A comparison of the Callaway Site design with NRC Branch Technical Position, APCSB 9.5-1, Appendix A is presented in Appendix 9.5-1. The fire hazards analysis for the site facilities outside the Standard Power Block which could affect site shutdown structures, systems, and components is contained in Appendix 9.5-B.

The FPS water supply is separated from all other site water supply systems and is based on providing 2300 gallons per minute of water for three hours to sprinkler systems with a simultaneous total flow of 1000 gallons per minute to hose stations.

Three 1500 gallons per minute fire pumps are provided. Two are diesel-driven and one has an electric drive. Any two of the three fire pumps are capable of providing 3300 gallons per minute of water to the fire system, with the shortest portion of the fire loop out of service, with sufficient head to meet the 80 psig interface pressure requirement at the Power Block. A jockey pump is provided to maintain normal system pressure when the fire pumps are not in operation.

9.5.1.2.2 Component Description

The site portion of the FPS consists of the following principal components:

a. Two separate 300,000 gallon maximum capacity tanks are furnished. The tanks are interconnected so that three pumps can take suction from either/or both of the tanks. Check valves are provided so that a leak in one tank or its supply piping does not cause both tanks to drain.

b. Each fire water tank is capable of providing for a period of two hours the maximum water demand for any safe shutdown area. This is based on 1,000 gpm to the largest safe shutdown area.

c. The Fire Protection System water storage is not interconnected with any sanitary or service water storage systems.

d. The fire water supply system is not common with any other system.

e. A 14" diameter underground yard loop around each Standard Power Block with branches to each building as shown on Figure 9.5-1. The fire loop is sectionalized by means of Post Indicating Valves (PIV) to isolate portions of the main for maintenance or repair without shutting off the entire system.

f. The lateral to each hydrant from the fire main is furnished with a curb valve, for isolation of damaged hydrants without reducing the effectiveness of the supply system.

g. Two-and-one half inch hose was considered in the design of the Fire Protection System and hose houses, however, 1-1/2 inch hose was selected because of the ability of a single individual to better handle and fight fires with the smaller hose.

h. Fire hoses are tested at 250 PSI or 50 PSI above maximum fire main operating pressure whichever is greater. Hoses stored outside are tested annually. The interior standpipe hoses are tested every three years.

9.5.1.2.3 System Operation

The fire water storage tanks are filled from the clarified water supply. The requirement for an eight-hour refill of one tank is met with clarified water from the Water Treatment Plant. The fire pump piping configuration provides for suction from either or both storage tanks.

Fire pumps are arranged to start automatically when the yard fire loop pressure drops below the pressure maintained by the jockey pump. The motor-driven pump is arranged to start first followed by the diesel-driven pumps. Pumps are stopped locally only. Manual start controls are provided at each pump and in each Power Block Control Room.

A fire alarm system is provided, comprised of ionization and heat detectors and manual pull boxes (located in compliance with Article 310 of NFPA-72A, 1974), fire pump alarms and sprinkler operation alarms with signals to the Unit 1 and Unit 2 Main Control Room annunciators.

Fire pump alarms include, as a minimum, controller not in Auto Mode, pump running, power failure and failure-to-start indicator. In addition, the diesel engine has a malfunction alarm. The fire-water tanks include level and temperature alarms.

9.5.1.2.4 Off Site Assistance

The Callaway Plant is designed to be self-sufficient with respect to fire fighting activities. No reliance is placed on help from local fire departments.

9.5.1.2.5 Provisions During Construction of Unit 2

When Unit 1 is operating and Unit 2 is under construction, the permanent fire protection system will be complete for Unit 1, including the fire loop around the Power Block, service to the Power Block, pump capacity, water storage and supply, hydrants, hose houses, post indicating valves and fire alarm system. The remaining construction area will be segregated from the operating areas by a protective fence.

The construction FPS will be interconnected to the Unit 1 system through isolation valves. A fire-water main distributes water to hydrants and hose stations located around the construction site and to sprinklers located in various construction facilities. Fire water will be provided to Unit 2 construction as deemed necessary and available by the Plant Superintendent, Callaway Plant.

A fire brigade, trained to operate the Fire Protection System, is available for suppression of fire during construction of Unit 2.

9.5.1.3 Safety Evaluation

Safety evaluations are numbered to correspond to the safety design bases.

SAFETY EVALUATION ONE - By virtue of the location and construction of site facilities, the possibility of fires and the potential effects on Category I facilities are minimized. Refer to Appendix 9.5-B. Provisions embodied into the design of Non-Category I site facilities include:

a. Service Building: An automatic wet-pipe sprinkler system is used in the consumable storage area, a Halon 1301 automatic system is used in the record storage area and standpipe fire hose systems are provided throughout the building, supplemented by portable extinguishers.

b. Stores Building: A Halon 1301 automatic system is used in the radiograph storage area with the remainder of the building having an automatic wet-pipe sprinkler system with standpipe fire hose systems provided throughout, supplemented by portable extinguishers.

c. Auxiliary boiler fuel oil storage tank: Spread of fire is prevented by a containment dike.

d. Circulating water cooling towers: Non-combustible construction with flame-resistant fill material.

e. Compressed gas storage: Outdoors, located to prevent accident effects on safety-related facilities.

SAFETY EVALUATION TWO - Two separate 300,000 gallon capacity fire-water storage tanks are provided. The tanks are interconnected so the pumps can take suction from either/or both of the tanks. Check valves are provided so that a leak in one tank or its supply piping will not allow both tanks to drain.

Three 50% capacity fire pumps are provided, (one driven electrically and two diesel-driven). Failure of one pump to operate does not prevent the system from supplying 100% design flow. Connection to the yard fire main loop is through two supply lines from opposite sides of the fire pump house.

SAFETY EVALUATION THREE - The site FPS consists of proven components selected to minimize risks of failure or inadvertent operation. Extinguishing materials used are compatible with the equipment in the areas served.

9.5.1.4 Tests and Inspections

The fire protection systems are installed by a contractor qualified and experienced in the work. This installation is tested and inspected in accordance with the requirements of the agencies listed in Section 9.5.1.1.3 and with Preoperational Test Procedures. To insure system integrity and completeness refer to Site Addendum Appendix 9.5A for further discussion.

9.5.1.5 Personnel Qualification and Training

The Site Architect/Engineers' Supervisor of fire protection design assisted in the development, design and equipment specification for the Fire Protection System. He is a member of the Society of Fire Protection Engineers and Registered Professional Engineers.

The Union Electric manager of Safety and Health assists in the inspection and testing of the Fire Protection System. He also assisted in the development of a Fire-Fighting Training Program for the operating plant. He or members of his staff, include Registered Professional Engineers, a Certified Safety Professional, a member of the National Fire Protection Association (NFPA) and a member of the American Society of Safety Engineers (ASSE).

9.5.1.6 Callaway Plant Fire Protection Program

The Callaway Plant Fire Protection Program is established to ensure that a fire will not prevent safe shutdown of the plant and will not endanger the health and safety of the public. Fire protection at the Callaway Plant uses a defense-in-depth concept which includes fire detection, extinguishing systems and equipment, administrative controls and procedures, and trained personnel. The Callaway Plant Fire Protection Program and Procedures are implemented before fuel loading.

9.5.1.7 Organization

9.5.1.7.1 Plant Superintendent, Callaway Plant

The Plant Superintendent is responsible for the overall Fire Protection Program and retains the ultimate responsibility for program implementation. He delegates the authority to formulate the program to the Plant Fire Marshal. As Chairman of the Plant Onsite Review Committee, he periodically assesses the effectiveness of the Fire Protection Program at Callaway.

9.5.1.7.2 Assistant Plant Superintendent, Callaway Plant

The Assistant Plant Superintendent reports to the Plant Superintendent and assumes the responsibilities of the Plant Superintendent in his absence or when assigned.

9.5.1.7.3 Safety Supervisor

The Safety Supervisor reports to the Superintendent of Personnel Development. He has been designated Fire Marshal and is responsible for the development and implementation of the Callaway Plant Fire Protection Program. He is responsible for providing a balanced approach in direction for the Fire Protection Program. He ensures that the Fire Protection Program is effectively implemented.

Specific duties of the Safety Supervisor/Fire Marshal include the following:

1. Ensuring that periodic inspections of safety-related areas for combustibles is performed in accordance with established procedures.

2. Determining the effectiveness of housekeeping practices.

3. Ensuring the availability and acceptability of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire retardant coatings.

4. Ensuring that prompt actions are taken to correct conditions adverse to fire protection and preclude their reoccurrence.

5. Ensuring that periodic testing of the fire protection system and equipment is conducted, the test results are evaluated, and actions are taken to correct any deficiency found in accordance with established procedures.

6. Scheduling fire drills and reviewing the results to access their effectiveness.

7. Ensuring that maintenance of fire detection, suppression, and extinguishing systems is scheduled and performed.

8. Preparing procedures to meet possible fire situations in the plant.

9. Performing periodic review of the fire brigade roster and initiating changes as needed.

10. Coordinating the preparation of the fire protection training programs for members of the fire brigade and other employees.

9.5.1.7.4 Onsite Review Committee

The Onsite Review Committee reviews normal and abnormal conditions or other anticipated operations which require special actions or procedures to ensure adequate fire protection and the safety of the Callaway Plant. The Onsite Review Committee is discussed in Section 13.4 of the Site Addendum.

9.5.1.7.5 Superintendent, Training

The Superintendent, Training is responsible for the coordination of the fire protection training programs for operating personnel and fire brigade members at the Callaway Plant. He is responsible for the maintenance of records of the fire protection trining of plant personnel.

9.5.1.8 Callaway Plant Fire Brigade

Local public fire departments have been analyzed to determine their ability to support the Callaway Plant fire brigade and results have shown them to be capable of making only a minor contribution to the overall fire fighting effort. Because of this fact, the Callaway Plant has been designed to be self-sufficient with respect to fire fighting activities and reliance on public fire departments for backup support has been excluded from the Fire Protection Program.

The Callaway Plant fire brigade is organized to deal with fires and related emergencies which could occur. The fire brigade consists of a Fire Brigade Leader and a 4-man fire team. Fire team size is consistent with the equipment that must be put into service during a fire emergency. Each fire team has a designated fire team leader, assistant fire team leader, and fire team member.

Members of each shift crew received fire brigade training and are therefore qualified members of the Callaway Plant fire brigade. A 5-man Fire Team is on duty at all times. Qualified personnel are assigned in accordance with established procedures to the fire brigade by the Operating Supervisor at the beginning of each shift.

The Fire Brigade Leader and at least two brigade members per shift shall have sufficient training in, or knowledge of plant safety-related systems to understand the effect of fire and fire suppressants on safe shutdown capacity.

The minimum equipment provided for the Callaway Plant Fire Brigade consists of personal protective equipment such as turnout coats, boots, gloves, helmets, emergency communications equipment, portable lights, portable ventilation equipment and portable extinguishers.

Self-contained breathing apparatus approved by NIOSH are provided for selected Fire Brigade, damage control personnel and control room personnel. Rated operating life for self-contained units shall be one-half hour. At least 10 masks will be available for Fire Brigade personnel.

Two extra air bottles are provided for each self-contained breathing unit to be used by Fire Fighting Damage Control or Control Room Personnel. An additional on-site 6-hour supply of reserve air is provided to permit quick and complete replenishment of exhausted supply air bottles.

The on-duty Shift Supervisor is designated "Fire Brigade Leader" and has overall responsibility in the following actions based upon assessment of the magnitude of the fire emergency:

1. Safe shutdown of the plant if required.

2. Implementation of the Emergency Plan.

3. Notification of the Emergency Duty Officer.

4. Requesting assistance from off-duty personnel,if necessary.

If a decision is made to implement the Radiological Emergency Response Plant, the Operating Supervisor is designated the Onsite Emergency Coordinator until relieved by the Emergency Duty Officer or a designated alternate.

To qualify as a member of the Callaway Plant Fire Brigade an individual must meet the following criteria:

1. He is available at all times to answer fire alarms.

2. he has attended the required training sessions for the position on the Fire Brigade he occupies.

3. He shall pass an annual physical examination.

9.5.1.8.1 Fire Brigade Training

A training program is established to assure that the capability to fight fires is developed and documented. The program consists of classroom instruction supplemented with periodic classroom retraining, practice in fire fighting, and fire drills. Classroom instruction and training is conducted by qualified individuals knowledgeable in fighting the types of fires that could occur within the plant and its environs and using on-site fire fighting equipment.

9.5.1.8.1.1 Classroom Instruction

Fire brigade members receive classroom instruction in fire protection and fire fighting techniques, prior to qualifying as members of the fire brigade. This instruction includes:

1. Identificaton of flammable materials and substances along with their location within the plant and its environs.

2. Identification of the types of fires that could occur within the plant and its environs.

3. Identification of the location of onsite fire fighting equipment and familiarization with the layout of the plant including ingress and egress routes to each area.

4. The proper use of onsite fire fighting equipment and the correct method of fighting each type of fire, including electrical fires, cable and cable tray fires, hydrogen fires, flammable liquids, waste/debris fires, fires involving radioactive materials, and record file fires.

5. Review of Callaway Fire Protection Plan with coverage of each individual's responsibilities.

6. Proper use of communication, lighting, ventilation, and emergency breathing equipment.

7. Direction and coordination of fire fighting activities (fire brigade leaders only).

8. Toxic and radiological characteristics of expected products of combustion.

9. Proper methods of fighting fires inside buildings and tunnels.

10. Review of fire fighting procedures and procedure changes.

11. Review of fire protection-related plant modifications and changes in fire fighting plans.

9.5.1.8.1.2 Retraining

Classroom refresher training is scheduled on an annual basis to assure retention of initial training.

9.5.1.8.1.3 Practice

Practice sessions are held for fire brigade members on the proper method of fighting various types of fires which might occur in a nuclear power plant. These sessions are scheduled on an annual basis

and provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus.

9.5.1.8.1.4 Drills

Fire brigade drills are conducted on a quarterly basis at Callaway Plant. Drills will be of two types: announced and unannounced. Training objectives are established prior to the drill by the Safety Supervisor. Afterwards, to determine how well the training objectives have been met the drill is critiqued on the following points:

1. Assessment of fire alarm effectiveness.

2. Assessment of the time required to notify and assemble the fire brigade.

3. Assessment of the selection, placement and use of equipment.

4. Assessment of Brigade Leader's effectiveness in directing the fire fighting effort.

5. Assessment of each Fire Brigade member's knowledge of firefighting strategy, procedures, and use of equipment, in the area assumed to contain the fire.

6. Fire brigade drills shall be performed in this plant so brigade can practice as a team.

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

8. The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met.

9. Performance deficiences of a Fire Brigade or of individual Fire Brigade members shall be remedied by scheduling additional training. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.

10. 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.

9.5.1.9 Fire Fighting Procedures

The development of a complete set of fire fighting procedures is the responsibility of the Plant Superintendent. The fire fighting procedures include the following:

1. Actions to be taken by the individual discovering the fire such as notificatón of the Control Room, attempting to extinguish the fire, and activation of local fire suppression systems.

2. Actions to be taken by the Unit Reactor Operator, such as sounding fire alarms and notifying the Operating Supervisor of the type, size and location of fire.

3. Actions to be taken by the fire brigade after notification of a fire, including location to assemble, directions given by the fire brigade leader, the responsibilities of brigade members such as selection of fire fighting and protective equipment, and use of preplanned strategies for fighting fires in specific areas.

4. Actions to be taken by the Emergency Duty Officer and Security Force after notification of fire.

5. The strategies established for fighting fires in safety-related areas and areas presenting a hazard to safety-related equipment and identification of combustibles in each plant zone covered by a fire fightng procedure.

6. The types of fire extinguishers best suited for controlling fires with the combustible loadings of the zone, and instructions for plant personnel during a fire.

9.5.1.10 Training 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 Firefighting within buildings shall be scheduled for all brigade members whose Performance Records show deficiencies.

9.5.1.11 Emergency Lighting

Emergency Lighting Units with at least an eight-hour battery power supply shall be provided in all areas needed for operation of Safe Shutdown Equipment and in access and egress routes thereto.

9.5.1.12 Administrative Controls

Administrative Controls and Procedures are established to ensure the reliable performance of Fire Protection Personnel, System, and Equipment.

These controls shall establish procedures to:

1. Govern the proper handling of flammable gasses and liquids, HEPA and Charcoal Filters, Dry unused Ion Exchange Ressins and other combustibles in safety-related areas.

2. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection.

3. Govern the handling of and limit transient fire loads such as flammable liquids, wood and plastic materials in buildings containing safety related systems or equipment. This control required an inplant review of work activities to identify transient fire loads.

4. The Superintendent, Maintenance is responsible for reviewing the work activities to identify transient fire loads.

5. Govern the use of ignition sources by use of a flame permit system to control welding flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done. If work continues over more than one shift the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.

6. Minimize waste, debris, scrap, and oil spills resulting from a work activity in the safety-related area while work is in progress and remove the same upon completion of the activity or at the end of each work shift.

7. Govern periodic inspections for accumulation of combustibles and to ensure continued compliance with these administrative controls.

8. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Such transient combustible material, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.

9. Control actions to be taken by the individual discovering the fire such as notification of the Control Room,

attempting to extinguish the fire, and activation of local fire suppression systems.

10. Control actions to be taken by the Unit Reactor Operator, such as sounding fire alarms, and notifying the Operating Supervisor of the type, size, and location of fire.

11. Control actions to be taken by the fire brigade after notification of a fire, including location to assemble, directions given by the fire brigade leader, the responsibilities of brigade members such as selection of fire fighting and protective equipment and use of preplanned strategies for fighting fires in specific areas.

12. Define the strategies established for fighting fires in safety-related areas and areas presenting a hazard to safety-related equipment including the designation of the:

    A. Fire hazards in each plant zone covered by a fire fighting procedure.

    B. Fire extinguishers best suited for controlling fires with the combustible loadings of the zone and the nearest location of these extinguishers.

    C. Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors will be specifically identified in the procedure with the appropriate precautions and methods for access specified.

    D. Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrcial system in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).

    E. Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling will be designated.

    F. Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire

scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.

G. Potential radiological and toxic hazards in fire zones.

H. Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operations.

I. Operations requiring control room and operating supervisor coordination or authorization.

J. Instructions for plant operators and general plant personnel during fire.

9.5.1.13 Fire Barrier Cable Penetration Seal Qualifications

Penetration seal designs shall utilize only non-combustible materials and shall be qualified by tests that are comparable to tests used to rate fire barriers. This Acceptance Criteria for this test shall include:

1. The Cable Fire Barrier Penetration Seal has withstood the Fire Endurance Test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to this Fire Resistance Rating required of the barrier.

2. The Temperature Levels recorded for the unexposed side are analyzed and demonstrate that this maximum temperature is sufficiently below the cable insulation ignition temperature.

3. The Fire Barrier Penetration Seal remains intact and does not allow projection of water beyon the unexposed surface during the hose stream test.

9.5.1.14 Fire Doors

Fire doors are provided with closing mechanisms and will be inspected semi-annually to verify that the closing mechanisms are operable.

Fire doors are normally closed and locked except where the door is a means of egress in which case they are closed and latched. Fire doors that are locked closed will be inspected weekly to verify position. Fire doors that are closed and latched will be inspected daily to verify that they are in the closed position.

9.5.2 Communicaiton Systems (Offsite)

9.5.2.1 Design Bases

The offsite communications system is designed to provide reliable plant-to-offsite communications and will consist of:

a. Touchtone Telephone System (Plant)
(Supplied by Kingdom Telephone Company)

b. Touchtone Telephones (Unlisted Number)

c. Microwave Telephone System
(Supplied by UE)

d. Plant UHF Radio System
(Supplied by UE)

e. UE VHF Radio System
(Supplied by UE)

f. Security Radio System
(Supplied by UE)

g. National Warning System (NAWAS) Telephone

9.5.2.2 System Description

9.5.2.2.1 Toughtone Telephone System

The touchtone telephone system consists of electronic automatic switchboard (EPABX) equipment and telephone stations supplied by the local public telephone company, Kingdom Telephone Company. The Telephone stations are located throughout the Power Block, in the main control room, in the various buildings around the site, in the security building, and in the service building where all the administrative offices are located. The system has 10 combination direct inward/outward dial trunks to the local public telephone system. Also, there are 8 tie trunks to the UE St. Louis office switchboard via the microwave system.

The power to the telephone (EPABX) equipment is 120 VAC obtained from the Non-Class IE power system. The bus which serves the telephone power feeder is backed up by the Security Diesel Generator.

9.5.2.2.2 Touchtone Telephones (Unlisted Numbers)

For emergency use, four unlisted telephone numbers are provided for direct access to the outside local public telephone system. One unlisted number is on the telephone in each of the following locations:

1. Office of the Plant Superintendent, Callaway Plant;

2. Unit 1 Operating Supervisor's Office;

3. Unit 2 Operating Supervisor's Office;

4. Security

These four telephone lines are direct from the local public telephone system exchange and do not interface with the plant EPABX.

9.5.2.2.3 Microwave Radio System

The microwave radio system consists of total solid-state battery-powered equipment, designed and engineered for normal system voice communicaitons, telemetering, computer interface and protective relaying.

The communications handled by the microwave system include:

1. The telephone trunks from the UE St. Louis office switchboard to the EPABX equipment;

2. An off premise telephone station (OPS) from the UE St. Louis office switchboard for the Plant Superintendent, Callaway Plant;

3. Direct telephone circuit from the Load Dispatch Office (LDO) to the Unit 1 and Unit 2 Control Rooms;

4. The UE VHF Radio System connection to the UE St. Louis office.

In addition, the microwave system locally at Callaway handles the supervisory control to the Intake Structure, the telephone circuit and the public address system circuits between the Power Block and the intake structure, and also the plant UHF radio system for radio communications in the plant area.

The battery charger for the plant microwave equipment is fed from a bus which is backed up by the Security Diesel Generator.

9.5.2.2.4 Plant UHF Radio System

UE maintains a plant UHF radio system for overall plant site area coverage reaching out as far as the intake structure. This two-way radio system provides communicaitons for operating purposes with plant radio-equipped vehicles and plant hand-held portable radios. This system is for use during normal operation or during a plant emergency. This radio system is available on the Unit 1 and Unit 2 Control Room radio consoles and on the security radio consoles. Encode equipment is provided on each console for use to signal the radio-equipped vehicles.

9.5.2.2.5 UE VHF Radio System

UE maintains plant access to the existing UE VHF Radio System via the microwave system. This two-way radio system is used to reach the Emergency Duty Officer (EDO) through its wide area coverage of the UE

system. This system provides communications with the radio equipped vehicle provided for the EDO. The vehicle is equipped with encode and decode equipment for signalling. Also a plant hand held portable radio (Plant UFH Radio System) is provided for use by the EDO. The UE VHF Radio System is available on the Unit 1 and Unit 2 Control Room radio consoles and on certain security radio consoles. Encode and decode equipment is provided on each console for two-way signalling.

9.5.2.2.6 Security Radio System

Refer to Section 13.6 of the Site Addendum.

9.5.2.2.7 National Warning System (NAWAS) Telephone

An extension on the National Warning System (NAWAS) Telephone System is installed in the Operating Supervisor's office in the Unit 1 Control Room. This extension, consisting of a separate wall-mounted, push-to-talk handset and a monitor speaker, provides two-way telpehone communications with the Defense Civil Preparedness Agency by a telephone circuit to the Missouri State, Troup F, Highway Patrol Headquarters in Jefferson City, Missouri. The NAWAS extension is used primarily to receive warning at the plant site of impending state and federal agencies of any serious problems at the plant.

9.5.2.3 Safety Evaluation

There are no safety funcitons associated with the communication systems.

9.5.2.4 Inspection and Testing Requirements

Communication systems of the types described above are feasible and practical and are in routine use. These systems have a history of successful and reliable operation at existing plants.

Where applicable, the radio equipment will be checked and calibrated in accordance with the latest rules and regulations of the Federal Communication Commission governing this type of operation.

SNUPPS-C

FSAR CLARIFICATIONS

ITEM 1 Revision of TABLE 13.1-1 of Chapter 13 of the FSAR

Union Electric Response

Table 13.1-1 will be revised to include the STA and modes 1 through 4 requirement for shift manning in Section I.A.1.3 of NUREG 0737. A draft of this table is attached and it will be included in the next revision of the FSAR.

TABLE 13.1-1

POSITION TITLES, LICENSE REQUIREMENTS AND MINIMUM SHIFT FOR MANNING VARIOUS MODES OF OPERATION

Position	License	Unit 1 & Unit 2 Cold Shutdown		Unit 1 Operating Unit 2 Cold Shutdown		Unit 1 Cold Shutdown Unit 2 Operating		Unit 1 & Unit 2 Operating	
		Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2
Shift Supervisor	SRO	1	0	1	0 (0)**	0	1	1	1
Operating Supervisor	SRO	1	1	1	1 (0)**	1	1	1	1
Unit Reactor Operator	RO	1	1	2	1 (0)**	1	2	2	2
Equipment Operator	none	1	1	2	1 (0)**	1	2	2	2
Assistant Equipment Operator	none	1	1	2	1 (0)**	1	2	2	2
Radchem Technician	none	1*		1*		1*		1*	
I & C Technician	none	1*		1*		1*		1*	
Shift Technical Advisor	none	0		1***		1***		1***	

*available to both units
**unit 2 under construction
***modes 1 through 4 operation

ITEM 2 Rad Chem Tech on Shift

Union Electric Response

A revision to the FSAR will be incorporated to commit to the presence of a Rad Chem Technician on shift at all times between fuel load to initial criticality. A copy of Section 13.1.2.3 is attached and will be included in the next revision.

13.1.2.3 Operating Shift Crews

The composition of the operating shift crew is contingent upon the operating status of the two units. During routine activities, each unit is operated as a separate plant with some cases of shared responsibility. Position titles, license requirements and minmum shift manning for various modes of operation are contained in Table 13.1-1.

Shift crew composition may fall below that specified above only to accommodate unexpected absences of on-duty shift crew members. In such situations, replacement personnel are brought in as soon as possible.

During refueling operations, a senior licensed operator or licensed fuel handler with no concurrent operational duties directly supervises fuel handling and transfer activities.

Radiation protection coverage is provided by the RAD/Chem or Assistant RAD/Chem Technician assigned to the shift by the Assistant Superintendent, Engineering-Radiation-Chemical or under certain circumstances by operating personnel who have received the proper radiological training. A RAD/Chem Technician will be assigned on-shift at all times, from fuel load through commercial operations, when Reactor is in operating modes 1-4.

ITEM 3 Responsibilities of the Plant Superintendent and the Onsite Radiation Protection Manager in The ALARA Program

Union Electric Response

The following description will be incorporated in a revision to Chapter 12 of the FSAR. The Plant Superintendent, Callaway Plant is responsible for the implementation of the corporate and Plant ALARA Programs. The specific responsibilities of the Plant Superintendent, Callaway Plant include:

a. Ensuring support of the ALARA Program from all plant personnel.

b. Supporting the Assistant Superintendent, Engineering-Rad/Chem in maintaining occupational radiation exposures ALARA.

c. Participation in the selection of specific goals and objectives of Callaway Plant.

The position of onsite Radiation Protection Manager is filled by the Assistant Superintendent, Engineering-Radiochemistry. His responsibilities are listed in FSAR chapter 12.5.1.

ITEM 4 Revision of Chapter 13 To Include Minimuum Requirements of Additional Site Positions

Union Electric Response

Attached are various minimum requirements for Callaway Plant positions. These position requirements and descriptions will be incorporated in the next revision of the FSAR.

Equipment Operators

1. A total of one year of power plant experience, of which a minimum of six months shall be nuclear power plant experience.

2. Successful completion of Phase I and II of Reactor Operator training.

3. High school education or equivalent.

Assistant Equipment Operators

1. Successful completion of Phase I of Reactor Operator training within six months of entering the position.

2. High school education or equivalent.

Instrument and Control Technician

1. High school education or equivalent.

2. 3 years experience in instrumentation and control of which one year should be related Technical Training.

Instruments and Control Technicians

Performs maintenance and surveillance Testing in all plant Instrumentation and control systems including computers. He assists in the development of plant procedures. He reports to the Instrument and Controls fireman.

Qualifications - Maintenance Personnel

Foremen - Minimum qualifications shall meet ANSI/ANS 3.1-1978 Section 4.3.2 "Supervisors Not Requiring NRC Licenses."

Mechanics - Minimum qualifications shall meet ANSI/ANS 3.1-1978 Section 4.5.3 "Maintenance Personnel."

Plant Helpers - Minimum qualifications shall be:

1) High school diploma or equivalent.

2) Capable of learning and applying basic skills in maintenance operations.

Duties/Responsibilities - Maintenance Personnel

Foremen

1) Supervise the activities of the Plant Helpers and Maintenance Mechanics, including Nuclear Electrical Mechanic, Nuclear Maint. Mechanic-Pipefitter, Nuclear Maint. Mech.-Machinist, and Nuclear Maint. Mech.-Certified Welding.

2) Assist the Maintenance Planners in work scheduling.

3) Supervise maintenance personnel in performing preventive and corrective maintenance and maintenance related surveillance testing.

Mechanics

1) Perform electrical and mechanical maintenance tasks as assigned by the Maintenance Foremen or General Maintenance Foreman.

2) Inspect, repair, maintain and modify plant equipment and perform other work as directed.

3) Perform these tasks in accordance with approved procedures when appropriate, including sign-offs and verifications.

Plant Helpers

1) Perform general labor and porter work in all areas and on all plant equipment and service facilities as assigned by the Maintenance Foreman or other supervisors as designated by the Supt. or Assistant Supt., Maintenance.

2) Assistant Maintenance Mechanics in performing their assigned tasks as directed by the Maintenance Foremen or General Mainenance Foreman.

3) Perform these tasks in accordance with approved procedures when appropriate.

Quality Control Inspectors

Minimum Qualifications

1. High school education or equivalent.

2. 3 years experience in equivalent inspection, examination, or testing activities.

or

1. Completion of college work leading to an Associate Degree or equivalent in a related discipline.

2. 1 year experience in equivalent inspection, examination, or testing activities.

or

1. College graduate.

2. 6 months experience in equivalent inspection, examination, or testing activities.

Duties/Responsibilities

1. Perform independent inspections of maintenance, modification, rework or repair on safety related systems or systems designated as having an augmented Quality Assurance Program (Seismic II/I, Fire Protection and Group D Augmented).

2. Perform receipt inspections of components and parts for safety related systems or systems designated as having an augmented Quality Assurance Program (Seismic II/I, Fire Protection and Group D Augmented).

ITEM 5 I&C FOREMAN Experience Requirements

Union Electric Response

I&C Foreman and Gen. Mte. Foreman per ANSI 3.1 - 1978 require 4 years experience. Union Electric committed to the 1978 standard and will verify and correct all entries in the FSAR to reflect the requirements.

ITEM 6 Annual Evacuation Drill

Union Electric Response

Union Electric will commit to an annual drill as outlined in the SRP and the FSAR will be changed to reflect this commitment.

ITEM 7 Crane Operating Procedures

Union Electric Response

Union Electric commits to writing operating procedures for the cranes at Callaway to be complete 90 days before fuel load. The crane technical manuals have just arrived and a proper review has not been completed.

Temporary procedures are defined in Section 13.5.2.2.10. Self cancelling or transient nature procedure are defined as a temporary procedure written to test or evaluate a system that has a time window in which the procedure can be used.

ITEM 8 Shift Supervisor Responsibilities

Union Electric Response

The Vice President Nuclear has issued a directive statement on the duties and responsibilities of the Shift Supervisor. This directive has been sent to the NRC under separate cover.