TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

November 21, 1979

Director of Nuclear Reactor Regulation
Attention: Mr. L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rubenstein:

In the Matter of the Application of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

Enclosed are forty copies of additional revisions to TVA's revised response to NUREG 0578, Short Term Lessons Learned Requirements, for Sequoyah Nuclear Plant. These revisions address the comments and concerns resulting from the November 6, 1979, meeting with NRC and TVA.

For your convenience, the enclosed revised pages replace the corresponding pages in the revised response to NUREG 0578 submitted by my letter to you dated October 31, 1979.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure (40)

1404)28

7911280 187

A

DIRECT INDICATION OF POWER-OPERATED RELIEF VALVE AND SAFETY VALVE POSITION FOR PWRs AND BWRs (2.1.3a)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

Position indication in the main control room for power operated relief valves is currently available at Sequoyah. TVA will provide main control room indication of valve position of the pressurizer safety valves as specified in the following response.

RESPONSE

The power operated relief valves have a reliable direct, stem-mounted position indication in the main control room. Valve position of the pressurizer safety valves is currently provided in the following manner.

1. Temperature is sensed downstreatm of the valves and displayed in the main control room including high temperature alarms.

2. The pressurizer relief tank has temperature, pressure, and fluid level indication and alarms in the main control room.

3. The pressurizer has high pressure alarms in the main control room.

An environmentally qualified acoustic monitoring system for the three safety relief valves on each unit will be provided before fuel loading in respective units. An accelerometer will mounted on the valve discharge line just downstream of each valve. The accelerometer signals will go to a charge converter inside containment which will be mounted in a NEMA-4 enclosure. A valve flow indicator module will be located in the main control room. The flow indicator module will give positive indication of the fully open and fully closed position of each valve. An alarm in the main control room will indicate when any valve is not in the fully closed position.

1404 029

NOV 21 1979

6. Each PWR should have: (A.) Safety grade calculational devices and display (minimum of two meters) or (B.) a highly reliable single channel environmentally qualified, and testable system plus a backup procedure for use of steam tables. If the plant computer is to be used, its availability must be documented.

7. In the long term, the instrumentation qualifications must be required to be upgraded to meet the requirements of Regulatory Guide 1.97 (Instrumentation for Light Water Cooled Nuclear Plants to Assess Plant Conditions During and Following an Accident) which is under development.

8. In all cases appropriate steps (electrical, isolation, etc.) must be taken to assure that the addition of the subcooling meter does not adversely impact the reactor protection or engineered safety features systems.

9. The attachment provides a definition of information required on the subcooling meter.

1404 030

NOV 21 1979

INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING (2.1.3.b)

SUBCOOLING METER

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

TVA will provide continuous monitoring of the deviation from saturation conditions. The plant computer will be used to perform this function. Procedures are being developed which will be used by the operator to recognize inadequate core cooling with currently available instrumentation. Operator instruction for primary coolant saturation indication will emphasize the need to use related plant parameters.

RESPONSE

TVA will provide continuous monitoring of the deviation from saturation conditions. The plant computer will be used to perform this function.

The plant computers presently monitor reactor system hot leg temperatures and pressurizer pressure. In addition, steam table conversion routines are a part of the computer software. Programs will be added to calculate saturation temperature corresponding to the measured pressurizer pressure. In the event any hot leg temperature measurement approaches the saturation temperature by a predetermined amount, an alarm will occur in the control room. The margin to saturation will be continuously displayed on a computer output trend recorder in the main control room.

TVA is developing procedures to be used by the operator to recognize inadequate core cooling with currently available instrumentation.

CLARIFICATION ITEMS

1. The guidelines for procedures specified in the above response are being developed by the Westinghouse Owners' Group in response to the Bulletins and Orders task force. TVA will provide plant procedures based on these guidelines.

2. A continuous monitoring of margin to saturation conditions will be provided.

3. Redundant safety grade temperature input from each hot leg and/or multiple core exit thermocouples are provided for measurement of saturation conditions.

4. Redundant safety grade system measurement is provided at Sequoyah.

NOV 21 1979

CLARIFICATION ITEMS (cont.)

5. Continuous monitoring of the primary coolant saturation conditions will be provided as specified in the above response.

6. The margin to saturation will be continuously displaced on a trend recorder in the main control room. A backup trend recorder is available. Saturation curves are provided in the main control room and procedures will require the use of these curves on the loss of indication of margin to saturation. We expect the computer availability to exceed 99 percent.

7. We consider the present design we are pursuing to be adequate.

8. Changes to the Sequoyah design will not affect the reactor protection or engineered safety features systems.

9. Refer to pages 20a and 20b.

NOV 21 1979

INFORMATION REQUIRED ON THE SUBCOOING METER

Display

Information Displayed (T-Tsat, Tsat, Press, etc.)	TSAT-T (Sat. Temp. Margin) or P PSAT (Sat. Pres. Margin)
Display Type (Analog, Digital, CRT)	Analog and digital
Continuous or on Demand	Analog-continuous Digital-on demand
Single or Redundant Display	Redundant - can be put on any of 4 pens
Location of Display	Main Control pnl. (Analog) Operators Console (Digital)
Alarms (include setpoints)	P-PSAT ≤200 psig TSAT-T ≤15°F
Overall uncertainty (°F, PSI)	1.5% (computer plus display)
Range of Display	Selectable
Qualifications (seismic, environmental, IEEE279)	

Calculator

Type (process computer, dedicated digital or analog calc.)	Process Computer
If process computer is used, specify availability. (% of time)	99%
Single or redundant calculators	Single
Selection Logic (highest T., lowest press)	Hottest hot leg. Avg. incore Hottest incore, Avg. przr. press.
Qualifications (seismic, environmental, IEEE279)	
Calculational Technique (Steam Tables, Functional Fit, ranges)	Steam table routines temp (32-70.55°F) press (14.7-3206)

Input

Temperature (RTD's or T/C's)	RTD-Hot legs T/C's-incore
Temperature (number of sensors and locations)	RTD in each RC hot leg 60 T/C's at core exit
Range of temperature sensors	RTD - 0-700°F T/C's - 0-1770°F

1404 033

NOV 21 1979

Uncertainty* of temperature sensors (°F at 1σ)	RTD ±1.5°F normal envir. ± .5% accident envir. T/C's ± .2°F normal envir.
Qualifications (seismic, environmental, IEEE279)	RTC-qualified T/C's-not qualified
Pressure (specify instrument used)	Przr. avg. pressure or RC system pressure
Pressure (number of sensors and locations)	4 Sensors on pressurizer 1 Sensor on Rx Coolant System
Range of Pressure sensors	przr. sensors-1700-2500 psig RCS press. 0-3000
Uncertainty* of pressure sensors (PSI at 1σ)	.5% normal environment 10% accident environment
Qualifications (seismic, environmental, IEEE279)	All are qualified

Backup Capability

Availability of Temp & Press	yes - both temp and press avail. from qual. inst.
Availability of Steam Tables etc.	yes - steam tables will be in control room
Training of operators	yes
Procedures	yes

*Uncertainties must address conditions of forced flow and natural circulation

1404)34

NOV 21 1979

RESPONSE (cont.)

Instrumentation for the operator for the Reactor Vessel Level Instrumentation System is intended to be unambiguous and reliable so that operator error or misinterpretation is avoided. The system would include the following control board indicators:

> An indication of upper region water level on each instrumented loop displaying water level in feet from 0 to -16 feet after compensation for any reactor coolant temperature and density effects. Indicator lights are included to indicate whether or not the pump in the loop is operating.

The Reactor Vessel Level Instrumentation is to be used in conjunction with a coolant subcooling readout to determine the state and transient behavior of the reactor coolant system. During normal operation, the reactor vessel level indicators would read off scale since the dynamic pressure drop due to coolant flow would be greater than the meter range. With all pumps shut down, the indicators will provide a direct indication of water level in the reactor vessel.

TVA will extend the range of incore thermocouples to give readout of fuel temperatures that could be expected if the core was partially uncovered. This readout will indicate when thermocouple temperatures are offscale high.

1404 035

NOV 21 1979

CONTAINMENT ISOLATION (2.1.4)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

The Sequoyah Nuclear Plant Meets all of the NRC positions concerning containment isolation. Specific information pertaining to each of the psoitions is given below.

RESPONSE

1. The Sequoyah containment isolation system is designed to operate in two stages: Phase A and Phase B. Phase A isolates all process lines except safety injection, containment spray, portions of component cooling water, essential raw cooling water, and control air. Phase B isolates all remaining process lines except safety injection, containment spray, and auxiliary feedwater. The Sequoyah containment isolation design utilizes the concept of diversity of initiating signals. Phase A isolation can be initiated manually and is initiated by automatic or manual safety injection (SI) actuation. The SI signal is derived from (1) high steam line flow concident with low steam line pressure or low-low average reactor coolant average temperature, (2) high steam line differential pressure between loops, (3) low pressurizer pressure, or (4) high containment pressure. Phase B isolation can be initiated manually or automatically on a high-high containment pressure signal. The high-high containment pressure signal is redundant, Class IE circuitry. In addition, isolation valves in the primary containment ventilat on system actuate on manual initiation of Phase A, Phase B, or SI and automatically on SI or high radiation signals.

2. TVA has undertaken a study to (a) examine each system which penetrates the containment, (b) determine whether or not it is essential, (c) describe basis for this determination, (d) modify design if required, and (e) report results to NRC.

   Every system that penetrates containment has been reevaluated to determine if it should be classified as essential or nonessential. The current classifications have been found to be acceptable and no changes in classification are planned.

3. The Sequoyah Nuclear Plant design complies with NRC requirements on the automatic isolation of nonessential systems.

4. The Sequoyah Nuclear Plant design complies with the NRC's requirements by requiring manual actions on the controls of individual components should it be necessary to change their status after the containment isolation signal has been cleared.

NOV 21 1979

1404 036

CONTAINMENT ISOLATION (2.1.4)

CLARIFICATION ITEMS

1. Qualified diverse containment isolation signals are provided at Sequoyah.

2. As specified in the above response, an evaluation of essential and non-essential systems has been performed and Sequoyah complies with NRC requirements. This information will be made available for NRC review.

3. See section 3 of the above response.

4. See section 4 of the above response.

1404 037

NOV 21 1979

INERTING BWR CONTAINMENTS (SECTION 2.1.5.b)

POSITION

It shall be required that the Vermont Yankee and Hatch 2 Mark I BWR containments [illegible] ted in a manner similar to other operating BWR plants. Inerting sh[illegible] also be required for near term OL licensing of Mar[illegible] and Mark III BWR's.

CLARIFICATION

None given.

1404 038

NOV 21 1979

INERTING BWR CONTAINMENTS

SECTION 2.1.5.B

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARYI

This position does not apply to Sequoyah Nuclear Plant since it is a PWR.

RESPONSE

None required.

CLARIFICATION ITEMS

None given.

1404 039

NOV 21 1979

CAPABILITY TO INSTALL HYDROGEN RECOMBINER AT EACH LIGHT WATER NUCLEAR POWER PLANT (2.1.5.c)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

This requirement is not applicable to Sequoyah

RESPONSE

The Sequoyah design has an ESF recombiner system inside containment which is redundant and fully qualified (see FSAR Section 6.2.5) and is manually actuated from the main control room.

CLARIFICATION ITEMS

1. Combustible gas control has been accounted for in the Sequoyah design as stated in the above response.
2. Their is no personnel exposure associated with recombiner use at Sequoyah.
3. Procedures for recombiner use are adequate for Sequoyah Nuclear Plant and no upgrading is required. However, a caution statement will be added to SOI 83.1 to restrict recombiner operation when containment hydrogen concentration is greater than four percent.

1404 040

NOV 21 1979

INTEGRITY OF SYSTEMS OUTSIDE CONTAINMENT LIKELY

TO CONTAIN RADIOACTIVE MATERIALS FOR PWRs AND BWRs (2.1.6.a)

POSITION

Applicants and licensees shall immediately implement a program to reduce leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient or accident to as-low-as-practical levels. This program shall include the following:

1. Immediate Leak Reduction

   a. Implement all practical leak reduction measures for all systems that could carry radioactive fluid outside of containment.

   b. Measure actual leakage rates with system in operation and report them to the NRC.

2. Continuing Leak Reduction

   Establish and implement a program of preventive maintenance to reduce leakage to as-low-as-practical levels. This program shall include periodic integrated leak tests at intervals not to exceed each refueling cycle.

CLARIFICATION

Licensees shall, by January 1, 1980, provide a summary description of their program to reduce leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient or accident. Examplesof such systems are given on page A-26 of NUREG-0578. Other examples include the Reactor Core Isolation Cooling and Reactor Water Cleanup (Letdown function) Systems for BWRs. Include a list of systems which are excluded from this program. Testing of gaseous systems should include helium leak detection or equivalent testing methods. Consider in your program to reduce leakage potential release paths due to design and operator deficiencies as discussed in our letter to you regarding North Anna and Related Incidents dated October 17, 1979.

1404 041

NOV 21 1979
Revision 1

SYSTEMS INTEGRITY FOR HIGH RADIOACTIVITY

SECTION 2.1.6.a

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

TVA will investigate practical leakage reduction measures on systems which may contain radioactive fluids. Procedures for reducing and quantifying leakage from liquid systems are presently in the review and approval cycle; implementation will be completed by January 1, 1980. These procedures will be submitted for NRC review.

RESPONSE

TVA will investigate practical leakage reduction measures on systems which may contain radioactive fluids post-LOCA and will examine such systems as the residual heat removal (normal letdown path), containment spray and safety injection (recirculation mode), chemical volume and control, sampling, and waste disposal systems.

This examination will include a study of valve stem packing leakoffs, rotating seals on equipment, gasketed connections or joints, drain pipes to open connections, and building drainage systems.

TVA will identify the above systems that may be leak checked and will implement a periodic leak check program on these systems. System leakages will be reported to the NRC.

Procedures for reducing and quantifying leakage from liquid systems are presently in the review and approval cycle; implementation will be completed by January 1, 1980. These procedures will be submitted to NRC. These procedures were written in compliance with the guidelines listed below.

1. Visual inspection with the system in operation is required.

2. Closed loop systems, such as component cooling water, will not be inspected.

3. Inspection will be performed quarterly except where accessibility is limited by radiation exposure. These systems or portions of a system will be inspected during hot shutdown or other periods of accessibility.

4. Leakage will be quantified and specifically located by valve number pump flange or other similar means.

1404 042

NOV 21 1979

5. Leakages will require immediate attention. All leakage identified will be "tracked" in plant until the leakage is stopped or controlled (i.e., normal pump seal leakage per manufacturer's spec).

6. Leakage for each quarterly test will be reported on an annual basis to NRC.

The systems identified for leakage checks are listed below.

a. Safety Injection
b. Containment Spray
c. RHR
d. Equipment and Floor Drain Systems (Primary Containment)
e. *Chemical and Volume Control System
f. Sampling

*Not required quarterly due to radiation exposure

Procedures for reducing leakage from gaseous systems are based on the surveillance and inservice testing programs. Identification of gaseous leakage is accomplished in response to any alarm from area radiation dectectors. Leakages will require immediate attention. All gaseous leakages will be "tracked" and be controlled.

Results of TVA's investigation of practical leakage reduction will be completed and made available to the NRC by January 1, 1980.

CLARIFICATION ITEMS

Refer to response above.

1404 043

NOV 21 1979

DESIGN REVIEW OF PLANT SHIELDING AND ENVIRONMENTAL QUALIFICATION OF EQUIPMENT FOR SPACES/SYSTEMS WHICH MAY BE USED IN POST ACCIDENT OPERATIONS (2.1.6.b)

RESPONSE (cont.)

TVA will calculate the source terms for the sump water recirculating piping, pumps, and valves installed in the auxiliary building. TVA will then identify the vital areas in the auxiliary building which may need to be entered for servicing during an accident recovery period. The shielding in these vital areas will be reevaluated to assess its effectiveness in such a circumstance. The occupancy time limits, taking into consideration transit time and gamma shine intensities will then be calculated for the vital auxiliary building areas. Additionally, TVA will revise procedures as appropriate.

CLARIFICATION ITEMS

1. As specified in the above response, the Sequoyah design bases include the assumption of TID14844 sources.

Sequoyah Nuclear Plant will meet the requirements of GDC 19.

1404)44

NOV 21 1979

CLARIFICATION

Control Grade (Short-Term)

1. Provide automatic/manual initiation of AFWS.
2. Testability of the initiating signals and circuits is requied.
3. Initiating signals and circuits shall be powered from the emergency buses.
4. Necessary pumps and valves shall be included in the automatic sequence of the loads to the emergency buses. Verify that the addition of these loads does not comprimise the emergency diesel generating capacity.
5. Failure in the automatic circuits shall not result in the loss of manual capability to initiate the AFWS from the control room.
6. Other Considerations
   a. For those designs where instrument air is needed for operation, the electric power supply requirement should be capable of being manually connected to emergency power sources.

1404 045

NOV 21 1979

AUTO INITIATION OF AUXILIARY FEEDWATER (AFW)
2.1.7.A

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

Sequoyah complies with all of the requirements of 2.1.7.A.

Response

The auxiliary feedwater system is automatically initiated by redundant, coincident logic to preclude loss of function due to a single failure and to provide on line testability. The auxiliary feedwater system and initiating logic are described in TVA's response to NRC-OIE Bulletin 74-06A and in Sequoyah FSAR Section 10.4.7.2. The auxiliary feedwater control circuitry including the automatic initiating circuitry is safety-grade, Class 1E, and is powered from a power source connected to the emergency power system. Each auxiliary feedwater pump has manual initiation capability independent of the automatic initiation. The ac motor-driven pumps and valves are included in the automatic alignment of the loads to the emergency power system.

CLARIFICATION ITEMS

1. Automatic and manual initiation of AFW are provided at Sequoyah.
2. On line testability is provided.
3. Initiating signals are powered from the emergency power system.
4. The ac motor driven pumps and valves are included in the automatic alignment of loads to the emergency power system.
5. Manual initiation capability is provided independent of the automatic initiation.
6. Appropriate electric power is supplied via the emergency power system for all valves where control air is needed for operation.

1404)46

NOV 21 1979

3. Providing information on coolant chemistry (e.g., dissolved gas, boron and pH) and containment hydrogen.

The above information requires a capability to perform the following analyses:

1. Radiological and chemical analyses of pressurized and unpressurized reactor coolant liquid samples;

2. Radiological and hydrogen analyses of containment atmosphere (air) samples.

CLARIFICATION

The licensee shall have the capability to promptly obtain (in less than 1 hour) pressurized and unpressurized reactor coolant samples and a containment atmosphere (air) sample.

The licensee shall establish a plan for an onsite radiological and chemical analysis facility with the capability to provide, within 1 hour of obtaining the sample, quantification of the following:

1. certain isotopes that are indicators of the degree of core damage (i.e., noble gases, iodines and cesiums and non-volatile isotopes),
2. hydrogen levels in the containment atmosphere in the range 0 to 10 volume percent,
3. dissolved gases (i.e., H_2 , O_2) and boron concentration of liquids.

or have in-line monitoring capabilities to perform the above analysis. Plant procedures for the handling and analysis of samples, minor plant modifications for taking samples and a design review and procedural modifications (if necessary) shall be completed by January 1, 1980. Major plant modifications shall be completed by January 1, 1981.

During the review of the post accident sampling capability consideration should be given to the following items:

1404 047

NOV 21 1979

IMPROVED POST-ACCIDENT SAMPLING CAPABILITY

2.1.8.A

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

A design and operational review of the reactor coolant and containment atmosphere sampling systems and analysis facilities is being performed.

RESPONSE

A design and operational review of the reactor coolant sampling systems and analysis facilities is being performed and will be complete by January 1, 1980. TVA expects to complete required modifications by January 1, 1981, provided that equipment procurement/installation conflicts are not encountered. These modifications will make provisions for sampling water from the reactor coolant system for the degraded accident condition. TVA will also identify the type and nature of onsite analysis required. If practical, TVA will procure the required analysis equipment and locate, design, and build an onsite analysis facility.

Until the design modifications are complete, procedures will be devised to evaluate the primary coolant system activity depending on the accessibility of the sampling stations for particular degraded conditions.

To enhance the capability at Sequoyah for post-LOCA sampling TVA will:

1. Make provisions for sampling water from the reactor coolant system and the residual heat removal system for the degraded accident condition.

2. Install new lines with connecitons to the existing gaseous radiation sampling system for use in sampling the containment atmosphere for the degraded accident conditions.

3. Route sample lines to a shielded sampling station in an accessible area and provide for taking samples which could be removed offsite for analysis.

CLARIFICATION ITEMS

A. TVA will provide the capability to obtain (within one hour) Reactor Coolant samples and containment air samples under accident conditions. This capability will be provided by January 1, 1981. Refer to pages 52a through 52m for current sampling procedures.

B. Plant procedures for the handling and analysis of samples, minor plant modifications for taking samples, and a design review and procedural modifications (if necessary) will be completed by January 1, 1980. TVA will provide, as practical, onsite radiological and chemical analysis capacities in order to quantify the following:

1. core damage (RES)

2. hydrogen level in containment

3. dissolved gases and boron content (RCS)

C. Provisions will be made:

1. to permit sampling under both positive and negative pressure.

2. for purging sample lines, for reducing plateout in sample lines, for minimizing sample loss or distortion, for preventing blockage of sample lines, for appropriate disposal of samples, and for passive flow restrictions.

3. to qualify the sampling system to appropriate seismic and environmental requirements.

D. The radiological sample analysis capability will include provisions to:

a. Identify and quantify isotopes to levels corresponding to the source terms given in item 2.1.6.B. The ability to dilute samples and to measure nuclide concentrations as low as 1 μCi/gm will be provided.

b. Restrict background levels in the health physics laboratory.

c. Maintain plant procedures to identify the analysis required, measurement techniques and provisions for reducing background.

E. The chemical analysis capability will consider the presence of the radiological source term indicated by the radiological analysis.

F. Procedural changes and plant modifications will be made to assure that radiation exposures are as low as reasonably achievable. TVA will ensure that these criteria are met using the criteria identified.

G. TVA will demonstrate the capability to obtain and analyze a sample containing radio isotopes according to the criteria discussed above.

1404 049

NOV 21 1979

REACTOR COOLANT

1. Sampling

A. Sample Point Location:
1. The primary sample point if Hot Sample Room sink 1A or 2A.

2. Sample from both units can be obtained from emergency sample station, sink #A9, located on elevation 734, u, 7 feet south of column All.

B. Radiation Zone Designation: Hot Sample Room: III (5.0-100 mr/hr)
Emergency Sample Station: I (0-1.0 mr/hr)

C. Method of Sampling: C.2.1 (Hot Sample Room)
C.1 (Emergency Sample Station) Ensure that flow is routed to station from Hot Sample Room.

D. Flush Time: 5 minutes

2. Sample Parameters	Reference
A. PH	TI-11 B.29
B. Conductivity	TI-11 B.13
C. Calcium	TI-11 B.47
D. Aluminum	TI-11 B.Punchlist
E. Silica	TI-11 B.31
F. Coolant Gross γ Activity	TI-12 B.4
G. Tritium	TI-12 B.1
H. Dissolved Fission Gases	TI-12 B.5
I. Crud - Isotopic	TI-12 B.5
J. Iodine - Total and I-131 Dose Equivalent	TI-12 B.5
K. Magnesium	TI-11 B.48
L. Chlorides	TI-11 B.9
M. Fluorides	TI-11 B.16
N. Dissolved Oxygen	TI-11 B.27
O. Lithium	TI-11 B.53
P. Boron	TI-11 B.5
Q. Hydrogen	TI-11 B.22
R. Hydrazine	TI-11 B.20
S. Hydrogen Peroxide	TI-11 B.66
T. Total Suspended Solids	TI-11 B.41

3. Data Compilation and Limits

A. TI-37 Appendix A Log Sheet 1

B. TI-2 , Table 1

1404 050

NOV 21 1979

C.1 GENERAL GRAB SAMPLING INSTRUCTIONS

1. Follow the appropriate precautions listed in Section D of this instruction.

2. Obtain the equipment needed to collect a representative sample (Polyethylene Bottle, plastic bucket, gloves,...).

3. Request the Shift Engineer or Unit Operator to operate equipment (i.e. recirculate contents of tank or line up system for sampling).

4. Purge sample lines per suggested flush times for each individual sample point.

5. Maintain a proper sample flow to obtain the sample quickly, but so as not to cause splashing or spilling.

6. Rinse the sample container three times with sample.

7. Collect the sample by filling the container to within approximately one-half inch of the top of the container before stopping sample flow.

   NOTE: If the sample can be affected by exposure to the atmosphere (i.e. Hydrazine or dissolved gases), it shall be collected by overflowing the sample container to remove trapped air, by using a sample bomb, or by collecting under an inert gas blanket in the sample container.

8. Cap the sample container tightly.

9. Return system to condition prior to sampling.

1404 051

NOV 21 1979

SINK A

C.2.1.1 General

1. Before sampling, make sure exhaust fan for Sink A has been energized from switch box #867 (located next to Hot Sample Room entrance) - Unit 2 switch box #868 - and turn on fan with local switch at hood.
2. Follow the appropriate precautions listed in section D of this instruction.

C.2.1.2 Hot Leg Loops 1 and 3 (Pressurized Sample)

C.2.1.2.1 Initial Valve Line-Up Prior to Sampling

1. Loop 1 sample line isolation valve (1-68-548) and/or loop 3 sample line isolation valve (2-68-578) (normally) Open
2. Loop 1 isolation valve (FCV-43-20) and/or loop 3 isolation valve (FCV-43-21)
   (FCV-43-20 and - 21 operated by respectively numbered hand switches on switch box #2016 (Unit 2: #2017) next to Hot Sample Room entrance) Open
3. Reactor Building isolation valve (FCV-43-22) (FCV-43-22 Operated by hand switch - 43-22 on switch box #2016 (Unit 2: #2017) next to Hot Sample Room Entrance) Open
4. Auxiliary Building isolation valve (FCV-43-23) (FCV-43-23 operated by hand switch - 43-23 on switch box #2013 (Unit 2: #2014) Opposite Sink A) Open
5. Inlet and outlet cooling water isolation valves (valves located behind main panel for Sink A) Open
6. Laboratory isolation valve to sample cooler inlet (valve located on top row of main panel) Open
7. Laboratory isolation valve to sample cooler outlet - sample pressure regulator (Valve located on main panel directly below inlet isolation valve) Open
8. Isolation valve to pressure indicator (Valve located on pressure indicator) Open
9. Sample Bypass Valve. (Valve located in sample sink-See figure 3) Closed
10. Sample Throttle Valve - grab sample analyzer valve (valve located on main panel) Open
11. Grab sample device - see figure 1-or pressurized sample vessel inlet and outlet valves (Sample device connected to quick-disconnects in sink) Open
    Note: Outlet valve of grab sample device should be closed.
12. Valves upstream and downstream of quick-disconnects (Valves located in sample sink-see figure 3) Open
13. Sample Sink drain to volume control tank (valve located behind main panel-downstream of flow-indicating sightglass) Open

1404 052

NOV 21 1979

14. Isolation valve to emergency sample station (Valve located on Main Panel) Closed

C.2.1.2.2 Obtain Sample in the Following Manner

1. If pressurized sample vessel is not in place, insert as follows:
   a. Open sample bypass valve in sink.
   b. Close valves upstream and downstream of quick-disconnects in sink.
   c. Remove grab sample device carefully so as not to bend and/or damage the quick-disconnects.
   d. Insert pressurized sample vessel, and ensure that the quick-disconnects are secure.
   e. Reestablish flow by first opening pressurized sample vessel inlet and outlet valves, then open the valves upstream and downstream of quick-disconnects, and finally close the sample bypass valve.
2. Adjust the sample flow to 8 gph by throttling the grab sample analyzer valve.
3. Flush the sample line for the time suggested.
4. Throttle the outlet valve of the pressurized sample vessel to pressure the vessel to 500 psi.
5. Quickly close the pressurized sample vessel inlet and outlet valves tightly, and then immediately open the sample bypass valve.
6. Close the valves upstream and downstream of the quick-disconnects.
7. Remove the pressurized sample vessel carefully so as not to bend and/or damage the quick-disconnects.
8. Double check to make sure that the pressurized sample vessel inlet and outlet valves are closed tightly.
9. Insert grab sample device, if desired.
10. Return valves to line-up stated in C.2.1.2.1
    Note: If grab sample device is not to be inserted, have sample flow through the sample bypass line, with the valves upstream and downstream of the quick-disconnects closed.
11. Return the sample to the laboratory for analysis.

C.2.1.3 Pressurizer Liquid (Pressurized Sample)

C.2.1.3.1 Initial Valve Line-up Prior To Sampling

1. Sample line isolation valve (68-575) (Normally) Open
2. Sample Isolation valve (FCV-43-10) (FCV-43-10 operated by handswitch -43-10 located on switch box #2016 (unit 2: #2017) next to Hot Sample Room entrance). Closed

1404 053

NOV 21 1979

3. Reactor Building isolation valve (FCV-43-11) (FCV-43-11 operated by hand switch -43-10 located on switch box #2016 (Unit 2: #2017) next to Hot Sample Room Entrance). Closed
4. Auxiliary Building Isolation valve (FCV-43-12) (FCV-43-1 operated by handswtich-43-12 located on switch box #2013 (Unit 2: #2014) Opposite Sink A. Closed
5. Laboratory Isolation Valve to sample cooler inlet (Valve located on top row of main panel for sink A) Closed
6. Isolation valve to pressure indicator (Valve located on pressure indicator). Open
7. Inlet and Outlet cooling water isolation valves (valves located behind main panel)
8. Laboratory isolation valve to sample cooler outlet (valve located on main panel directly below inlet isolation valve)
9. Sample Bypass Valve (Valve located in sink-see figure 3) Open
10. Isolation valves upstream and downstream of quick-disconnects (Valves located in sink-see figure 3) Closed
11. Sample station drain to volume control tank (Valve located behind main panel-downstream of flow-indicating sightglass). Open
12. Inlet flow valve to flow indicator. Open

C.2.1.3.2 Obtain Sample in the Following Manner

1. Insert pressurized sample vessel, if not already in place. Ensure quick-disconnects are secure. Open pressurized sample vessel inlet and outlet valves.
2. Open FCV-43-10, FCV-43-11, and FCV-43-12 in that order.
3. Open Laboratory Inlet Isolation Valve.
4. Adjust flow to 8 gph and 15 psi, using the laboratory outlet isolation valve. Use inlet flow valve to flow indicator to attain 8 gph if necessary.
5. Flush sample line for the time suggested.
6. Towards end of flush, open valves upstream and downstream of quick-disconnects, and close sample bypass valve, to flush sample through pressurizes sample vessel.
7. Throttle Outlet valve of pressurized sample vessel to pressurize vessel to 500 spi.
8. At 500 psi, quickly close the pressurized sample vessel inlet and outlet valves, and then immediately open the sample bypass valve.
9. Close FCV-43-12, FCV-43-11 and FCV-43-10 in that order.
10. When pressure indicator indicates zero pressure, close the valves upstream and downstream of quick-disconnects.

11. Remove the pressurized sample vessel carefully so as not to bend and/or damage the quick disconnects.
12. Double check to make sure that the pressurized sample vessel inlet and outlet valves are closed tightly.
13. Return valves to line-up stated in C.2.1.3.1.
14. Return sample to laboratory for analysis.

C.2.1.4 Grab Sampling

1. This section applies to obtaining grab samples from the following streams in Sink A:

   a. Hot Legs Loop 1 and 3
   b. Pressurizer Liquid
   c. Inlet and Outlet of Mixed Bed Demineralizer
   d. Upstream and Downstream of evaporator feed ion exchanger.
   e. CVCS Holdup Tank Recirculation
   f. Tritiated drain tank recirculation

C.2.1.4.1 Initial Valve Line-Up Prior To Sampling

1. Initial valve line-ups are as described in C.2.1.2.1 for the Reactor Coolant and in C.2.1.3.1 for the Pressurizer liquid.
2. Initial valve line-ups for the remaining samples are for all valves to be opened, except for the following:
   a. Isolation valves upstream and downstream of the Quick-Disconnects.
   b. Sample Bypass Valve.
3. To sample any of the sample points listed above, insert the grab sampling device (see figure 1). Ensure that the Quick-Disconnects are secure and the sample outlet valve is closed.
   Note: To insert the grab sampling device to grab sample the Reactor Coolant, manipulate the valves are suggested in C.2.1.2.2-1 (a-e) if the pressurized sample vessel is in place at the time. Ensure that the sample outlet valve is closed.
4. Attach a section of tygon tubing to the sample outlet valve of the grab sampling device and place outlet end in sink.

C.2.1.4.2 Obtain Sample In The Following Manner

1. Open the isolation valves upstream and downstream of the Quick-Disconnects.
2. In the case of sampling the Reactor Coolant, the pressurizer liquid, and the inlet (or outlet) to the mized bed demineralizer, ensure that the outlet valve of the sample station is open (valve located behind main panel downstream of flow-indicating sightglass).

1404 055

NOV 21 1979

3. Open the grab sampling device inlet and outlet valves.
4. Adjust the sample flow to 8 gph and approximately 15 PSI using the laboratory outlet isolation valve. Use the inlet flow valve to the flow indicator, if necessary.
5. Flush the sample line for the time suggested.
6. After flushing, close the valves before and after the Quick-Disconnect on the downstream side of the grab sampling device.
7. Open the sample outlet valve and allow a flow to run into the sink for 10 to 15 seconds.
8. Rinse the sample bottle by filling it approximately one third full, swirling it around, and dumping in sink. Repeat.
9. Fill the sample bottle to within one inch of the top, unless otherwise directed. Close the sample outlet valve.
10. Cap the sample bottle tightly.
11. Close the appropriate valves upstream of the sampling station necessary to sufficiently shut off flow to the sampling station.
12. Close the isolation valve upstream of the inlet Quick-Disconnect.
13. Return sample to laboratory for analysis.

C.2.1.5 Pressurizer Gas

C.2.1.5.1 Initial Valve Line-Up Prior to Sampling

1. Sample Line Isolation Valve (68-576) (Normally) Open
2. Sample Isolation Valve (FCV-43-1) (FCV-43-1 operated by handswitch-43-1 on switch box #2016 (Unit 2: #2017) next to Hot Sample Room Entrance Closed
3. Reactor Building Isolation Valve (FCV-43-2) (FCV-43-2 operated by handswitch-43-2 located on switch box #2016) Closed
4. Auxiliary Building Isolation Valve (FCV-43-3) (FCV-43-3 Operated by handswitch-43-3 located on switch box #2013 (Unit 2: #2014)opposite sink A) Closed
5. Laboratory Isolation Valve to sample cooler inlet (Valve located on top row of main panel for sink A) Closed
6. Inlet and outlet cooling water isolation valves (valves located on top row of main panel for sink A). Closed
7. Laboratory Isolation Valve to sample cooler outlet (valve located on second row of main panel, directly below the respective inlet isolation valve) Open
8. Isolation valve to pressure indicator (Isolation valve on pressure indicator) Open
9. Isolation valve upstream and downstream of Quick-Disconnects. (Valve located in sample sink-See figure 3) Closed

1404 056

NOV 21 1979

10. Sample Bypass Valve
    (Valve located in sample sink-see Figure 3) Open
11. Drain to Volume Control Tank
    (Ball valve behind main panel downstream of flow-indicating sightglass) Open

C.2.1.5.2 Obtain Sample In The Following Manner

1. Insert the pressurized sample vessel into position and ensure that the Quick-Disconnects are secure.
2. Open FCV-43-1, FCV-43-2, and FCV-43-3, in that order, using the appropriate hand switches.
3. Open the isolation valves upstream and downstream of Quick-Disconnects.
4. Open the inlet and outlet valves of the pressurized sample vessel.
5. Gradually open laboratory inlet isolation to sample cooler inlet.
   Note: Carefully observe the sample pressure and temperature indicators.
6. Purge the sample line at 15 psi for the time suggested.
7. After purging, close the pressurized sample vessel outlet valve and pressurize to approximately 10 psi.
8. At 10 psi, close the pressurized sample vessel inlet valve.
9. Close FCV-43-3, FCV-43-2, and FCV-43-1, in that order.
10. Open sample bypass valve.
11. Observe sample pressure indicator. When zero pressure is obtained, return valves to line-up as stated in C.2.1.5.1

C.2.1.6 Volume Control Tank Vent

C.2.1.6.1 Initial Valve Line-Up Prior To Sampling

1. Sample Line Isolation Valve (Valve off of tank vent) (Normally) Open
2. Isolation Valve (FCV-43-5) (FCV-43-5 operated by hand switch-43-5 located on switch box #2016 (Unit 2: #2017) next to hot sample room entrance) Closed
3. Laboratory Inlet Isolation Valve (Valve located on top row of main panel for sink A)
4. Isolation valves upstream and downstream of Quick-Disconnects (See figure 3: valves located in sample sink) Closed

1404 057

NOV 21 1979

C.2.1.6.2 Obtain Sample In The Following Manner

1. Insert the pressurized sample vessel and ensure that the Quick-Disconnects are secure.
2. Open the pressurized sample vessel inlet and outlet valves.
3. Open isolation valves upstream and downstream of Quick-disconnects.
4. Open FCV-43-5
5. Gradually open laboratory inlet isolation valve.
6. Adjust flow rate to approximately 1 CFM.
7. Purge the sample line for the time suggested.
8. After purging, close FCV-43-5.
9. When the flow indicator indicates zero flow, close pressurized sample vessel inlet and outlet valves.
10. Close the isolation valves upstream and downstream of the Quick-Disconnects.
11. Close the Laboratory Inlet Isolation Valve.
12. Carefully remove pressurized sample vessel.
13. Ensure valves are returned to line-up stated in C.2.1.6.1
14. Return sample to alboratory for analysis.

1404)58

NOV 21 1979

GASEOUS RADIATION MONITORS

1. Sampling

A. Sample Locations:

1. Shield Building Vent Effluent Monitor, 1 (2)-90-100, located in Auxiliary Building, elevation 749.0, A4-Wor (A1-2-w). Sample off monitor.

2. Auxiliary Building Vent Effluent Monitor, 0-90-101, located in Auxiliary Building elevation 763, A8-T, sample off monitor.

3. Condenser Vacuum Pump Vent Effluent Monitor, 1(2)-90-99 (High Range) and 1(2)-90-119 (Low Range), located in turbine building, elevation 732, T7-for (T10-F), sample off FT-2-257, panel 1(2) - L-192. (Before filter) Turbine Building elevation 732 T7-for (T10-f).

4. Containment Building (Lower Compartment) Gaseous Process Monitor, 1 (2)-90-106, located in Auxiliary Building, elevation 714, A3½ - U or (A12½-U), Sample off monitor.

5. Containment Building (Upper Compartment) Gaseous Process Monitor, 1(2)-90-112, located in Auxiliary Building, elevation 714, A3½ - U or (A12½ - U), sample off monitor.

6. Containment Purge Gaseous Process Monitor, 1(2)-90-130 and 1(2) -90-131, located in Auxiliary Building, elevation 690, A3-7 (A14-U) sample off monitors.

7. Service Building Vent Effluent Monitor, 0-90-132, located in Service Building elevation 718, 54 (above Power Stores), sample off monitor.

8. Main Control Room Intake Gaseous Process Monitor, 9-90-125 and 0-90-126, located in Control Building, elevation 732, Mechanical Equipment Room (North), sample off monitor.

9. Main Control Room Emergency Intake Gaseous Process Monitor, 0-90-205 and 0-90-206, located in Control Building elevation 732, Mechanical Equipment Room (North), sample off monitor.

10. Waste Gas Decay Tanks Gaseous Process Monitor, 0-90-118, located in Auxiliary Building, elevation 669, A3½-S, sample off gas analyzer, located in Auxiliary Building, elevation 690, unit 2 Hot Sample Room (method B.76)

B. Radiation Zone Designation: I (0 to 1 mr/hr)

1404 059

C. Sample Method: C.6

D. Flush Time: 5 minutes

NOV 21 1979

GASEOUS RADIATION MONITOR (Cont.)

2. Sample Parameters — Reference

A. - Isotopic — TI-12 B.5

B. Gross Activity — TI-12 B.4

3. Data Compilation and Limits

(Punchlist)

1404 060

NOV 21 1979

C.6 Gas Sampling

C.6.1 General

1. Follow the appropriate precautions listed in Section D of this instruction.
2. Obtain the apparatus needed to collect a representative sample (i.e. stainless steel pressurized sample vessel Marinelli Beaker).
3. This instruction is for sampling other than tritium.

C.6.2 Sampling From The Gas Analyzer

1. Notify the Unit Operator prior to valving in system to be sampled at the gas analyzer.
2. Connect the pressurized sample vessel to the outlet of the gas analyzer. Ensure that the quick-disconnects are secured.
3. Align the gas analyzer according to TI-17, B.7.3.
4. Open the pressurized sample vessel inlet and outlet valves.
5. Close valve 9342.
6. Open valves 9341A and 9341B.
7. Purge the sample line for the time suggested.
8. After purging, close the sample vessel inlet and outlet valves.
9. Immediately open valve 9342.
10. Close valves 9341A and 9341B. Double-check to ensure that these valves are closed tightly.
11. Disconnect the sample vessel from the quick disconnect. Approximately label the sample vessel.

1.2 Return the sample to the laboratory for analysis.

C.6.3 Gas Monitor Sampling

1. Notify the unit operator prior to sampling.
2. Connect the sample vessel to quick disconnects on the monitor outlet.
3. Open the inlet and outlet valves to the sample vessel.
4. Open the valves upstream and downstream of the quick disconnects.
5. Close the main line bypass valve.
6. Purge the sample vessel for the time suggested.
7. After purging, close the sample vessel inlet and outlet valves.
8. <u>Immediately</u> open the main line bypass valve.
9. Close the valves upstream and downstream of the quick disconnects. Ensure that they are closed tightly.
10. Disconnect the sample vessel from the quick disconnects. Approximately label the sample vessel.
11. Return the sample to the laboratory for analysis.

2. Sampling area vent monitors

a. Follow appropriate precautions in section D of this instruction.
b. Use the apparatus as shown in figure 2 to collect the sample.
c. Notify control room prior to sampling.
d. Fill cavity in tritium trap with indicating silica gel. Have a small piece of tissue inserted between the rubber stopper and gel. Weigh the sample chamber to obtain tare weight and record.
e. Carry sample apparatus to area vent monitor.
f. Connect tritium trap to sample connections located on the vent monitor package.
g. Align valving through the sampling trap.
   1. Open outlet valves on the sample trap.
   2. Open inlet valves on the sample trap.
   3. Close monitor inlet valve.
   4. Adjust flow through the trap to 50cc per minute on the rotameter.
   5. Collect the sample for a period of 1 hour.
   6. After 1 hour, check and make sure 1/3 or more of the tritium trap has turned pink. If so, continue to step (7). If not, continue.
   7. Realign valves for normal operation.
      a. Close the inlet and outlet valves to the sample trap.
      b. Open monitor inlet valve.
h. Remove sample trap using the quick disconnects.
i. Carry the sample tray to the lab.
j. Weigh the sample container and sample and record the weight difference.

1404 062

NOV 21 1979

B. By January 1, 1981, TVA will provide high range noble gas effluent monitors for all identified release paths. This monitor will meet the requirements of Table 2.1.8.B.2. Information requested on these monitors will be made available to the NRC.

2. Radioiodine and Particulate Effluents

A. Requirements for January 1, 1980 - A design study to assist in developing interim procedures for monitoring radioiodine and particulate effluents is underway. The procedures will be provided to the NRC when they are developed.

B. By January 1, 1981, TVA will provide the capability to continuously sample effluents and onsite analysis for radioiodine and particulates with state-of-the-art equipment. The requested information will be made available to the NRC.

3. Containment Radiation Monitors

By January 1, 1981, TVA will provide two radiation monitors outside the annulus which meet the intent of the requirements of Table 2.1.8.B.3.

1404 063

NOV 21 1979

CONTAINMENT PRESSURE INDICATION 2.1.9(a)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

Sequoyah will comply with all of the requirements of this position before January 1, 1981.

Response

Four qualified, continuous indications of the containment pressure are provided in the main control room. The 5 psig negative pressure requirement is not applicable to Sequoyah since qualified vacuum relief of the containment maintains the pressure at greater than negative 0.5 psig. The existing pressure indicators have a range of -1 to 15 psig. Redundant, continuous containment pressure indication with a range up to four times the design pressure (0 to 50 psig) of the steel containment will be provided.

CLARIFICATION ITEMS

1. The monitors will meet the applicable design requirements for qualification, redundancy and testability in accordance with Sequoyah's commitment to IEEE 323-71.

2. The monitors will be installed and operational by January 1, 1981.

1404)64

NOV 21 1979

CONTAINMENT HYDROGEN INDICATION 2.1.9(b)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

Sequoyah has redundant safety-grade hydrogen analyzers located in the annulus. These monitors have a range of 0 to 10 percent hydrogen concentration. Sequoyah complies with all of the requirements of this NRC position.

Response

Redundant, safety-grade hydrogen analyzers are located in the annulus between the containment and shield building. These monitors provide continuous indication in the main control room within a few minutes of being remotemanually actuated in the main control room. The range of these monitors is from 0 to 10 percent hydrogen concentration from negative 2 psig to positive 50 psig pressure.

Revisions to the Sequoyah FSAR to include descriptions of the hydrogen analyzer, sampling points, readout and system capabilities will be made before January 1, 1980.

CLARIFICATION ITEMS

1. The hydrogen analyzers of Sequoyah meet the applicable requirements for qualification, redundancy, and testability in accordance with Sequoyah's commitment to IEEE 323-71.

2. These analyzers are installed and operational.

CONTAINMENT WATER LEVEL INDICATION

POSITION

A continuous indication of containment water level shall be provided in the control room for all plants. A narrow range instrument shall be provided for PWRs and cover the range from the bottom to the top of the containment sump. A wide range instrument shall also be provided for PWRs and shall cover the range from the bottom of the containment to the elevation equivalent to a 600,000 gallon capacity. For BWRs, a wide range instrument shall be provided and cover the range from the bottom to 5 feet above the normal water level of the suppression pool.

CLARIFICATION

1. The narrow range sump level instrument shall monitor the normal containment sump level vice the containment emergency sump level.

2. The wide range containment water level instruments shall meet the requirements of the proposed revision to Regulatory Guide 1.97 (Instrumentation for Light-Water Cooled Nuclear Power Plant to Assess Plant Conditions During and Following a Accident).

3. The narrow range containment water level instruments shall meet the requirements of Regulatory Guide 1.89 (Qualification of Class IE Equipment of Nuclear Power Plants).

4. The equivalent capacity of the wide range PWR level instrument has been changed from 500,000 gallons to 600,000 gallons to ensure consistency with the proposed revision to Regulatory Guide 1.97. It should be noted that this measurement capability is based on recent plant designs. For older plants with smaller water capacities, licensees may propose deviations from this requirement based on the available water supply capability at their plant.

5. The containment water level indication shall be installed by January 1, 1981.

1404 066 NOV 21 1979

CONTAINMENT WATER LEVEL INDICATION 2.1.9(c)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

The sump water level is indicated by four separate qualified, and continuous level instruments with readout in the main control room. These instruments provide adequate indication of the water level in the sump. Sequoyah complies with all of the requirements of this NRC position.

Response

The floor of the reactor building serves as the sump for the containment. It is instrumented with four separate, qualified, and continuous level instruments which indicate in the main control room. The range of the instruments is from less than six inches above the floor up to 20 feet above the floor. If 600,000 gallons of water were introduced into containment in addition to the fluid volume of the reactor coolant system, safety injection accumulators, and a total ice melt, the containment water level would not exceed the 20 ft. range of the level instruments. A small sump suction pocket (about 120 cubic feet) in the reactor building floor serves as a collector for the recirculation piping exiting the containment and does not require qualified level instrumentation.

CLARIFICATION ITEMS

1. The narrow range sump level instrument monitors the normal containment sump level and the wide range sump level instrument monitors the emergency sump level.

2. The wide range sump level instrument meets the applicable requirements for qualification, redundancy, and testability. in accordance with Sequoyah's commitment to IEEE 323-71

3. The narrow range sump level instrument meets the appropriate requirements of Regulatory Guide 1.45.

4. If 600,000 gallons of water were introduced into containment, in addition to the entire fluid volume of the reactor coolant system, safety injection accumulators, and a total ice melt, the containment water level would not exceed the design basis for the wide range water level monitor.

5. The sump water level monitors are installed and operational.

1404 067

NOV 21 1979

3. Where practical the RCS vents should be kept smaller than the size corresponding to the definition of a LOCA (10CFR50 Appendix A). This will minimize the challenges to the ECCS since the inadvertent opening of a vent smaller than the LOCA definition would not require ECCS actuation although it may result in leakage beyond Technical Specification Limits. On PWRs the use of new or existing valves which are larger than the LOCA definition will require the addition of a block valve which can be closed remotely to terminate the LOCA resulting from the inadvertent opening of the vent.

4. An indication of valve position should be provided in the control room.

5. Each vent should be remotely operable from the control room.

6. Each vent should be seismically qualified.

7. The requirements for a safety grade system is the same as the safety grade requirement on other Short Term Lessons Learned items, that is, it should have the same qualifications as were accepted for the reactor protection system when the plant was licensed. The exception to this requirement is that we do not require redundant valves at each venting location. Each vent must have its power supplied from an emergency bus. A degree of redundancy should be provided by powering different vents from different emergency buses.

8. For systems where a block valve is required, the block valve should have the same qualifications as the vent.

1404 068

NOV 21 1979

REACTOR COOLANT SYSTEM VENTING 2.1.9(d)

SEQUOYAH NUCLEAR PLANT RESPONSE

SUMMARY

TVA will provide the capability to vent the reactor vessel head by January 1, 1981. The design for this vent will be made available for NRC review by January 1, 1980.

Response

TVA will provide the capability to vent the reactor vessel head in addition to the existing venting capability from the pressurizer. The new reactor vessel head vent system will meet all of the NRC requirements.

It is, of course, not feasible to directly vent the reactor coolant system high points in the U-tubes of the steam generators. This venting capability is not required.

CLARIFICATION ITEMS

A. Procedures for use of the reactor vessel head vent at Sequoyah will be made available to the NRC before January 1, 1981.

B. (Not applicable to Sequoyah)

C. PWR Vent Design Consideration

1. a) A reactor vessel head vent will be installed by January 1, 1981, to provide the capability to vent noncondensible gas from the reactor coolant system.

   Currently, there are no procedures for removal of noncondensible gas from the U-tube regions in the steam generators. WCAP 9600 shows that there will not be a significant accumulation of noncondensible gas in the U-tube region. Small amounts of noncondensible gas that does accumulate in the U-tube region will be removed by natural circulation. The benefits of and necessity for procedures for removal of large amounts of noncondensible gas from the U-tube region will be addressed as part of the Item 2.1.9 task and procedures, if appropriate, will be provided.

   c) Venting of the pressurizer is provided as part of the Sequoyah design.

2. Appropriate design considerations will be implemented in design of the reactor vessel head vent.

1404 069

NOV 21 1979

2c. In the event that the assistant shift engineer (shift supervisor) is absent, the unit operator will be the lead operator on the unit to which he is assigned. For multiple unit plants, an additional licensed operator will be available in the control complex to act as as assistant to the unit operator in abnormal or emergency situations. The line of command is clearly specified in administrative procedures.

3. The shift engineer and assistant shift engineers will receive such training.

4. The administrative duties of the shift supervisor will be reviewed by the senior officer of TVA responsible for plant operations. Administrative functions that detract from or are subordinate to ensuring safe operation of the plant will be assigned to other employees. The following actions have already been taken:

   1. A clerk has been assigned to the shift engineer's office on each shift to perform administrative details formerly done by the shift engineer.

   2. Part of the routine "non-management" duties of the assistant shift engineer have been assigned to other employees.

CLARIFICATION

Refer to pages 85a through 85g for the Administration Instructions regarding authorities and responsibilities for safe operation and shutdown of Sequoyah units 1 and 2. Refer to pages 85h through 85o for job descriptions of the shift engineer, assistant shift engineer, unit operator and assistant unit operator.

1404 070

NOV 21 1979

Sequoyah Nuclear Plant

ADMINISTRATIVE INSTRUCTION

AI-2

AUTHORITIES AND RESPONSIBILITIES FOR SAFE OPERATION AND SHUTDOWN

Units 1 & 2

Prepared By: W. M. Guinn

Revised By: W. M. Guinn

Submitted By: Daniel Record
Supervisor

PORC Review: 10-2-79
Date

Approved By: [signature] for Superintendent

Date Approved: 10-2-79

DISTRIBUTION

1C	Plant Master File
1C	Superintendent
1U	Assistant Superintendent (Oper.)
1U	Assistant Superintendent (Maint.)
1C	Administrative Supervisor
1C	Maintenance Supervisor (M)
1C	Assistant Maintenance Supervisor (M)
	Maintenance Supervisor (E)
	Assistant Maintenance Supervisor (E)
1C	Maintenance Supervisor (I)
1C	Results Supervisor
1C	Operations Supervisor
1C	Quality Assurance Supervisor
1C	Health Physicist
1C	Public Safety Services Supv.
1C	Chief Storekeeper
1C	Preop Test Program Coordinator
1C	Outage Director
1C	Chemical Engineer
	Radiochem Laboratory
	Instrument Shop
1C	Reactor Engineer
1C	Instrument Engineer
1C	Mechanical Engineer
1C	Staff Industrial Engineer
1C	Training Center Coordinator
1C	[illegible] - Chickamauga Engrg Unit - SNP
	Public Safety Services - SNP
1C	Shift Engineer Office
1C	Unit Control Room
1C	QA&A Rep. - SNP
	Health Physics Laboratory
1U	Chief, Nuclear Generation Branch
1U	P Prod Central Office File
1U	Superintendent, WBNP
	Superintendent, BFNP
1U	Superintendent, BENP
1U	EN DES - MEB NEG
	Supv., NPHPS ROB, MS
1U	NRC-IE:II
	Power Security Officer, 604 PRB-C
	Nuclear Materials Coordinator
1U	Manager, OP-QA&A Staff
1U	P Prod Plant Eng. Branch

Rev. No.	Date	Revised Pages	Rev. No.	Date	Revised Pages
3	3/23/78	All			
4	12/4/78	1,2,3			
5	10/2/79	2			

The last page of this instruction is Number 6.

NOV 21 1979

1404 071

AUTHORITIES AND RESPONSIBILITIES FOR SAFE OPERATION AND SHUTDOWN

Purpose: To delineate authorities and responsibilities for safe operation and shutdown of Sequoyah Nuclear Plant.

Instructions:

(1) Each operating shift is headed by a shift engineer, who shall be a licensed senior operator. He is in direct charge of plant operations and is responsible through his supervisor to the plant superintendent for adherence to all requirements of the operating license and technical specifications. He or his representative grant permission for equipment to be removed from service for maintenance. He is responsible for initiating additional surveillance required when conditions warrant.

(2) The unit operator is responsible for the safe operation of his assigned unit. He is responsible for adherence to the technical specifications. He shall have the responsibility for and authority to shut the unit down in the event he determines safety of the reactor or personnel is in jeopardy or when operating parameters exceed any of the reactor protection system setpoints and automatic trip has not occurred. He shall remain in the control room at all times during his assigned tour of duty unless properly relieved by another licensed or senior licensed operator.

(3) In the event of a reactor trip or an unexplained power reduction, it is the responsibility of the shift engineer to analyze the cause and determine that operations can continue safely before returning the reactor to power.

(4) Prerequisites to making the reactor critical shall be:

(a) Permission from the plant superintendent, assistant superintendent, or operations supervisor.

(b) The unit pre-startup checklist shall be completed as applicable.

(c) It shall be the responsibility of the shift engineer to ensure the above requirements are met. A senior reactor operator shall be present in the control room when the reactor is made critical.

*(5) The reactor operator and/or senior reactor operator directing operations
* shall believe and respond conservatively to instrumentation unless the
* indications are proven to be incorrect by channel comparisions,
* offscale indications, or non-conformance identification.

*(6) Maintaining Cognizance of Operational Status: 1404)72

(a) System configuration control of CSSC equipment - Systems shall be aligned according to applicable valve, instrumentation, and power availability checklists for the desired operational mode. The most recent checklists, i.e., desired configuration, shall remain in the System Status Files in the Unit Control Room. NOV 21 1979

(6) (Cont.)

(a) (Cont.)

Deviations from these checklists shall be permitted after ascertaining the effect of the deviation on Technical Specifications and safety to personnel and equipment. These deviations shall be recorded and also filed in the System Status Files.

(b) Essential Instrumentation - Prior to unit startup essential instru-
* mentation, as defined in GOI-1E, will be made operable and documented
* in applicable General and System Operating instructions. The Instrument
* Maintenance Supervisor or his representative shall make available to
* the Shift Engineer a listing of any essential instrumentation not in
* service.

* Removal of essential instrumentation from service shall be permitted after ascertaining the effect on Technical Specification and plant operations.

(7) Review of operating data:

(a) Routine shift personnel shall review operating data on an "as collected" basis, taking corrective actions as applicable and reporting unusual or out of limit conditions to the shift engineer.

(b) In the preparation of plant operation statistics, key operating log sheets and recorder tracings shall be reviewed daily except for weekends and holidays by the results section. Abnormal changes observed shall be called to the attention of the plant superintendent and appropriate supervisors for investigation and corrective action if required.

(8) Defined surveillance area for the unit control room.

This requirement shall be waived until initial fuel loading of each unit as applicable. Technical Specification 6.2.2 prescribes conditions during which the unit controls will be manned by a licensed operator.

Appendices A and B of this instruction delineate control room surveillance areas and provide guidance as to when each area may be entered by the licensed operator assigned to the particular unit. A person assigned as the unit operator shall remain in the normal surveillance area (area 1) unless:

(a) He is relieved by a qualified person and in accordance with Administrative Instruction AI-5, or

(b) A qualified relief is not available and operating conditions are such that entry into area 2 or 3 is necessary.

If the reactor is in mode 5 with no positive reactivity change in progress <u>or</u> mode 6 with no core alterations in progress, entry into area 2 is unrestricted.

1404 073 NOV 21 1979

* (9) Recovery of articles inadvertently dropped into the reactor vessel or primary systems: (Reference DPM N78M5)

If an article is inadvertently dropped into the reactor vessel or introduced into the primary system, an evaluation of when and how to retrieve the article shall be made immediately and the attached form Appendix C completed and approved by the plant superintendent.

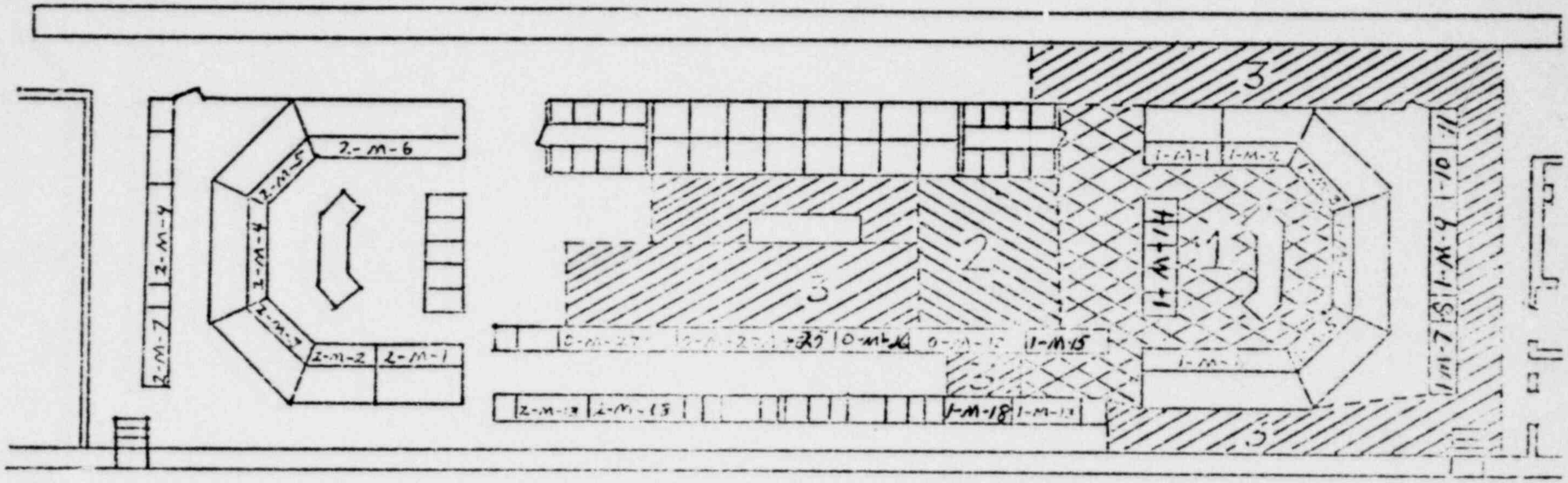
Before retrieving any article, a procedure shall be approved by the plant superintendent (verbal approval will be acceptable). As a minimum, the procedure shall delineate the required system lineup, the special tools required, the method of search and retrieval, and appropriate precautions to avoid further movement of the article deeper into the system.

If the retrieval of the article is to be delayed, a lost-piece analysis shall begin immediately.

1404)74

NOV 21 1979

UNIT 1 CONTROL ROOM OPERATING AREAS



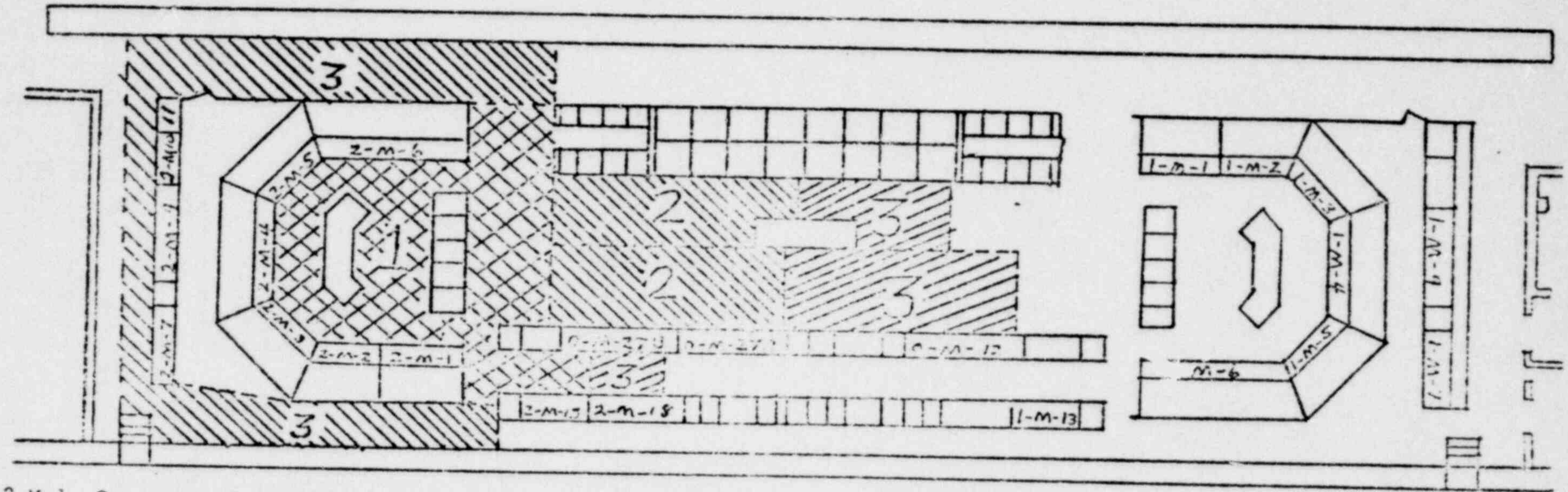
1-M-1 Generator & Auxiliary Power
1-M-2 Turbine Control
1-M-3 Feedwater, Steam, & Condensate
1-M-4 Reactor Control
1-M-5 Reactor Coolant System & Auxiliary Steam
1-M-6 Engineered Safeguards Systems & Aux Systems
1-M-7 Circuit Breakers
1-M-8 Turbine Supervisory Control
1-M-9 Ventilation, Ice Containment, & Reactor Bldg
1-M-10 Temperature Monitoring
1-M-11 Gross Fuel Failure Detector
1-M-13 Neutron Monitoring
1-M-14 Computer
1-M-15 Unit Water Services
1-M-18 Traveling Incore System
0-M-25 Meteorological & Environs Monitoring
0-M-26 Diesel Generator Control
0-M-27A Essential Raw Cooling Water
0-M-27B Component Cooling Water
0-M-12 Radiation Monitoring & Recording

Area 1 - Normal Surveillance Area.

Area 2 - Areas entered occasionally to verify receipt of alarms and/or initiate corrective actions.

Area 3 - Areas entered in the event of an emergency affecting the safety of major equipment or personnel.

UNIT 2 CONTROL ROOM OPERATING AREAS



2-M-1 Generator & Auxiliary Power
2-M-2 Turbine Control
2-M-3 Feedwater, Steam, & Condensate
2-M-4 Reactor Control
2-M-5 Reactor Coolant System & Auxiliary Steam
2-M-6 Engineered Safeguards Systems & Aux Systems
2-M-7 Circuit Breakers
2-M-8 Turbine Supervisory Control
2-M-9 Ventilation, Ice Containment, & Reactor Bldg
2-M-10 Temperature Monitoring

2-M-11 Gross Fuel Failure Detector
2-M-13 Neutron Monitoring
2-M-14 Computer
2-M-15 Unit Water Services
2-M-18 Traveling Incore System
0-M-25 Meteorological & Environs Monitoring
0-M-26 Diesel Generator Control
0-M-27A Essential Raw Cooling Water
0-M-27B Component Cooling Water
0-M-12 Radiation Monitoring & Recording

Area 1: Normal Surveillance Area

Area 2: Areas entered occasionally to verify receipt of alarms and/or initiate corrective actions.

Area 3: Areas entered in the event of an emergency affecting the safety of major equipment or personnel.

85E

1404 076

NOV 21 1979

SEQUOYAH NUCLEAR PLANT UNIT ________

1. Description of lost article.

2. Time and location the article was lost.

3. List applicable systems operating at the time the article was lost.

4. Has the article been visually located? ________ Yes / No

5. Verbal approval to proceed received from the plant superintendent?

________ Yes / No ________ Date / Time ________ SRO

6. Projected time of retrieval (if retrieval is delayed) ________

7. An additional "lost-piece analysis" (is) (is not) required.

________ Plant Superintendent / ________ Date

1404 077

NOV 21 1979

TVA 12D (PD-4-84)

JOB DESCRIPTION

No. 202.01

Positions in Wage Schedule D
Office of Power

Agreed: [signature] (IBEW)

[signature] (Director of Power Production)

Title: Shift Engineer (Nuclear)

Division: Power Production

Branch: Nuclear Generation

Approved by JCC: July 7, 1976

Effective Date: July 7, 1976

Location: Nuclear plants

Other Information:
This job description supersedes Job Description No. 202.01 dated August 4, 1971.

1. Supervision Received

Under the general supervision of the Power Plant Operations Supervisor and under the direct supervision of the Assistant Power Plant Operations Supervisor. Proceeds on his own responsibility, following reasonably well-established lines, in the performance of assigned duties and is directly responsible on the shift for the operation of the entire plant. Reports to the supervisor any condition or situation that may result in impaired or faulty operating results.

2. Duties and Responsibilities of the Position

Is directly responsible through appropriate personnel for the safe and efficient startup, operation, and shutdown of the reactors and turbogenerator units and appurtenant equipment.

Responsible through appropriate personnel for the operation of common systems and equipment.

Responsible for the entire plant safety and security when supervisors are not present. Responsible for initiating emergency actions as required by various emergency plans and instructions. Serves as on-site coordinator upon initiation of plant emergency condition until relieved by appropriate personnel. Responsible through appropriate personnel for all fuel handling or other core alterations and documentation of these operations performed by operating personnel.

Responsible through appropriate personnel for compliance with approved written instructions and for documentation of these for plant permanent records.

Responsible for approval of temporary instructions and changes to instructions utilized during his shift.

Directs all corrective action during his assigned shift during a radiological emergency, fire, civil disorder, bomb threat, oil spills, or breach of plant security, carrying this condition through to termination or until relieved.

As assigned, participates in the preparation of the various instructions and assists in the subsequent changes as the need warrants. While possessing a Senior Reactor license, may approve temporary changes to plant instructions in accordance with plant administrative procedures.

NOV 21 1979

1404 078

Responsible for the compliance with plant technical specifications. Is responsible for the approval of special work permits when required for work within the plant, checking for adequacy of protective measures. As required reviews work plans for effect on plant operation.

Directs through appropriate personnel the inspecting, operating, and clearing out for maintenance, all power and control boards. Responsible for the operation of the plant electrical power system. Responsible for the operation of the transformer yard. cooling tower area, and switchyard. Responsible through appropriate personnel for switching and clearing equipment under the jurisdiction of the power system dispatcher.

Responsible for the issuance of protective and jumper inhibit and wire removal tags through established instructions for all equipment in the plant not covered by the system dispatcher. Supervises personnel, coordinates operations, and makes or causes to be made frequent periodic inspections of the plant and other areas in his jurisdiction to determine the operating condition and safety of equipment and the cleanliness and orderly condition in these areas.

Receives load schedules through appropriate channels and maintains these schedules through instructions to operators. Determines the most efficient generation within limits of plant safety and equipment availability.

When emergency maintenance is required, contacts the appropriate personnel in accordance with established instructions.

Directs the removal or placing in service, in preparation for or completion of construction or maintenance, all plant equipment under his jurisdiction. Should operating difficulties or equipment failures develop, immediately takes steps to eliminate the difficulty or remove the equipment from service upon his own responsibility.

Prepares or directs the preparation of the daily report covering station load requirements; equipment clearances; special work permits; abnormal operating conditions; equipment in need of repairs; information regarding changes in operator work schedules; leave or request for leave by operators; and any other pertinent or essential operating information of both routine and emergency nature. Assists in scheduling, instructing, and training of operators as required. Responsible for ensuring that training schedules of operators assigned to the shift are carried out.

Responsible for determining that the necessary positions are properly manned and provides relief as required. Approves the daily timesheet for operating personnel assigned to his shift.

Approves or disapproves leave requests in accordance with plant instructions.

Directly responsible on the shift for the safety of operating personnel and of maintenance employees when they are called to the job without a foreman. Sees that safety rules and practices are followed in the work and issues detailed instructions as necessary. Works closely with the health physics group to

1404 079

protect personnel from radiation hazards for minimizing exposures. When unsafe working and operating conditions are found on the shift, corrects those conditions if possible. Reports to his supervisor the actions taken or recommends actions to be taken. Reviews radiation exposure records of personnel on the shift and directs the assignment of work such that exposure be held to a minimum.

Responsible for applying the provisions of the General Agreement in the day-to-day conduct of his duties and responsibilities.

3. Supervision Over Others

Responsible for the supervision of all operating personnel on the shift. Supervises those assigned to him for special work or training and makes emergency assignments to the shift maintenance men. Has functional supervision over the Janitors, Health Physics Technician, Public Safety Officers, and Chemical Laboratory Analysts assigned to his shift.

4. Minimum Essential Qualifications for Performance of the Work

This position requires a fundamental knowledge of the principles of nuclear fission; a knowledge of the characteristics, constructions, and operation of reactors, steam generators, turbogenerators, pumps, and heat exchangers; and an understanding of the theory and practice governing the generating and safe handling of nuclear energy, electrical energy, and steam, the safe handling of radioactive substances, and transmission of steam and liquids at high pressures and temperatures. Must have the capacity to apply this knowledge to the correct procedures to be followed in all emergency as well as routine operations.

Must possess the ability to plan, direct, and coordinate the work of personnel under his supervision and to cooperate with all responsible parties involved in the construction, maintenance, or testing of plant equipment or the control and distribution of electrical energy. Will be required to have a U.S. Nuclear Regulatory Commission Senior Operator's license.

Should have at least a high school education or its equivalent and must have (a) completed the training and operating requirements for the position in the recognized operator's training program; or (b) completed 8 years of steam plant operation, 2 years of which must have been recently spent in a nuclear plant with a reactor power level greater than 350 MWt and in a position similar to that of Shift Engineer in TVA; or (c) a combination of experience and training equivalent to the requirements stipulated under (a) and (b) above.

5. Supplemental Data Relative to Difficulty, Responsibility, or Requirements of the Position

The unit-type nuclear plant consists of a high performance nuclear reactor with associated coolant system and emergency core cooling systems, a large capacity turbogenerator, and associated auxiliary systems. Each steam-electric unit is served by appropriate high-voltage, high-capacity buses, transformers, and switches for proper connection of the units into the power system.

he complexity of the equipment increases considerably the skill and knowledge equired on the part of the Shift Engineer to be able to recognize incipient rouble in time to prevent equipment outages or serious faults. Because of he large capacities and complexity of ne equipment, very close supervision ust be given to the starting and stopping of equipment at the time of any hange in load condition.

ust be capable of absorbing extensive additional training in the fundamentals f nuclear power and must develop a thorough knowledge of equipment controls, d procedures before assuming the responsibilities of the position. Training ncludes fundamental and practical aspects of nuclear theory, health physics, adiation monitoring, and reactor control and instrumentation. Once acquiring e necessary license for performance of the job, must be capable of intaining that license through the on-going retraining and examinational ocess.

1404 081

TVA 12D (P[illegible]-64)

JOB DESCRIPTION

No. 202.31

Positions in Wage Schedule D
Office of Power

Agreed: (signature) (IBEW)

(signature) (Director of Power Production)

Title Assistant Shift Engineer (Nuclear)
Division Power Production
Branch Nuclear Generation

Approved by JCC July 7, 1976
Effective Date July 7, 1976
Location Nuclear plants

Other Information:

This job description supersedes Job Description No. 202.31 dated August 4, 1971.

1. Supervision Received

The Assistant Shift Engineer is under the immediate supervision of the Shift Engineer and under the general supervision of the Assistant Power Plant Operations Supervisor. Follows established operating instructions in doing the work of this position. When established instructions do not cover a particular operating problem, seeks directions from the Shift Engineer unless the situation is critical, in which case the incumbent uses his own judgment.

2. Duties and Responsibilities of the Position

Responsible during the assigned shift and in the assigned area for the starting, stopping, paralleling, separating, loading, unloading, and safe and efficient operation of steam turbogenerator units, high-performance nuclear reactors, and appurtenant equipment operated principally from a central control room and to a lesser extent operated from local control stations adjacent to the equipment.

Responsible directly and through appropriate personnel for following plant written instructions. As required, approves instructions coordinating their use with the responsible persons in other sections and organizations. Provides training opportunities through the use of instructions consistent with prudent plant operation. Must be knowledgeable of the plant technical specification concerning the required plant capabilities when removing equipment from service, making sure that performance surveillances meet minimum requirements before equipment is removed from the affected system.

Is responsible through subordinates for documenting unit status prior to startup and component system status during operation.

As assigned, is responsible for the safe handling of fuel during fuel receipt, fuel loading, refueling, core fuel relocation, core component handling, or fuel handling for other purposes. Is responsible for documentation covering all fuel movements.

Reviews all trouble reports that originate during his shift concerning his unit, and assures that adequate information is included. Assures that equipment is restored to service promptly following postmaintenance testing. Reviews maintenance activities on the shift for proper coordination with plant operation.

As assigned, participates in the preparation of the various instructions and assists in the subsequent changes as the need warrants. While possessing a Senior Reactor license, may approve temporary changes to plant instructions in accordance with plant administrative procedures.

Is responsible for assisting in the maintaining of plant security regulations and taking those actions necessary to assure that they are not violated. He instructs personnel on shift in the security requirements and restrictions before allowing them to assume their duties.

Responsible for the safe and correct operation of all electrical boards to maintain a constant source of power to the equipment and controls.

Responsible for operation of equipment in the transformer yard, cooling tower area, and switchyard. Responsible for periodic inspections of the transformer yard and switchyard and all electrical boards to check for ground indications, relay targets, etc. The correct sequential operation of this equipment is of primary importance to reactor safety and system load. As assigned, is responsible for the operation of the radioactive waste facilities.

Responsible for the operation of the standby diesel generators and their associated equipment. Responsible for the necessary surveillances to assure their availability and assuring that premaintenance and postmaintenance surveillance are satisfactory.

A portion of his time will be spent in a unit control room, checking temperatures, pressures, and the operation of all unit equipment, and directing or performing routine operations. Is responsible for determining that established operating instructions with reference to proper time and heating limitations are observed when bringing unit equipment into service.

Cooperates with the plant engineering staff in making tests and adjustments of steam turbogenerator equipment and reactor equipment. Responsible for the cleaning of equipment in the plant.

May relieve any of the employees under his supervision when necessary for equipment inspection tours or other reasons pertaining to job requirements. Either directly, or through the Unit Operator or Assistant Unit Operators, is responsible for seeing that all of this equipment is operated safely and efficiently. As required, may inspect, adjust, or operate all valves, dampers, or other control mechanisms on the equipment to ensure safe, economical, and reliable production of power. Keeps the supervisor informed of the condition of equipment at all times and secures advice when necessary. Follows the load schedule given by the Shift Engineer insofar as the equipment allows.

Either personally or through appropriate employees, directs the operation of plant equipment outside the powerhouse.

Sees that training schedules are followed. Assists in the training of operators, students, and trainees. Breaks in new personnel; instructs them in plant safety rules. As occasion and opportunity arise, teaches operators of lower grades the technical aspects of plant operation.

On specific directions from the Shift Engineer, clears up and tags equipment. Removes the tags and makes the equipment ready for service when directed by the Shift Engineer. Places and removes jumper inhibit and wire removal tags as directed by Shift Engineer. May have a Unit Operator perform this work, but is held accountable for what is done. In accordance with established plant procedure, receives, checks for accuracy, and personally performs switching and tagging requested by the Power System Load Dispatcher.

Must see that the unit control boards are manned by a properly licensed Unit Operator or a qualified operator of higher grade at all times. Directs and assists in preparing a daily log sheet, recording gauge and instrument readings necessary for the daily, monthly, and permanent operating records, as well as recording equipment conditions and changes, and may also perform special work as assigned by the Shift Engineer.

Responsible for ensuring that the employees under his supervision perform their work safely and with minimum radiation exposure. Ensures that special equipment needed for operator work assignments is available and in good condition. Inspects the equipment and the assigned area for unsafe conditions and reports any conditions found to the Shift Engineer.

3. Supervision Over Others

Supervises the work of one or more Unit Operators, Assistant Unit Operators. Student Operators, or other employees as assigned.

4. Minimum Essential Qualifications for Performance of the Work

This position requires a fundamental knowledge of the principles of nuclear fission; a knowledge of the characteristics, construction, and operation of reactors, steam generators, turbogenerators, pumps, and heat exchangers; and an understanding of the theory and practice governing the generating and safe handling of nuclear and electrical energy and steam, safe handling of radioactive substances, and transmission of steam and liquids at high pressures and temperatures. Must have a thorough understanding of the functions and operations of all the plant control systems and have a thorough understanding of nuclear plant health physics, safety rules, and practices concerning men and equipment. Will be required to have a U.S. Nuclear Regulatory Commission Senior Operator's license.

Should have a high school education or its equivalent and must have (a) completed the training and operating requirements for the position in the recognized operator's training program; or (b) completed 6 years of steam plant operation, 2 years of which must have been recently spent in a nuclear plant, with a reactor power level greater than 350 MWt and in a position similar to that of Assistant Shift Engineer in TVA; or (c) a combination of experience and training equivalent to the requirements stipulated under (a) and (b) above.

5. Supplementary Data Relative to Difficulty, Responsibility, or Requirements of the Position

Should have the ability to act quickly with good judgment in emergencies and the ability to obtain the fullest cooperation of the employees under his direction. Should be able to plan the work, using the best methods possible;

give clear, concise instruction, and maintain good job relations. The way the equipment is operated directly affects plant safety, efficiency, and maintenance expense.

The Assistant Shift Engineer must be capable of absorbing extensive additional training in the fundamentals of nuclear power and must develop a thorough knowledge of equipment, controls, and procedures before assuming the responsibilities of the position. Training includes fundamental and practical aspects of nuclear theory, health physics, radiation monitoring, and reactor control and instrumentation. Upon acquiring the necessary license for job performance, must be capable of maintaining this license through the on-going retraining and examinational process.

The complexity of the equipment increases considerably the skill and knowledge required on the part of the Assistant Shift Engineer to be able to recognize incipient trouble in time to prevent equipment outages or serious faults. Because of the large capacities and complexity of the equipment, very close supervision must be given to the starting and stopping of equipment at the time of any change in load condition.

1404)85

NOV 21 1979

TVA 12D (PD-4-64)

JOB DESCRIPTION

No. 220.11

Positions in Wage Schedule D
Office of Power

Agreed: [signature] (IBEW)

[signature] (Director of Power Production)

Title Unit Operator (Nuclear)

Approved by JCC July 7, 1976

Division Power Production

Effective Date July 7, 1976

Branch Nuclear Generation

Location Nuclear plants

Other Information:

This job description supersedes Job Description No. 220.11 dated August 4, 1971.

1. Supervision Received

Under the immediate supervision of the Assistant Shift Engineer and the general supervision of the Shift Engineer. Follows established operating instructions in operating his assigned equipment or operates it as directed by the supervisor. In emergencies, when there is not time to get advice from the supervisors, may deviate from established instructions and operate on his own initiative to correct the existing condition or to save life or property.

2. Duties and Responsibilities of the Position

Starts, stops, parallels, separates, loads, and unloads one steam turbogenerator unit; directs or performs the operations for starting, stopping, loading, and unloading one nuclear reactor and appurtenant equipment. The reactor and turbogenerators are operated as a unit. Is responsible for the safe and efficient operation of one unit and appurtenant equipment. Responsible for operating the unit in a safe and economical way in order to maintain load schedules satisfactorily.

Spends a major portion of his time in the control room, and cannot leave it unless there is another Licensed Operator available to take his place at the control board. May be assigned equipment inspection, operation, or other duties outside the control room by the supervisor. Is responsible for taking and recording at designated intervals, the necessary electrical readings. May be assigned the responsibility of operating the communication equipment.

Responsible directly or through appropriate personnel for the proper alignment of all systems as required on the master check-off list prior to unit startup and documenting all changes in its component systems.

Observes the established written instructions when performing all operations during his shift. Directs subordinates in the performance of written instructions using them as training opportunities when compatible with plant conditions. Is responsible for compliance with the documentation requirements for these written instructions, submitting the completed forms to his immediate supervisor.

1404 086

NOV 21 1979

Maintains a continuous familiarity with plant operating instructions, noting any change or modification that is made in them as a result of design, plant status, or other requirements.

He is responsible directly or through subordinates for liquid or gaseous releases to be held within the licensed limits placed upon the unit. He must be aware of the unit conditions at all times, operating within prescribed limits for each load entity. He must possess the knowledge and ability to interpret core conditions, making changes as needed to maintain safe and efficient operation.

Must be aware of plant technical specifications concerning the various unit parameters. Any reportable occurrences that are experienced must be reported to the Assistant Shift Engineer or in his absence to the Shift Engineer. The indicated corrective requirements must be followed as outlined.

Directs subordinates in operations necessary for maintaining proper unit conditions.

Keeps daily logs that are required for documentation of unit conditions, recording all necessary readings for the daily, monthly, and permanent operating records. Records all equipment changes and any abnormal or unusual conditions that may exist on any of the equipment he is operating.

Is responsible for maintaining plant security regulations and taking the measures required to ensure security in his assigned area.

As directed, makes inspections and checks of the unit main and auxiliary equipment and reports to his supervisor any abnormal or unusual operating condition. Responsible for and assists in keeping the equipment and assigned area in a clean and orderly condition.

As directed, assists in fuel and core component handling and in the handling and disposal of spent fuel and radioactive waste.

Required to have a thorough knowledge of clearing mechanical and electrical equipment for maintenance but does not clear and tag any equipment except under the direct orders of the Assistant Shift Engineer.

Required to have a thorough knowledge of the operation of all electrical boards under both normal operating and accident conditions. As required, operates the diesel generators.

As assigned, assists in the training of persons in the technical aspects of plant operation and safety rules.

May be assigned other duties consistent with the operating and surveillance requirements of the shutdown unit during shutdown periods.

1404 087

NOV 21 1979

3. Supervision Over Others

Directs the work of one or more Assistant Unit Operators, student operators, or others as assigned.

4. Minimum Essential Qualifications for Performance of the Work

This position requires a fundamental knowledge of the principles of nuclear fission; a knowledge of the characteristics, construction, and operations of reactors, core coolant equipment, nuclear instrumentation, steam generators, turbogenerators, pumps, and heat-exchange equipment; and an understanding of the theory and practice governing the generation and safe handling of nuclear and electrical energy and steam, the safe handling of radioactive substances, and the transmission of steam and liquids at high pressures and temperatures. Must know the function of the controls and of all the equipment of his unit. Will be required to have a U.S. Nuclear Regulatory Commission Reactor Operator's license.

Should have a high school education or its equivalent and must have (a) completed the training and operating requirements for the position in the recognized operator's training program; or (b) completed four years of steam plant operation, one year of which must have been recently spent in a nuclear plant with a reactor power level greater than 350 MWt and in a position similar to that of Unit Operator in TVA; or (c) a combination of experience and training equivalent to the requirements stipulated under (a) and (b) above.

5. Supplementary Data Relative to Difficulty, Responsibility, or Requirements of the Position

Must have the ability to act quickly with good judgment in emergencies and the ability to obtain the fullest cooperation of other employees and supervisors.

Should have a thorough understanding of nuclear plant health physics and safety rules and practices in connection with both personnel and equipment.

Must be capable of absorbing extensive training in the fundamentals of nuclear power and must develop a thorough knowledge of equipment, controls, and procedures before assuming the responsibilities of the position. Training includes fundamental and practical aspects of nuclear theory, health physics, radiation monitoring, and reactor control and instrumentation. Once acquiring the necessary license for performance on the job, must be capable of maintaining that license through the on-going retraining and examinational process.

The complexity of the equipment increases considerably the skill and knowledge required on the part of the Unit Operator to be able to recognize incipient trouble in time to prevent equipment outages or serious faults. Because of the large capacities and complexity of the equipment, very close attention must be given starting and stopping equipment at the time of any change in load condition.

TVA 11D (PD-4-44)

JOB DESCRIPTION

Positions in Wage Schedule D
Office of Power

No. 220.31

Agreed: (IBEW ~~or Hod Carriers~~) (TVA Division Director) (TVA Division Director)

Title: Assistant Unit Operator

Approved by JCC: 56th Joint Classification Committee Meeting August 4, 1971

Division: Power Production

Effective Date: August 4, 1971

Branch: Steam-Electric Generation

Location: Browns Ferry & Sequoyah Nuclear Plants

Other Information:

Supervision Received

Under the immediate supervision of the Unit Operator and under the general supervision of the Assistant Shift Engineer. Follows established operating procedures and does not deviate from those procedures during normal operating conditions except as directed. Performs assigned routine inspections and manipulative operations without close supervision. Performs as directed the more difficult manipulative operations under the observation of, or during direct communication with, the Unit Operator or the Assistant Shift Engineer.

Duties and Responsibilities of the Position

At a nuclear plant, performs assigned duties, makes routine inspections, and assists in the operation of plant equipment as directed or according to well-established procedures.

Will assist in the operation of and perform work requirements within well-defined operating areas:
Reactor building, auxiliary building, turbine room, condenser room, screen and pumphouse and diesel building in connection with the following equipment:

Reactors, steam generators, steam turbogenerators, and all appurtenant equipment such as unit control boards, dampers, feedwater pumps, raw-water system, demineralizers, extraction stage heaters, heater drain pumps, air compressors and air system, feedwater treating system, gland water and distilled-water pumps, hot-well pumps, gland seal leakoffs, turbine lubricating system, auxiliary oil pumps, hydrogen cooling system, CO_2 systems, condenser air removal equipment, steam and conductivity instruments, station sumps and sump pumps, circulating-water pumps, intake screens, chemical feeders, coagulation and sedimentation tanks, filters, chlorinators, ion exchangers, auxiliary boiler, diesel-electric station-service equipment, radioactive-waste disposal system, fuel-handling facilities, station-service readings, etc.

1404 089 NOV 21 1979

Much of this equipment is controlled from the central mechanical control room; however, some of it is operated from control stations adjacent to the equipment.

As assigned, is responsible to the Shift Engineer or Assistant Shift Engineer for the operation of all equipment located at the pumping station. All equipment in the pumphouse will be operated either from the central control room or from local manual and automatic control stations located at the pumphouse.

All equipment must be periodically checked and inspected, and it is the duty of the incumbent to make routine inspection tours of the equipment in his assigned area.

A portion of his time will be spent wiping, cleaning, and assisting in maintaining the assigned area in a clean and orderly condition.

Must break in new employees, instruct them, and see that they learn the plant safety rules. As occasion and opportunity arise, must teach operators of lower grades the technical aspects of plant operation.

As directed, assists in the removal and installation of fuel and control rods in the reactor and in the handling and disposal of spent fuel and radioactive waste.

Assists in keeping a daily log, recording all instrument readings necessary for the daily, monthly, and permanent operating records. Maintains a log of all water plant equipment.

Supervision Over Others

May direct the work of one or more student operators and other employees as assigned.

Minimum Essential Qualifications for the Performance of the Work

Must have a general knowledge of the nuclear, mechanical, and electrical characteristics of the equipment and controls involved and of the safe handling of radioactive substances. Must be able to apply this knowledge in emergencies as well as in routine operations. The candidate should have a high school education and must have (a) completed the operator training program requirements stipulated for this position or (b) 3 years of nuclear plant operating experience, 6 months of which was in a position similar to that of Assistant Unit Operator in TVA.

Supplementary Data Relative to Difficulty, Responsibility, or Requirements

This position requires a general knowledge of the construction and characteristics of steam turbogenerators and nuclear reactors, including principles of nuclear fission, and their related auxiliary equipment and the ability to apply this knowledge to the correct procedure to be followed in all emergencies as well as in routine operation. This position requires a thorough knowledge of raw-water pumps, circulating-water pumps, chemical feeders, settling basins, filter beds, water-softening facilities, hypochlorinators, vacuum-priming system, water sampling and analysis to maintain prescribed limits. Should have an understanding of nuclear plant health physics and safety rules and practices.

SHIFT TECHNICAL ADVISOR (2.2.1.b)

SEQUOYAH NUCLEAR PLANT UNIT 1 RESPONSE

SUMMARY

The shift technical advisor requirements are to be implemented by January 1, 1980, or by initial criticality. The shift technical advisor training will not be complete until January 1981; however, minimum training requirements will be completed.

RESPONSE

TVA will provide an on-shift technical advisor to the shift supervisor to support the diagnosis of off-normal events and to advise the shift supervisor of actions to terminate or mitigate the consequences of such events.

The Shift Technical Advisor will have the following qualifications: (1) additional training in basic engineering principles, (2) extensive training in plant transient and accident response, (3) technical specification training with emphasis on the basis for limiting conditions for operation, and (4) significant reactor training on systems and operating procedures.

The duties of the Shift Technical Advisor will include: (1) control room support in the diagnosis of off-normal events, (2) advice to the shift supervisor to terminate or mitigate the consequences of off-normal events, (3) make engineering evaluations of plant conditions required for maintenance and testing, and (4) cognizant of current information disseminated by TVA's operating experience review group.

On each shift, there will be one shift technical advisor, However, this person will be assigned other duties when his duties as shift technical advisor are not required, provided that his availability is not compromised. TVA is optimistic that a substantial portion of the Shift Technical Advisor training may be completed by January 1, 1981.

As an interim policy by January 1, 1980, degreed shift nuclear engineers will be placed on shift to act as shift technical advisors. These interim STA's will receive additional training in the following areas:

- (a) Nuclear Plant Systems
- (b) Transient and Accident Recognition on Plant Simulator
- (c) Limiting Conditions for Operations and Bases
- (d) TVA Emergency Plan
- (e) Shift Assignments and Responsibilities

1404)91

NOV 21 1979

As an interim policy by January 1, 1980, (1) an additional SRO will be placed on each shift to act as Shift Technical Advisor as circumstances require, and a duty engineer shall also be designated on call for advice in support of the shift technical advisor, or (2) a plant experienced degreed engineer will be placed on shift to act as shift technical advisor.

TVA believes that a multi-disciplined review group is necessary to adequately investigate LER's. TVA's Nuclear Experience Review Panel presently reviews all licensee event reports. When applicable, results of the review will be incorporated in TVA's operator training and requalification programs. In addition, periodic training sessions are conducted for each shift crew. The material covered during these sessions include, but is not limited to, licensee event reports, operator errors, recent equipment problems, changes to technical specifications, and general plant status. The Shift Technical Advisors shall have additional responsibilities in being cognizant of the results of the LER review as applied to Browns Ferry.

1404 092

NOV 21 1979

CLARIFICATION

1. In addition to the accident assessment function, the shift technical advisor will be cognizant of information determined by the TVA Operating Experience Review Group.

2. The shift technical advisor will be independent of duties that detract from his primary functions or dilute his dedication to these primary functions. The shift technical advisor will be an addition to the previously defined operating staff.

3. Although the shift technical advisor will not be completely trained for his duties by January 1, 1980, the STA will be a full-time shift employee who will be available within 10 minutes of being summoned during any shift.

4. The shift technical advisor will be on duty by January 1, 1980, and training requirements will be met by January 1, 1981. The shift accident and operating experience assessment. Information on the qualifications of the key plant personnel is given on pages 90a through 90i.

1404 093

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Nuclear Engineer

Appointee: Bill Lagergren

Formal education:	1968	42 weeks:	Electronics Technician Schools, Basic and Advanced
	1970	26 weeks:	Navy Nuclear Power School, MI California
	1971	24 weeks:	Nuclear Power Training Unit, 55G Prototype, Reactor Operator, Idaho
	1973-76	B.S. Nuclear Engineering, Texas A & M University	
Training:	1972	16 weeks:	Reactor Theory and Safety Analysis Training, U.S.N..
	1977	2 weeks:	Westinghouse OCAP Course (Incore 3, Tote 2, Follow, Eight Codes)
	1977	Participated in At Power Physics Testing Joseph M. Farley Nuclear Power Plant, APCO	
	1978	Participated in Initial Criticality and Low Power Physics testing North Anna Nuclear Power Station, VEPCO	
Experience:	1969-70	1-1/2 years:	Electronics Technician USS Tawasa ATF-92
	1971	2 months:	Reactor Operator/Instructor, 55G Prototype, Idaho
	1971-72-73	2-1/2 years:	Reactor Operator, USS Woodrow Wilson, SSBN624G
	1974-75	2 years:	Nuclear Counting Lab Technician and Electronics Technician, Texas A & M University
	1976-79	3 years:	Nuclear Engineer Sequoyah Nuclear Plant, Construction Phase, TVA

Cumulative work experience 8 years 2 months

1404 094

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Nuclear Engineer

Appointee: R. W. Fortenberry

Formal education:	1967	AA Pre-Engineering, Hinds Junior College, Raymond, Mississippi
	1970	B.S. Nuclear Engineering, Mississippi State University
Training:	1965-1970	4½ years: B.S. in Nuclear Engineering
	November 1970-December 1970	8 weeks: Reactor Operations and Analysis at ORNL
	April 1971	4 weeks: BWR Technology Course
	September 1972-December 1972	12 weeks: PWR Engineering and Operations Analysis Course
	September 1976	1 week: Test Engineer during refueling startup at Indian Point #2 Nuclear Station
	August 1977-September 1977	2 months: Test Engineer during initial startup at Farley Nuclear Plant

Cumulative work experience: 9 years

1404 095

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Nuclear Engineer

Appointee: R. E. Alsup

Formal education:	1971	AS. Pre-Engr., Grayson County College, Denison, Texas
	1974	B.S. Nuclear Engineering, Texas A & M University
Training:	May 1973- July 1973	Coop student including 3 months at 1 MW research reactor - Nuclear Science Center - Texas A & M
	May 1974	4 years - BS Nuclear Engineering
	February 1975- April 1975	12 weeks: PWR Engineering and Operations Analysis Course
Experience:	1974- 1979	5 years: Nuclear Engineer, Results Section, Sequoyah Nuclear Plant
	June 1976	3 months: Member of Westinghouse Startup Team for Indian Point Unit #3

Cumulative work experience: 5 years

1404 096

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Mechanical Engineer

Appointee: Gary L. Terpstra

Formal education:	1975	B.S. Marine Engineering, U. S. Merchant Marine Academy	
	1977	M.S. Nuclear Engineering, Purdue University	
Training:	March 1977 - May 1977	8 weeks:	Nuclear Engineering Training Program for Qualification as Shift Engineer at Browns Ferry Nuclear Plant
	August 1977	1 week:	Simulator course in BWR operating principles.
Experience:	1973 - 1974	1 year - sailing as Engine Cadet aboard various U.S. Merchant Ships	
	March 1977 - August 1978	1½ years - Nuclear Engineer at Browns Ferry Nuclear Plant	
	August 1978 - Present	Sequoyah Nuclear Plant	

Cumulative work experience: 2½ years

1404)97

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Nuclear Engineer

Appointee: Don C. Arwood

Formal education:	B.S. and M.S. degrees in nuclear engineering from University of Tennessee at Knoxville.
Training:	6 month training assignment with the functional analysis group at the Westinghouse Nuclear Center in Monroeville.
	Training assignment at the North Anna unit 1 plant for the initial criticality and low power physics testing (approximately 2 weeks).
	Training assignment at the Farley Nuclear Station for the "at power" physics testing (approximately 1 week).
	Attended the BWR short course at the TVA Browns Ferry simulator.
	Qualified shift nuclear engineer at Browns Ferry Nuclear Plant.
Experience:	January 1975 - January 1977--Assigned to the Browns Ferry Nuclear Plant as a shift nuclear engineer.
	January 1977 - November 1978--Plant nuclear engineer at Sequoyah Nuclear Plant.
	November 1978 - present--Transient analysis engineer in the TVA Division of Nuclear Power Central Office in Chattanooga, Tennessee.

1404 098

NOV 21 1979

QUALIFICATIONS OF KEY PLANT PERSONNEL

Nuclear Engineer

Appointee: O. J. Zeringue

Formal education:	1971-1974	B.S. Nuclear Engineering, North Carolina State.
	1971-1975	Mech. Engineering Grad School, North Carolina State.
Training:		Completed 1 week long simulator course in Browns Ferry simulator.
		Completed 6 month qualification programs for startup test engineer and shift nuclear engineer at Browns Ferry.
		Completed 1 year training assignment with Westinghouse Nuclear Operations Group (startup testing and data evaluation).
		Completed 2 month training session in reactor systems and startup testing for Sequoyah Nuclear Plant.
Experience:	1971-1975	Co-op student in the Nuclear Plant Design Review Section - Carolina Power and Light.
	1975-1977	Assigned as nuclear engineer at Browns Ferry Nuclear Plant. Prepared and performed preoperational and startup tests, evaluated test results, and acted as shift nuclear engineer during startup, shutdown and power operation.
	1977-1978	Training assignment with Westinghouse Nuclear Operations Group. Acted as test engineer during fuel load and startup testing at D. C. Cook II and North Anna unit 1. Participated in load follow test and data evaluation in Trojan and Beaver Valley.
	1978-Present	Assigned as Nuclear engineer in Division of Nuclear Power. Provided onsite or central office support to TVA nuclear plants during startup testing, reload testing and power operation.

NOV 21 1979

1404 099

SUMMARY OF QUALIFICATIONS FOR KEY AUGMENTING PERSONNEL - STARTUP TEST PROGRAM

Position	General Qualifications: Academic	General Qualifications: Experience	Nuclear Qualifications: Academic	Nuclear Qualifications: Experience
Nuclear Engineer Frank L. Robinson, III	SAME AS NUCLEAR		1973 - B.S. Nuclear Engineering University of Virginia 1977 - M.S. Nuclear Engineering, University of Virginia	2 months at operating PWR (Surry P.S.) 2 years Pre-Startup at PWR (North Anna P.S.) 1-3/4 years shielding researcl 2½ years Pre Startup at PWR (Sequoyah N.P.)

SUMMARY OF QUALIFICATIONS FOR KEY AUGMENTING PERSONNEL - STARTUP TEST PROGRAM

	General Qualifications		Nuclear Qualifications	
Position	Academic	Experience	Academic	Experience
Nuclear Engineer G. W. Gault	1978 - B.S. Nuclear Engineering, University of Cincinnati Engineer-in-Training	Same as Nuclear	4 years - B.S. in Nuclear Engineering	15 months Coop at Sequoyah Nuclear Plant Results Section 18 ~~8~~ months Nuclear Engineer, Sequoyah Nuclear Plant Trained & qualified as startup engineer.

-406-

1404 101

NOV 21 1979

SUMMARY OF QUALIFICATIONS FOR KEY AUGMENTING PERSONNEL - STARTUP TEST PROGRAM

	General Qualifications		Nuclear Qualifications	
Position	Academic	Experience	Academic	Experience
Nuclear Engineer C. A. Sharp	1978 - B.S. Nuclear Engineering, Texas A&M University	Same as Nuclear	4 years - B.S. in Nuclear Engineering	5 months Nuclear Engineer, Sequoyah Nuclear Plant